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Rethinking technology transfer in the agriculture sector : the case of the Philippines

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RETHINKING TECHNOLOGY TRANSFER IN THE AGRICULTURE SECTOR: THE CASE OF THE PHILIPPINES

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In loving memory of my mother, Cheming.

For my father, Fony.

ABSTRACT

The concept and practice of technology transfer in the agriculture sector in the Philippines need rethinking. The common notion of technology transfer in the agriculture sector is based on the traditional view of innovation in which technologies and techniques are assumed to flow essentially unchanged from one location to another in a linear fashion. The technology transfer approaches of interveners in the agriculture sector have been generally top-down. While these approaches have achieved some degree of success, they have not been sufficiently far-reaching to spur the growth of the rural economy. This thesis questions the linear and top-down orientation of technology transfer both as explanation and as prescription in the context of the agricultural research and extension system in the Philippines.

The central assumption of the thesis is that technology transfer in agriculture can be best understood as a social and political process. In this context, four levels of analysis are undertaken. First, theories and models associated with technology transfer are reviewed to determine the extent to which they explain or influence the technology transfer approaches in the agriculture sector. Second, the political economy of the agriculture sector and technology transfer is examined to understand the actions of the Philippine state toward agricultural development and the context in which other actors operate. Third, the immediate setting of the technology transfer process, which is the agricultural research and extension system, is analysed in terms of the roles, policies, strategies and interrelationships of the different actors. Fourth, detailed case studies of three agricultural co-operatives in the Philippines are used to examine the dynamics and complexities of the technology transfer process at the field level.

The traditional innovation and diffusion models are a reasonable depiction of most of the technology transfer practices in the developing countries including the Philippines. The actions of participants are limited in part by the largely bureaucratic structure of agricultural research and extension, and also shaped by the domestic and global political economy. They have been implemented within the context of the economic development policies of Philippine governments which in recent years have been export-oriented and foreign investment-led. The case studies demonstrate the various approaches to technology transfer. In particular, one case illustrates the successful balance between top-down and bottom-up approaches to rural intervention. Another case shows the complexities of a development project funded by a foreign donor. The case studies indicate that farmer participation and institution building are important ingredients of a successful technology transfer project along with research and development, technology and support services.

The thesis concludes that technology transfer mechanisms and policies must consider the intricacies of the larger environment within which the agricultural research and extension system operates. It suggests the importance of understanding the contradictions, opportunities, socio-political processes and constraints within the political economy environment of the agriculture sector. This knowledge is useful for developing technology transfer strategies that will overcome such contradictions and constraints. The thesis also argues for the application of technology transfer approaches that provide clear mechanisms for participation by farmers. Technology transfer programs have the best potential to achieve broad-based development when they focus on strengthening rural organisations—the foundation upon which appropriate rural-based socioeconomic activities could emerge and be sustained.

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CONTENTS

LIST OF ACRONYMS

AADC	-	Ayala Agricultural Development Corporation
AAMRO	-	Accounting and Auditing Manual for Research Operations
AAPP	-	Accelerated Agricultural Productivity Project
ACIAR	-	Australian Centre for International Agricultural Research
ADB	-	Asian Development Bank
AF	-	Association of Foundations
AFTA	-	ASEAN Free Trade Area
AGRINET	-	Agricultural and Natural Resources Information Network
AICDA	-	Agro-industrial Community Development Assistant
AKIS	-	Agricultural knowledge and information system
AMFCI	-	Alibangbangan Multipurpose Farmers Co-operative, Inc.
APEC	-	Asia Pacific Economic Cooperation
ARIs	-	Advanced Research Institutes
ARMIS	-	Agriculture and Resources Management Information System
ARRTIS	-	Agriculture and Resources Regional Technology Information System
ASA	-	Association of Siamese Architects
ASEAN	-	Association of Southeast Asian Nations
ASES	-	Agrotechnology Suitability Evaluation System
ASSP	-	Agricultural Support Services Project
ATI	-	Agricultural Training Institute
ATMS	-	Agricultural Technology Management System
BAR	-	Bureau of Agricultural Research
BARBD	-	Bureau of Agrarian Reform Beneficiaries Development
BDN	-	Basic domestic needs
BIDANI	-	Barangay Integrated Development Approach for Nutrition Improvement
BOD	-	Board of directors
BPTTT	-	Bureau of Patents, Trademarks and Technology Transfer
BRIS	-	Backward Resource Inventory System
CAIDS	-	Countryside Agro-Industrial Development Strategy
CAPE	-	Consultancy for Agricultural Productivity Enhancement
CARP	-	Comprehensive Agrarian Reform Program
CATS	-	Community audio-tower system
CBU	-	Capital build-up
CDA	-	Co-operative Development Authority
CDF	-	Countryside development fund
CEAT	-	Consulting Engineers Association of Thailand
CGIAR	-	Consultative Group on International Agricultural Research

CHED	-	Commission on Higher Education
CIAT	-	International Centre for Tropical Agriculture
CIMMYT	-	Centro Internacional de Mejoramiento de Maiz y Trigo
CIP	-	International Potato Centre
CLSU	-	Central Luzon State University
CMU	-	Central Mindanao University
CPP	-	Communist Party of the Philippines
CRTD	-	Center for Rural Technology Development
DA	-	Department of Agriculture
DAR	-	Department of Agrarian Reform
DATBED	-	DOST-Academe technology-based enterprise development
DATEC	-	Dingle Agricultural and Technical College
DECS	-	Department of Education, Culture and Sports
DENR	-	Department of Environment and Natural Resources
DFC	-	Davao Fruits Corporation
DOST	-	Department of Science and Technology
DOST-PSTC	-	Department of Science and Technology-Provincial S&T Center
DSC	-	Development Support Communication
DSSAT	-	Decision Support System for Agrotechnology Transfer
DTI	-	Department of Trade and Industry
EAGA	-	Brunei-Indonesia-Malaysia-Philippines-East Asian Growth Area
EIA	-	Environmental impact assessment
ENRAP	-	Environmental and Natural Resource Accounting Project
EOI	-	Export-oriented industrialisation
EPA	-	Economic Planning Agency
ERDB	-	Ecosystems Research and Development Bureau
EVAT	-	Expanded Value Added Tax
FACOMAs	-	Farmers' Co-operative Marketing Associations
FAO	-	Food and Agriculture Organization
FDI	-	Foreign direct investment
FIDA	-	Fiber Industry Development Authority
FITS	-	Farmers' Information and Technology Service
FRLD	-	Foundation for Resource Linkage and Development, Inc.
FSB	-	Farmer-Scientist Bureau
FSR	-	Farming systems research
FSR&D	-	Farming systems research and development
FSSRI	-	Farming Systems and Soils Research Institute
GATT-UR	-	General Agreement on Tariffs and Trade-Uruguay Round
GDP	-	Gross domestic product
GNP	-	Gross national product
GOJ	-	Government of Japan
GVA	-	Gross value added

HUKBALAHAP	-	Anti-Japanese People's Army
HYVs	-	High yielding varieties
IARCs	-	International Agricultural Research Centres
ICA	-	International Co-operative Alliance
ICARDA	-	International Centre for Agricultural Research in Dry Areas
ICLARM	-	International Center for Living Aquatic Resources Management
ICRAF	-	International Centre for Research in Agroforestry
ICRISAT	-	International Crops Research Institute for Tropical Agriculture
IDRC	-	International Development Research Centre
IITA	-	International Institute for Tropical Agriculture
IJRDP	-	Integrated Jalajala rural development project
ILCA	-	International Livestock Centre for Africa
IMF	-	International Monetary Fund
INJAFEDCO	-	Integrated Jalajala Federation of Co-operatives
IPM	-	Integrated pest management
IPR	-	Intellectual property rights
IRDP	-	Integrated Research and Development Program
IRRI	-	International Rice Research Institute
ISFP	-	Integrated Social Forestry Program
ISI	-	Import-substitution industrialisation
JICA	-	Japan International Cooperation Agency
KPA	-	Key Production Area
KS	-	Knowledge system
LandBank	-	Land Bank of the Philippines
LDBs	-	Land Development Banks
LGC	-	Local Government Code
LGUs	-	Local government units
LPMO	-	Localised project management office
LUSSA	-	Luzon Secretariat for South Action
Lutucan MPC	-	Lutucan Multipurpose Co-operative
MAF	-	Ministry of Agriculture and Food
MAI	-	Multilateral Agreement on Investment
MARO	-	Municipal Agrarian Reform Office
MFN	-	Most favoured nations
MIN	-	Mango Information Network
MITI	-	Ministry of International Trade and Industry
MNCs	-	Multinational corporations
MOA	-	Memorandum of agreement
MPEX	-	Manufacturing productivity extension for export promotion
MTPDP	-	Medium Term Philippine Development Plan
NAFTA	-	North American Free Trade Agreements
NaRDSAF	-	National R&D System in Agriculture and Fisheries

NAREA	-	National Agriculture Research and Extension Agenda
NARRDN	-	National Agriculture and Resources Research and Development Network
NARS	-	National agricultural research systems
NATCCO	-	National Confederation of Co-operatives in the Philippines
NATS	-	National agricultural technology system
NDC	-	National Development Corporation
NDDB	-	National Dairy Development Board
NDF	-	National Democratic Front
NEDA	-	National Economic and Development Authority
NEP	-	National Extension Project
NESAF	-	National Extension System for Agriculture and Fisheries
NFA	-	National Food Authority
NGOs	-	Non-government organisations
NHA	-	National Housing Authority
NIA	-	National Irrigation Administration
NICs	-	Newly industrialising countries
NIDL	-	New international division of labour
NIN	-	National Information Network
NIPSC	-	Northern Iloilo Polytechnic State College
NPA	-	New People's Army
NRCs	-	National research centres
NRMP	-	Natural Resources Management Program
NSI	-	National systems of innovation
ODA	-	Official development assistance
OECF	-	Overseas Economic Cooperation Fund
PARO	-	Provincial Agrarian Reform Officer
PBSP	-	Philippine Business for Social Progress
PCA	-	Philippine Coconut Authority
PCARRD	-	Philippine Council for Agriculture, Forestry and Natural Resources Research and Development
PCGG	-	Presidential Commission on Good Government
PENRO	-	Provincial Environment and Natural Resources Office
PhilRice	-	Philippine Rice Research Institute
PICOP	-	Paper Industries Corporation of the Philippines
PICRI	-	Philippine Industrial Crops Research Institute
PMO	-	Project management office
POs	-	People's organisations
POT	-	Package of technology
PPP	-	People's participation projects
PRA	-	Participatory rural appraisal
PSS	-	Provincial service stations
PTDC	-	Philippine Technology Development Corporation
PTVT	-	Provincial technology verification teams
PVO	-	Private voluntary groups

PVP	-	Plant variety protection
QGOs	-	Quasi-government organisations
QRA	-	Quick resource appraisal
QRs	-	Quantitative restrictions
R&D	-	Research and development
R&E	-	Research and extension
RAAKS	-	Rapid appraisal of agricultural knowledge systems
RACOs	-	Regional Applied Communication Offices
RACP	-	Regional Applied Communications Program
RAFC	-	Regional Agriculture and Forestry Council
RCPCC	-	Rice and Corn Production Coordinating Council
RDMIS	-	Research and Development Management Information System
RED	-	Rural-based Enterprise Development
RETRES	-	Research Information Storage and Retrieval System
RIARCs	-	Regional integrated agricultural research centres
RIARS	-	Regional integrated agricultural research systems
RICs	-	Regional integrated centres
RMP	-	Risk Management Process
ROS	-	Research outreach stations
RPC	-	Rice processing complex
RRA	-	Rapid rural appraisal
RRDIS	-	Regional Research and Development Information Services
RRDP	-	Rainfed Resources Development Project
RSRDH	-	Regional Symposium on Research and Development Highlights
RTTL	-	Research and technology transfer linkages
S&T	-	Science and technology
SAP	-	Structural adjustment programs
SCUs	-	State Colleges and Universities
SEAMEO	-	Southeast Asian Ministry of Education Organization
SEARCA	-	SEAMEO-Regional Center for Graduate Study and Research in Agriculture
SIN	-	Systems integration and networking
SLS	-	Scientific Literature Service
SMC	-	San Miguel Corporation
SMEs	-	Small- and medium-scale rural enterprises
SMSs	-	Subject matter specialists
SNs	-	Samahang Nayons
STAND	-	Science and Technology Agenda for National Development
STARRDEC	-	Southern Tagalog Agriculture and Resources R&D Consortium
STF	-	Special Technology Financing
T&V	-	Training and visit

TA	-	Technology adaptation
TABARGA MPC	-	Taminla Bamboo and Rattan Growers Association Multipurpose Co-operative
TAGCODEC	-	Tagalog Co-operative Development
Tagdecor	-	Tagdangua Development Corporation
TAPI	-	Technology Application and Promotion Institute
TBI	-	Technology business incubator
TCIA	-	Thai Construction Industry Associations
TD	-	Technology dissemination
TESDA	-	Technical Education and Skills Development Authority
TG	-	Technology generation
TLRC	-	Technology Livelihood and Resource Center
TOT	-	Transfer of technology
TRIPS	-	Trade Related Intellectual Property Rights
TV	-	Technology verification
UCPB	-	United Coconut Planters Bank Foundation, Inc.
UN	-	United Nations
UNRISD	-	United Nations Research Institute for Social Development
UPLB	-	University of the Philippines Los Banos
UPWARD	-	User's perspective with agricultural research and development
USAID	-	United States Agency for International Development
USM	-	University of Southern Mindanao
VEWs	-	Village extension workers
WARDA	-	West Africa Rice Development Association
WB	-	World Bank
WESVARRDEC	-	Western Visayas Agriculture and Resources Research and Development Consortium
WTA	-	World Trade Agreement
WTO	-	World Trade Organisation

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CHAPTER 1

INTRODUCTION

1.1 Background and Rationale

The Philippines is largely an agriculture-based economy. Agriculture, forestry and fisheries account for about half of the total national employment. Almost 70% of the total population live in the rural areas and are directly or indirectly dependent on agriculture for their livelihood. With the growing population and contracting land resource base[1] in the rural areas, the agriculture sector is put under heavy pressure to increase its productivity. This need for increased agricultural productivity has become more urgent considering new developments in the local and international environments that promote freer trade in agriculture. These developments point to competitiveness in agricultural production, either for export or local consumption, as an implicit rule of the game. As signatory to the General Agreement on Tariffs and Trade (GATT)-Uruguay Round or what is now referred to as the World Trade Agreement (WTA), even the country's agricultural products intended for the domestic market, except for rice, have been subjected to competition from imports because of reductions in tariffs. However, the Philippine agriculture sector is faced with the problem of declining competitiveness. The country's agricultural export products have not been doing well in the world market. The contribution of the agriculture sector to Gross Value Added has been declining and is one of the lowest among Asian countries.[2]

The role of technology transfer is well recognised in relation to the objective of increasing agricultural productivity and competitiveness.[3] Agricultural producers need technology options and innovations that will improve product quality and increase production, processing and marketing efficiencies. Since the agriculture sector in the Philippines is characterised by a large number of poor farmers and small enterprises whose capacities to generate innovative technologies are limited, the transfer of technologies from research institutions to the farmers has been a major component of most rural development programs. However, the common notion of technology transfer in this context is

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[1] Agricultural lands are increasingly being converted into residential and business-commercial areas.

[2] Cristina David, GATT and Philippine agriculture: Facts and fallacies, paper presented to the Symposium in Honour of Dr. Gelia Castillo, Diliman, Quezon City, 27-28 September 1994, pp. 13, 27.

[3] This does not imply that 'technology' is the only prerequisite for increasing agricultural productivity and competitiveness.

problematic because it implies a linear view of innovation, from technology generation to utilisation. With this perspective, technology is assumed to flow from local and international agricultural research centres to the end users in a sequential fashion.

In my experience with agricultural research and development coordination in the Philippines, technology transfer programs in the rural sector are generally top-down in orientation.[4] The intended end users of agricultural technologies have little participation in the identification and prioritisation of research areas and technologies for dissemination. These activities are largely performed by the research and academic institutions.

Another issue with rural development programs is that most of them are commodity-oriented. They consider 'increase in yield' rather than 'catering to specific market needs' as a measure of performance. For instance, programs of the Philippine grains sector have repeatedly aimed to increase production rather than develop grain products that can compete freely in the market.[5] As a result, the country's rice industry cannot compete with other countries in terms of producing 'long-grained, glutinous, no-broken-kernel' rice products.[6] Certainly, national scientists and farmers can argue that technologies for quality rice production are available locally. However, such technologies are not properly packaged for commercial application.

One of the consequences of these top-down and commodity-oriented approaches is that many technologies generated by the research community do not fit the needs, resources and environment of the farmers. There were some 2,000 agricultural technologies generated by the research community between the period 1972 to 1985.[7] However, few of these technologies have been absorbed into the production systems of the farmers and have been translated into rural enterprises. This situation is suggestive of the weak research and technology transfer linkage. It may also imply that the agricultural technologies developed by the research community are irrelevant or simply not ready yet for commercial use.

Technology transfer, to be relevant, must address the issues outlined above: increasing the competitiveness of agricultural products; finding alternatives or complementary approaches to the traditional top-down oriented programs; and improving

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[4] 'Top-down' means that control is exercised from the top levels of a hierarchical system.

[5] David Gorrez, Countryside agro-industrial development strategy (CAIDS) component: Review and assessment of rural development programs and projects in the Philippines, Report to the National Economic Development Authority (NEDA), Philippines, March 1994, unpub.

[6] *Ibid.*

[7] Philippine Council for Agriculture, Forestry and Natural Resources Research and Development (PCARRD).

linkages within the agricultural research and technology transfer system. It has to operate in an increasingly complicated environment considering global trade liberalisation and growing concerns for need-based technologies, equitable distribution of benefits, and environmental protection. These realities dictate the need to rethink the process of technology transfer in the agriculture sector.

I have a strong interest in the study of technology transfer in the rural sector. My experience in the field inspires me to pursue this research area. I have seen how some of the top-down government programs have failed as a strategy for broad-based rural development. In contrast, I have also witnessed the potential of some of the bottom-up approaches for rural development with emphasis on enterprise building and greater participation of the local people. I intend to explore further these alternative approaches in my research.

1.2 Objectives of the Thesis

This thesis tries to give precision to the concept of technology transfer in the context of the agricultural research and extension (R&E) system in the Philippines.[8] It views technology transfer as a social and political process. Its overall objective is to examine the concept and practice of technology transfer in the agriculture sector in the Philippines using an analytical framework based on some of the elements of interorganisational theories and political economy. Therefore, technology transfer is analysed in relation to the global and domestic political economy, and the roles, actions, and interrelationships of the different actors involved in the agricultural R&E system. It seeks to understand the conditions within the immediate and larger environments of the agricultural R&E system that limit or facilitate the actions of the various actors involved, particularly the farmers' abilities to exploit and transform technologies[9] into economic activities. The detailed processes of technology transfer are explored through fieldwork that focuses on agricultural co-operatives. The thesis also reviews theories and models related to technology transfer and analyses the extent to which these theories help elucidate the practice of technology transfer in the agriculture sector.

Specifically, it attempts to answer the following questions:

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[8] Technology transfer in the agriculture sector is associated with agricultural extension service. It is thus viewed, on one level, in relation with its immediate environment, which is the agricultural research and extension system. See chapter 4 for a more detailed discussion of the R&E system.

[9] Including both indigenous and introduced technologies.

1. To what extent do theories and models related to technology transfer explain and/or influence the actions and policies of agencies involved in the agricultural research and extension system in the Philippines?
2. How do some major political and economic factors, and organisational issues shape technology transfer in the agriculture sector in the Philippines?
3. What lessons could be learned from the technology transfer experiences of the agricultural research and extension system, in general and agricultural co-operatives, in particular?

By drawing insights from these investigations, my thesis aims to contribute to the rethinking of the concept and practice of technology transfer in the agriculture sector. At the end of the thesis, I first offer some recommendations that could help improve technology delivery and utilisation in the agriculture sector in the Philippines, and second identify the conditions necessary for these recommendations to have a better chance of success.

1.3 Structure of the Argument

The thesis sets out to demonstrate that a good understanding of technology transfer and its complexities can be achieved if technology transfer is viewed in the perspective of organisational theory and political economy. The conceptual framework of the thesis links various levels of analysis: the broad context of the international and national economies and the nation state; the immediate environment of technology transfer; and case studies of agricultural co-operatives in the Philippines. This multilevel approach is essential to capture adequately the complex social and political dimensions of technology transfer.

The thesis analyses the theory and practice of technology transfer in order to examine the extent to which linear or traditional models of innovation have informed the policies and actions of organisations involved in the agricultural research and extension system in the Philippines. I shall challenge this linear notion and top-down orientation of technology transfer in the agriculture sector. I shall argue that this common concept and practice are inappropriate as a basis for effective technology acquisition and utilisation because they do not take into account the socioeconomic and political environment in which technology transfer operates. Technology transfer is embedded in the social, economic and political structures of the state. Likewise, it is a socioeconomic and political process with profound effects on the structure of the rural society. The thesis argues that a

simplistic view of technology transfer fails to acknowledge many relevant issues, views, networks, interactions, linkages and knowledge systems in the agricultural research and extension (R&E) system. These shortcomings are a key determinant of the failure of technology transfer or extension programs to satisfy the requirements and challenges of agricultural development.

An examination of the political and economic context of technology transfer is necessary to show how the actions of agencies/entities within the agricultural R&E system are influenced in part by the limitations, opportunities and contradictions within the domestic and global political economy environments of the system. For instance, agencies/entities concerned may not always act in the best interest of the farmers because of the need to support the overall economic objectives of the Philippine government. Recognising and understanding the operation of these influences is the crucial first step toward developing technology transfer strategies that can work within the constraints and opportunities they present.

A closer look at the immediate setting of technology transfer will demonstrate that the largely bureaucratic character of the agricultural R&E system is counterproductive to the efficient delivery of extension service. This arrangement, favouring top-down approaches to agricultural R&D and technology transfer, is one of the factors that contributes to the weak linkages between research and extension units, between researchers and farmers, and between extension workers and farmers. I examine the incentive system for agricultural researchers and extension workers as a key determinant of the efficacy of linkages between them.

The fieldwork part of the thesis focuses on agricultural co-operatives in order to provide insights and lessons for rethinking the process of technology transfer. Agricultural co-operatives are good sites for analysis in terms of technology transfer because they have been the objects of many agricultural development programs of government and non-government organisations in the Philippines. The fieldwork examines how specific linkages of the co-operatives and technology transfer approaches of their interveners facilitate or hinder the process of technology acquisition and commercialisation. The case studies are intended to highlight the important ingredients of an effective technology transfer project involving agricultural co-operatives.

Considering the findings of the theoretical work and fieldwork undertaken in this thesis, some general principles for enhancing technology delivery and utilisation are proposed. The thesis concludes with an outline of the conditions and institutional arrangements which will be necessary for these recommendations to be realizable and workable.

1.4 The Notion of Technology Transfer

In sections 1.1 and 1.3, I pointed out the inadequacy of the common notion of technology transfer which suggests the movement of technology from one location or use to another. Chen's[10] interpretation, which states that technology transfer is 'not just acquiring of a knowledge in production but also a building up of a nation's [farmers'] technological capability' is more useful for my purpose.[11] Chen's definition implies the social nature and the complexity of the technology transfer process. With this definition, I can relate my own perception of technology transfer—that it involves an assortment of interrelated activities, and a continuous exchange of knowledge[12] and interaction among the different actors involved within and outside the agricultural R&E system. These activities, knowledge systems and interactions enable or restrict the intended users in absorbing a technology into their production system and in making improvements or adjustments to the technology to suit their own conditions.

In this thesis, I view technology transfer in the context of the interrelationship of a diverse set of activities, such as technology generation, testing, integration, packaging, pilot testing, networking, dissemination, acquisition and utilisation. However, this perspective does not in any way suggest a smoothly operating system where different components are assumed to perfectly fit one another. The way in which these activities and entities deal with each other and the degree of integration or conflict among them is studied empirically.

Technology transfer in the agriculture sector in the Philippines is often associated with agricultural extension. Extension is defined by Van den Ban and Hawkins[13] as

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[10] Edward Chen (ed.), *Transnational Corporation and Technology Transfer to Developing Countries*, vol. 18, Routledge, London, published for UNCTAD, 1994, pp. 1-2.

[11] This thesis focuses on the agriculture sector and therefore it highlights 'technology capability building of farmers'.

[12] Including tacit and codified knowledge, indigenous knowledge, national and transnational knowledge, etc.

[13] A.W. van den Ban and H. Hawkins, *Agricultural Extension*, Longman Scientific & Technical, New York, 1988, pp. 9, 11.

involving the conscious use of communication of information to help 'people' form sound opinions and make good decisions. It is usually identified with agriculture, thus the term agricultural extension, in which case the word 'people' is replaced by 'farmers'. It connotes the process of reaching and educating people in the rural and remote areas generally characterised as agricultural in nature. The extension service in the Philippines is frequently seen from the perspective of technology dissemination and strategies for increasing the knowledge and skills of the farmers. I argue that this view is simplistic because its focus is limited to the needs of the farmers. The technology transfer or extension service needs to take into account the different resource and knowledge processes within the agricultural R&E system. To carry out this strategy, interagency or intersectoral linkages and collaboration are required because no single agency can fully address the demands of the R&E system. Technology transfer in this thesis is not the same as the transfer of technology (TOT) concept of agricultural R&E. The TOT approach assumes a linear flow of technologies from researchers to extension workers and finally to farmers. Chapter 2 elucidates further the different models of agricultural R&E systems.

Technology transfer can be classified as endogenous or exogenous. Endogenous technology transfer takes place within national boundaries—for example between industries, and between research organisations and farmers or entrepreneurs. Exogenous technology transfer is viewed from the perspective of international business and economics—for example occurring between two developed countries, between two developing countries, and from a developed to a developing country or vice versa. My research is focused on endogenous technology transfer, and international perspective is limited to the topics indicated in section 1.5.2.

For purpose of discussion, the terms rural development and agricultural development are sometimes used interchangeably in this research. This is not to imply that rural development is equivalent to agricultural development. I recognise the fact that there is more to rural life than agriculture. For instance, farmers and/or their families engage in non-farm activities at certain times of the year either to supplement their farm income or for the main source of their livelihood. The terms agricultural research and technology transfer system, agricultural research and extension (R&E) system, and agricultural innovation system are also used interchangeably in this thesis. In the strictest sense, the

word 'agriculture' refers to crops and livestock production. However, in this thesis, 'agriculture' includes the forestry sector, especially the activities of the upland dwellers.

1.5 Analysing Organisations and their Roles in Technology Transfer and Development

To capture the social and political dimensions of technology transfer, the various levels of analysis in this thesis are grounded on some of the elements of interorganisational theories.[14] I find some formulations of interorganisational theory, particularly Benson's, most useful for my research. Benson[15] situates interorganisational relations 'within the structures of public policy sector' and the public policy sector 'within the structures, contradictions and crises of the larger society'. He defines a policy sector as a 'cluster or complex of organisations connected to each other by resource dependencies and distinguished from other clusters or complexes by breaks in the structure of resource dependence'.[16] In my case, the agricultural R&E system is the policy sector under scrutiny.

Benson[17] views an interorganisational policy sector as consisting of a 'surface level of substantive policy and administrative arrangements' determined by 'deep structure of rules and interests'. He proposes three levels of analysis to fully understand interorganisational relationships in a public policy sector.

The first level of analysis is concerned with administrative structures and policy paradigms that determine a set of interorganisational resource dependencies.[18] At this level, the division of labour or patterns of differentiation and control over activities in a policy sector is examined. The commitments of the sector to a particular set of policy options are also looked into. Such arrangements and policy paradigms are seen to define the relationships of resource dependence between organisations. This means that two agencies are most likely to have a resource-dependent relationship if their policy paradigms and domains intersect. The effective performance of one agency is contingent upon its access to resources provided by another agency. It follows that changes in the division of labour or policy paradigms would alter the interorganisational resource dependencies. Benson argues

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[14] Interorganisational theory is discussed later in this section.

[15] Kenneth J. Benson, 'A framework for policy analysis', in D. Rogers and D. Whetten (eds), *Interorganisational Coordination: Theory Research, and Implementation*, Iowa State University Press, Iowa, 1982, p. 137.

[16] *Ibid.*, p. 148.

[17] *Ibid.*

[18] *Ibid.*, pp. 149-154.

that administrative reorganisations are often used to change certain resource-dependent relations.[19] Conversely, existing interorganisational dependencies are seen to embody specific power structures that limit the range of alternative administrative arrangements and policy paradigms.[20] However, Benson contends that the study of power structures must go beyond the immediate set of resource-dependent relations, into the larger political economy.[21]

The second level of analysis involves 'accounting for the power of the various interests and for shifts in the distribution of power'.[22] Examples of interest groups in policy sectors are cited by Benson as follows: demand groups, support groups, administrative groups, provider groups and coordinating groups.[23] Each group has its own structured interests that lead to a specific set of concerns about interorganisational relations.[24] The groups behave in such a way that their interests are preserved or advanced. Therefore, changes in administrative arrangements that threaten these interests are frequently resisted or modified. The bases of power of various interest groups within a policy sector are derived from resource dependencies or distribution of resource control, their location in the network of interorganisational relations, and distribution of responsibility for decision making.[25] The power structure underlying a sector involves specific arrangements of structured interests that enable some interests but constrain others. In general, this underlying interest-power structure 'tends to preserve an hegemonic model consisting of policy paradigm, administrative arrangements, and interorganisational resource dependencies'.[26]

Finally, the interest-power structure is located within the third level—the rules of structure formation. Benson[27] maintains that there are certain rules, which are not rigid or stable norms, that set boundaries upon the organising actions of a policy sector. The rules of structure formation are in part related to the requirements of the larger economy and

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[19] *Ibid.*, p. 151.
[20] *Ibid.*
[21] *Ibid.*, p. 152.
[22] *Ibid.*, p. 160.
[23] *Ibid.*, pp. 155-158.
[24] *Ibid.*, p. 155.
[25] Karen S. Cook citing various authors, such as Benson, Lehman and Emerson in 'Exchange and power in networks of interorganisational relations', *The Sociological Quarterly*, vol. 18, Winter 1977, p. 72.
[26] Benson, 'A framework for policy analysis', *op.cit.*, p. 154.
[27] *Ibid*, pp. 149-164.

society. The theory has been developed for the case of the advanced capitalist countries, in which the central feature is the need to sustain capital accumulation and legitimation.[28] But then this will also apply in many developing countries, including the Philippines.[29]

Benson[30] depicts contradictions and crises in interorganisational structure. Contradictions are defined as fundamental structural inconsistencies that necessitate changes in existing structures.[31] Crisis is defined as a point of breakdown where the existing arrangements threaten to collapse in the face of contradictions.[32] Contradictions may produce 'dislocations and crises' which trigger a search for new structural arrangements.[33] According to Benson, a contradiction in interorganisational structure is 'a fundamental incompatibility between an hegemonic set of policies and administrative practices at one level and the underlying limiting set of structures and rules'.[34]

In summary, Benson's interorganisational theory focuses on linking levels of analysis.[35] I adopt this analytical approach in my thesis because it provides a useful framework for understanding the complex interorganisational relationships within and beyond the agricultural R&E system. Many things that occur within the system can only be fully understood or explained by connecting them to or locating them within the larger context.

The interorganisational concepts of coordination and resource dependency, which are developed by several theorists but already in effect incorporated in Benson's interorganisational framework, are by themselves a useful guide for understanding linkages between agencies or entities involved in my case studies. The issue of coordination is central in my case studies because co-operatives studied have many formal and informal linkages with different agencies, themselves mostly autonomous from each other. Various agencies provide co-operatives with support services such as technology, credit, market, information and training.

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[28] *Ibid.*, p. 161.

[29] Although there are strong national traditions which may not be capitalist in nature (e.g. remnants of feudalism, family firms, etc.), many developing countries are often dominated by capitalistic sectors.

[30] Benson, 'A framework for policy analysis', *op.cit.*, pp. 164-165.

[31] *Ibid.*, p. 164.

[32] *Ibid.*, pp. 164-165.

[33] Kenneth J. Benson, 'Organisations: A dialectic view', *Administrative Science Quarterly*, vol. 22, March 1977, p. 5.

[34] Benson, 'A framework for policy analysis', *op.cit.*, p. 165.

[35] Christopher Ham and Michael Hill, 'Conclusion: Linking levels of analysis', *The Policy Process in the Modern Capitalist State,* New York, 1993, p. 176.

My case studies look at, among other issues, the degree of coordination among various intervening agencies and its impact on linkages and technology transfer. Coordination is defined by Hall, *et al.*[36] as the process by which 'organisations attempt to ensure that their activities take into account those of other organisations'. Another important interorganisational concept is resource dependency. Resource dependency may help to explain the manner of linkages between organisations—the formation of particular divisions of labour and the development of specific patterns of control between organisations.[37] The dependence-characteristics of interorganisational relationships can be described in terms of the relative importance of the resource[38] to an organisation and the degree of substitutability of the source—whether alternative sources of supply cannot be easily found.[39]

Scharpf[40] further elaborates the notion of dependency relations in his discussion of 'exchange relationships'. High dependence relationship is defined by high importance of the resource and low substitutability of the source; low dependence is defined by a combination of low importance of the resource and low substitutability of source, or high importance of the resource and high substitutability of the source; and independence is defined by a combination of low importance of the resource and high substitutability of the source.[41]

Using this characterisation, the exchange relationship between two organisations is classified as mutual dependence, mutual independence, and unilateral dependence.[42] Mutual dependence exists when the resources involved are important for both agencies and neither party can find an available alternative source easily.[43] Mutual independence is described by the situation in which a resource is either not very important to either party or alternative sources of supply are easily available.[44] With unilateral dependence, the interest of the more dependent agency to maintain the existing exchange relations must be greater

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[36] Richard Hall, J. Clark, P. Giordano, P. Johnson, & M. Van Roekel, 'Patterns of interorganisational relationships', *Administrative Science Quarterly*, vol. 22, September 1977, p. 459.

[37] Benson, 'A framework for policy analysis', *op. cit.*, p. 143.

[38] 'Resource' is 'any valued activity, service or commodity'. Cited in Cook, *op. cit.*, p. 64.

[39] Fritz W. Scharpf, 'Interorganisational policy studies: Issues, concepts and perspectives', in Kenneth Harf and F. Scharf (eds), *Interorganisational Policy Making: Limits to Coordination and Control*, Sage Publications, London, 1978, p. 354.

[40] *Ibid.*, pp. 354-355.

[41] *Ibid.*, p. 355.

[42] *Ibid.*, pp. 355-357.

[43] *Ibid.*, p. 356.

[44] *Ibid.*

than the interest of the less dependent party.[45] This typology of resource-dependency is related to the concept of coordination.[46] A relationship of mutual dependence is said to encourage coordination since both parties have high stakes in preserving the ongoing exchange relationship.

1.6 Explanatory and Normative Orientations in Development Theories

At the national and international levels of analysis in my research, I also draw insights from different development theories. Knowledge of the basic principles and themes of development theories is useful for analysing the agricultural technology transfer system in its political and economic contexts. Some of the development theories identified in the literature are presented in the following section. My intention here is to understand their explanatory and normative elements in relation to the agriculture sector, not to review them comprehensively.

Modernisation theories define development in terms of economic growth through industrialisation and Westernisation.[47] They focus on national societies (nation-states) as the basic units of analysis[48] and view Western development as the model for all countries to emulate.[49] Development is defined as a succession of stages through which nation-states will pass—from traditional stage to modernity.[50] The agriculture sector is seen to play a major role in the transition from 'traditional' to 'modern society' by providing a base for industrial growth.[51] Technological change or commercialisation of agriculture is identified as central to this process.[52]

One of the major theses of modernisation theories is the importance of Western values (for example individualism and entrepreneurship), ideas and investment to

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[45] *Ibid.*

[46] *Ibid.*

[47] John Agnew, 'Technology transfer and theories of development: Conceptual issues in the South Asian context', *Journal of Asian and African Studies*, vol. XVII, nos 1-2, 1982, p. 18; Ray Kiely, *Sociology and Development: the Impasse and Beyond*, University of East London, UCL Press, 1995; and Johan Galtung, 'Part III: Development theory', *Peace by Peaceful Means: Peace and Conflict, Development and Civilization*, International Peace Research Institute, Oslo & Sage Publications, London, 1996.

[48] Agnew, *op.cit.*, p. 18.

[49] Ray Kiely, *Sociology and Development: The Impasse and Beyond*, UCL Press Limited Press, London, 1995, p. 4.

[50] See 'stages of growth theory' in Walter Rostow, *The Stages of Economic Growth*, Cambridge University Press, Cambridge, 1960, 1971; W. Moore, *Social Change*, Prentice Hall, New Jersey, 1963.

[51] Agnew, *loc. cit.*

[52] Agnew, *op.cit.*, pp. 18-19, citing various authors, including among others, W. Mellor, 'Increasing agricultural production in early stages of economic development: Relationships, problems and prospects', *Indian Journal of Agricultural Economics*, vol. 17, 1962, pp. 29-46 and C. Wharton, 'Research on agricultural development in Southeast Asia', *Journal of Farm Economics*, vol. 45, 1963, pp. 1161-1174.

development.[53] Another perspective on modernisation is the 'dual economy approach' that highlights the co-existence of, and the limited degree of interaction between, traditional and modern sectors.[54] Agricultural modernisation is perceived as a way of facilitating movement of labour from the agricultural to the industrial sector.[55]

A number of criticisms have been levelled against modernisation theories. Such theories are criticised for their following assumptions: technological determinism; a rigid separation between tradition and modernity; an unproblematic transformation from traditional to modern society; and a conflict-free modern world.[56] They failed to put development in context by their lack of consideration given to social structure and political history of nation-states.[57] The position on technology transfer of modernisation theories is apparently positive. The following actions are assumed to facilitate modernisation—providing the means for supply of technology, infrastructure development, and diffusion of knowledge about technology.[58]

Another group of development theories considers the 'world political economy' as the level of analysis and emphasises the inequities of the international economic order. The 'development of underdevelopment' theory claims that development in the modern nation-states or 'metropoles' proceeded at the expense of the traditional ones or 'satellites' through the transfer of economic surplus from the satellites to the metropoles.[59] This proposition implies that the traditional and modern sectors must not be treated in isolation because the traditional sector is as much a feature of the world-system as the modern sector.[60]

This world-systems view was elaborated on by Wallerstein[61] in his world-system analysis. Wallerstein[62] argued that the world capitalist economy in the sixteenth century

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[53] Rostow, *op.cit.*, 1971, p. 180; Galtung, *op.cit.*, p. 131; Agnew, *op.cit.*, p. 19.

[54] Agnew, *op.cit.*, p. 19.

[55] *Ibid.*, citing W. Lewis, 'Economic development with unlimited supplies of labor', *Manchester School of Economic and Social Studies*, vol. 22, 1954, pp. 139-191.

[56] Kiely, *op.cit.*, pp. 41-44.

[57] *Ibid.*

[58] Agnew, *op.cit.*, p. 23.

[59] Andre Gunder Frank, *Capitalism and Underdevelopment in Latin America* , Monthly Review Press, New York, 1969.

[60] Kiely, *op.cit.*, p. 45.

[61] Immanuel Wallerstein, *The Modern World-System: Volumes I to IV (Studies in Social Discontinuity)*, Academic Press, San Diego, 1974, 1980, 1989.

[62] I. Wallerstein, *The Modern World System: Capitalist Agriculture and the Origins of the European World-Economy in the Sixteenth Century*, Academic Press, San Diego, 1974.

was divided into 'core-states', 'peripheral areas' and 'semi-peripheral areas'. The world economy then was characterised by a periphery of a modern world-system providing the resources for the development of a European-North Atlantic core.[63] This imbalance has persisted as the core has continued to benefit from and dominate over an expanding periphery, and the periphery has become more dependent upon the core for investment, market and innovation. These theories have been questioned for implying that the countries in the periphery would not develop as long as they are 'tied to the core-dominated world system'.[64] Out of this criticism emerged dependency theory.

Dependency theory asserts that development of the economies of the dependent countries is predicated by the expansion of the dominant countries, 'which may have positive or negative effects on their immediate development'.[65] This suggests that development in the periphery is possible but it is 'dependent' on and led by the core nation-states. The implicit perspective of the world political economy theories on technology transfer is somewhat negative. These theories imply that technology transfer benefits only those countries that supply and control the technologies.[66] Technology transfer is viewed as 'dependency creating'.[67]

The neoclassical theory of development prescribes the use of 'free market' economic principles. It assumes that nation-states will benefit from exercising free trade if they specialise in producing and trading goods in which they have comparative advantage.[68] The theory advocates export-oriented growth strategies and minimum state intervention in development. state intervention is viewed as counterproductive when it results in protection of inefficient economic activities, rent-seeking operations, and discrimination against some sectors in the economy.[69]

Neoclassical theory has been criticised for overlooking the role of the state in the economic development of the newly industrialising countries (NICs) and the advantages offered by geographical conditions, and the political and social history of particular

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[63] *Ibid.*

[64] Kiely, *op.cit.*, pp. 46-47.

[65] *Ibid.*, citing O' Brien, ' A critique of Latin American theories of dependency', in I. Oxaal, *et al.* (eds), *Beyond the Sociology of Development*, Routledge and Kegan Paul, London, 1975, p. 12.

[66] Agnew, *op.cit.*, pp. 23-24.

[67] *Ibid.*

[68] This hypothesis is based on the works of David Ricardo. See for example, D. Ricardo, *Principles of Political Economy and Taxation*, Cambridge University Press, Cambridge, first published in 1821.

[69] Kiely, *op.cit.*, pp. 122-123.

countries.[70] The implicit assumption of this theory on technology transfer is that foreign investments and the development of a dynamic private sector will encourage the transfer of foreign and local technologies. In this case, the role of the state as a development agency is to provide a favourable environment for the private sector to develop and for foreign investments to expand.

Different development theories incorporate more or less consistent explanatory and normative elements. For instance, neoclassical theorists would celebrate the success of the Asian NICs and attribute it to limited state intervention and free market formula. Dependency and world systems theorists, on the other hand, would argue that the development of NICs led to the growth of a new international division of labour (NIDL).[71] The NIDL is said to have exacerbated dependency in the world system in the sense that industrialisation in the periphery or the NICs has continued to depend on the advanced capitalist countries.[72] Dependency theorists would also argue that the NIC development is at the expense of other things, such as labour and the environment. While neo-classical theorists would hail globalisation, other development theorists would criticise this as consolidating structures of inequality, imbalance and instability, and a new form of colonialism.

1.7 Conceptual Framework of Research and Structure of Thesis

The analytical framework of this thesis **(Figure 1.1)** is based on the premise that to understand technology transfer requires analysing it from various perspectives: the socioeconomic and political conditions within which technology transfer is embedded, the policies and development strategies of the Philippine state in relation to the different forms of internal and external pressures (e.g. global economic changes), and their implications for the agriculture sector and technology transfer; related theories and models; the roles, interrelationships, approaches and mechanisms of the different actors involved in the agricultural R&E system; and the organisation and management that govern the system. Interactions and approaches tend to vary according to the type of dominant interveners[73] in

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[70] John Brohman, 'Postwar development in the Asian NICs: Does the neoliberal model fit reality?', *Economic Geography,* vol. 72, no. 2, April 1996, p. 107.

[71] *Ibid.*, pp. 89-90 citing the works of F. Frobel, O. Heinrichs and Kreye, 'The tendency towards a new international division of labour', *Review*, vol. 1, 1977, pp. 73-88.

[72] *Ibid.*

[73] Includes government line agencies, non-government organisations, higher education institutes, the private sector and international agencies.

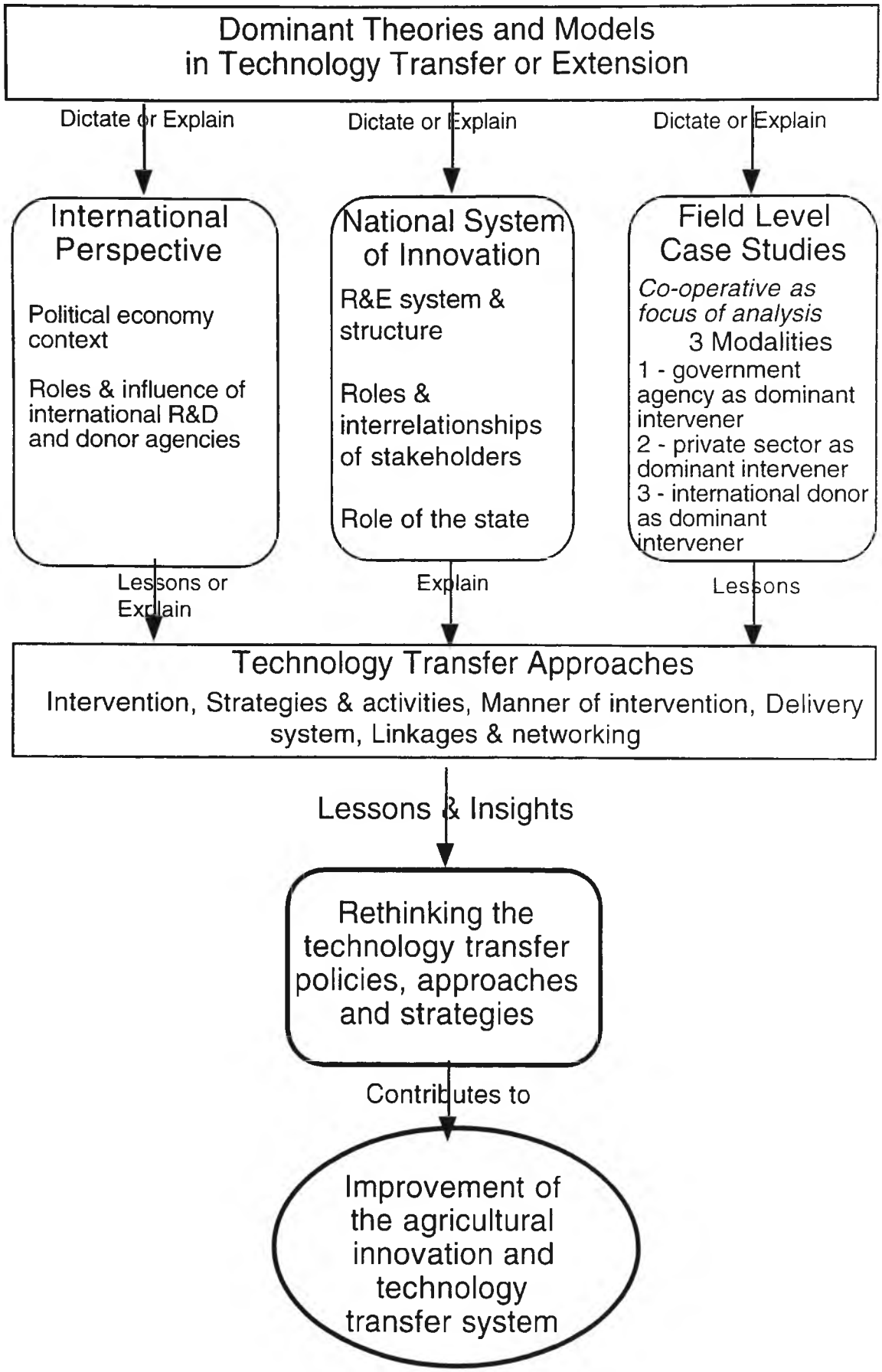

Figure 1.1 Conceptual Framework of the Research

the agricultural R&E system and agricultural producers[74] the system is serving. There are various levels and domains of interactions that need to be investigated—at international, national and local levels; and among and within public, private, or non-government organisations (NGOs). This research focuses less on private agribusiness corporations since they are self-contained in terms of research capability and technology transfer.

The general structure of the thesis is as follows:

1.7.1 Going Back to Basics: Theories and Models (Chapter 2)

A study of technology transfer process and practices requires an understanding of related theories, models and concepts. It is important to have a theoretical grasp of the process. Such an exercise can help explain past and current actions of the different institutions involved in terms of their technology transfer approaches and policies. It can provide the basis for understanding the impact of these actions in terms of their success or failure. Going back to theories and examining their strengths and weaknesses may provide the basis upon which alternative models can be formulated. I argue that the approaches and policies of different institutions concerned with technology transfer are influenced by the theories and models they consciously or unconsciously espouse. Conversely, actual experiences and problems shape the way theories and models are re-designed.

1.7.2 International Perspective (Chapter 3)

This thesis examines the general position of the Philippines within the changing landscape of the global economy and the way in which the global forces influence the local political economy. It analyses the manner in which these international and local forces interact and mediate each other, the tensions or conflict between them, and their impact on the agricultural technology transfer. Chapter 4 partly discusses the international view of technology transfer by examining the roles of foreign donors[75] and international agricultural research centres, and their influence on the agricultural R&E system.

1.7.3 National System of Innovation (Chapter 4)

The technology transfer process in the Philippine agriculture sector is examined in the context of the national environment within which it is located. Hence, the roles,

[74] Includes private corporations, small and medium-sized enterprises, co-operatives or resource-poor farmers.
[75] Include multilateral and bilateral aid, and technical assistance agencies; and international NGOs.

interrelationships, organisation, control and management dynamics of the different agencies or entities involved[76] are explored in terms of their direct and indirect involvement, and influence on research and technology transfer. This type of analysis may lead to the identification and definition of what specific linkages are weak in the agricultural R&E system. Only when the right linkage problems and causes are pinpointed can an intelligent proposal for an improved technology transfer approach be put forward. The different technology transfer approaches and strategies of actors or entities involved are examined in terms of their features, commonalities and differences. It is the intention in this exercise to determine areas of possible complementarity among various approaches. This type of analysis gives an indication of what changes are necessary to improve the system of agricultural innovation and technology transfer.

1.7.4 National Case Studies (Chapters 5-9)

Case studies in the Philippines are conducted to examine the dynamics of technology transfer at the field level and demonstrate the complex nature of interrelationships among the different stakeholders in the agricultural R&E system. The information derived from the case studies is expected to yield practical lessons that will contribute to the rethinking of the technology transfer approaches in the Philippines. The case studies focus on three farmer co-operatives as entry points for analysing interrelationships with and among the different entities providing interventions. Intervention in this case refers to assistance provided to co-operatives in terms of technology, extension, credit, market information and institution-building.

Finally, **chapter 10** explains key points and spells out implications of the research. It presents some recommendations on how to improve the practice of technology transfer and outlines the conditions necessary for these recommendations to be more effective.

1.8 Case Study Methodology

Agencies providing technology transfer or extension interventions to agricultural producers can be classified into five major categories: government line-agencies:[77] NGOs and private voluntary organisations (PVOs); state colleges and universities (SCUs); the

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[76] Include the public sector, private sector, NGOs, higher education institutes and agricultural producers.

[77] Includes agencies under the Department of Agriculture (DA), Department of Agrarian Reform (DAR), Department of Science and Technology (DOST), and Department of Environment and Natural Resources (DENR).

private sector; and foreign donors or international organisations. These agencies assist one or a combination of four different types of agricultural producers, as follows: resource-poor individual producers, farmer-co-operatives or associations, small and medium-scale rural enterprises (SMEs),[78] and big agribusiness corporations. Combining these two dimensions, there were at least 20 possible types of case studies that could have been chosen as indicated in **Table 1.1.** Each cell in the matrix thus represents an interrelationship between an agency that leads in terms of technology transfer or extension service, and a specific clientele served. In any instance or case, there is a dominant intervener, but other agencies or entities are involved to provide additional support services. This implies that multiple types of interaction exist among the different stakeholders within a particular case with one linkage[79] more dominant than the others.

For the purpose of limiting the choice of case study, only farmer-co-operatives were considered. At the technology delivery end, farmer-co-operatives or associations have been receiving significant attention from the government sector, as well as other interveners. The major arguments for co-operatives as conduit of government rural development programs are summed up in the following statements. Filipino farmers are generally limited-resource individuals and it is by organising themselves into co-operatives or associations that they become more efficient and empowered. Likewise, technology transfer or extension service providers can reach a larger number of people if efforts are directed towards an organised group of farmers. Chapter 6 provides a discussion of agricultural co-operatives in developing countries both in general, and in the Philippines in

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[78] An SME is defined as any business activity or enterprise engaged in industry, agribusiness and/or other services whether single proprietorship, co-operative, partnership, or corporation whose total assets, (inclusive of those coming from loans but exclusive of the land on which the particular business entity's office, plant and equipment are situated) and employment size fall under the following categories:

SME		Value of Assets	Employment Size
Micro-enterprise	-	US$5500.00 and below	5 workers or less
Cottage	-	above US$5,500.00 to 55,500.00	6 to 9 workers
Small	-	above US$55,500.00 to 555,500.00	10 to 99 workers
Medium	-	above US$555,500.00 to 2,222,200.00	100 to 199 workers

Source: Small and Medium-scale Enterprises Development (SMED) Council, *SMED Council Resolution no. 3*, 1995, quoted in Taeyoung Shin, 'Management of Technology', *Module II: Technology Support Services and Facilities*, DOST-UNDP Project Assessment Reports: Achieving International Competitiveness Through Technology Development and Transfer, Department of Science and Technology (DOST) and United Nations Development Programme (UNDP), Philippines, 1995, p. 81.

[79] 'Linkage is the 'means by which an institution bridge interactions with other agencies or organisations to ensure complementation of functions, better communication and efficiency of operation, whether formally or informally, top-down or supply-driven, temporal or permanent, long-term or short-term'. Defined by Brown and Librero, 'The NARRDS-LGU linkage: PCARRD experiences in research and extension', *Strengthening Research and Extension Linkage* , PCARRD Book Series no. 157/1996.

Table 1.1 Possible entry points of case study

Dominant Intervener	Clientele Served			
	Resource-poor individual producers (1)	**Farmer-Co-operatives/ Associations (2)**	**SMEs (3)**	**Agribusiness Corporations (4)**
Government line agency(A)	A1	A2	A3	A4
NGO/PVO (B)	B1	B2	B3	B4
SCUs (C)	C1	C2	C3	C4
Private sector (D)	D1	D2	D3	D4
Foreign donor (E)	E1	E2	E3	E4

particular. By focusing on farmer co-operatives, I do not assume that the observations from my case studies will apply to the other clientele groups of the agricultural R&E system.

The criteria applied in the process of selecting co-operatives for case study were

- accessibility and ease of getting information;
- relevance to national S&T priorities;
- engagement in agricultural techno-based enterprises; and
- representation of the following modalities:

  Case 1—co-operative whose dominant intervener is a government line agency;

  Case 2—co-operative with the private sector as the dominant intervener; and

  Case 3—co-operative with an international donor as the dominant intervener.

The common denominator among the three case studies was the presence of a co-operative as the object of development interventions. The co-operative was the common entry point for investigating the technology transfer approaches employed in the three intervention-modalities. The purpose of varying the cases in terms of dominant interveners was to determine the differences and similarities in the technology delivery approaches of different intervening agencies or entities.

The co-operative was the focus for analysing interrelationships with and among the different entities providing interventions. Since linkages among the research sector, extension group, farmers and other support institutions are central to the character of technology transfer in this research, the case studies examined the effectiveness of linkages among the different stakeholders involved in the three co-operatives. Effectiveness of any linkage or interrelationship was analysed in terms of the following indicators or questions:

- responsiveness to the needs of the target clients or how well it facilitates the flow of information on farmers' needs to researchers;
- capacity to transfer relevant technology or how well it facilitates the flow of information and techniques from the research system to the farmers; and
- sustainability of the linkage mechanism given the variety of institutions involved.[80]

Another measure considered in the analysis was the capacity to increase farmers' access to available resources.[81]

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[80] Peter Ewell, 'Links between on-farm research and extension in nine countries', in David Kaimowitz (ed.), *Making the Link: Agricultural Research and Technology Transfer in Developing Countries*, Westview Press, Boulder, San Francisco, 1990, pp. 154-162.

[81] Ricardo Ramirez, Virginia Cardenas and Nimal Ranaweera, 'Participatory rapid appraisal of farmers agricultural knowledge and communication systems', *Journal of the Asian Farming Systems Association*, vol. 3, no. 2, 1995.

As an initial activity, scanning of co-operatives for suitable case studies was done in consultation with officials and staff-members from the following agencies: Philippine Council for Agriculture, Forestry, and Natural Resources Research and Development (PCARRD); University of the Philippines Los Banos (UPLB); Land Bank of the Philippines (LandBank); Co-operative Development Authority (CDA); Philippine Business for Social Progress (PBSP); UPLB Foundation; Southern Tagalog Agriculture and Resources R&D Consortium, (STARRDEC); Department of Science and Technology Region 4 (DOST-IV); Rural-based Enterprise Development (RED) Foundation; and Technology Application and Promotion Institute (TAPI). [82]

The first list **(Appendix 1.1)** of 20 potential co-operatives for case study was subjected to the selection criteria mentioned above. The list was further reduced to 13 co-operatives shown in **Appendix 1.2** based on an additional criterion—that the beneficiaries of co-operatives are generally small-farmers or upland dwellers. After careful analysis of the shortlist, three co-operatives were finally identified **(Table 1.2)**. The geographical location of these three co-operatives is shown in **Figure 1.2.**

The following techniques and procedures were used in the conduct of case studies: in-depth interviews of selected co-operative officers and members, and representatives from agencies providing interventions to the co-operative (see **Appendix 1.3** for the names of persons and groups interviewed),[83] direct observation in the field; audio-visual recording; official document collection;[84] and validation of outputs with key actors involved. Permission from all concerned was sought well in advance before conducting the field visits and interviews. The nature and purpose of investigation were explained to the respondents beforehand. The interviews were mostly tape-recorded with the permission of the respondents. Note-taking of key points put forward by the respondents was also done during the interview but this was kept to the minimum so as not to break the spontaneity of discussion.

There were two sets of questions—one intended for co-operatives **(Appendix 1.4)** and another for the interveners **(Appendix 1.5)**. Questions were mostly open-ended and unstructured. Where possible, both individual and group interviews were undertaken in the

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[82] Some 31 interviews were conducted in deciding what case studies to pursue.

[83] Interviews were done during my field visits: 15 visits for Luzon case studies (cases 2 and 3) and 15 days stay in Iloilo province (which is one hour away from Manila by plane) for case 1.

[84] Collected approximately 900 pages of documents from the 3 co-operatives.

Table 1.2 Co-operatives for case study

Co-operative	Enterprise	Location	Dominant Intervener[1]
1. Tabarga Multi-purpose Co-operative (TABARGA MPC)	Bamboo nursery and other livelihood enterprises	Dueñas, Iloilo	DOST-PCARRD DENR-VI
2. Lutucan Multi-purpose Co-operative (Lutucan MPC)	Coco-coir processing	Sariaya, Quezon	Private sector (inventor) LandBank/UCPB
3. Integrated Jalajala Federation of Co-operatives (INJAFEDCO)	Rice production and processing	Jalajala, Rizal	JICA SEARCA DAR NATCCO

[1] Refer to List of Acronyms

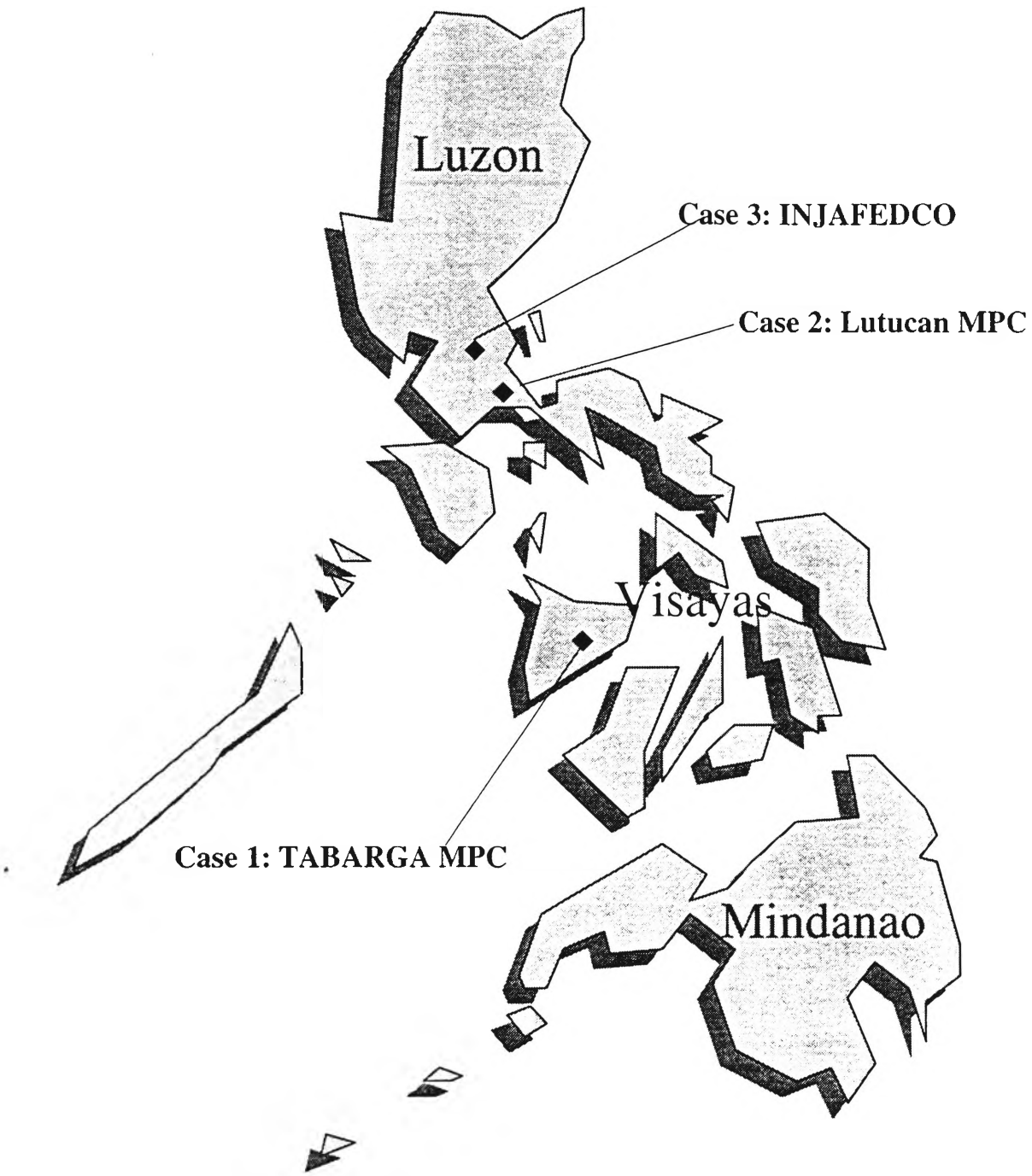

Figure 1.2 Map of the Philippines and location of case studies

case studies. Interviews with the co-operatives as a group, particularly in Cases 1 and 2, were scheduled to coincide with the regular or pre-scheduled board of director meetings and other co-operative activities where the officials and members were expected to attend. This arrangement was preferred by the co-operative officials so that they did not have to organise a separate activity or meeting solely for my purpose. Interviews of any available individual co-operative members were done either during the same occasion or during a separate field visit. In terms of intervening agencies or individuals, interviews were held in their respective offices or plant sites. The tape-recorded conversations were transcribed not later than one week after each interview. The information gathered from the respondents was validated with them through either face-to-face, written or telephone communication.

The case studies focus on both success stories and failures within the co-operatives because much can be learned from both experiences. However, failures are not necessarily a reflection of the actors' shortcomings as there are other factors that could be beyond the actors' control. I examine the factors behind the success and failures of the co-operatives with emphasis on the nature and effectiveness of linkages, and the technology transfer strategies of the intervening agencies.

CHAPTER 2

GOING BACK TO THE BASICS: THEORIES AND MODELS

2.1 Introduction

A study of the technology transfer process and practices requires an understanding of related theories, models and concepts. It is important to have a theoretical grasp of the process. Such an exercise can help explain past and present actions, and policies and strategies of different institutions involved in terms of their success and failure.

The objectives of this chapter are to examine the different theories and models related to technology transfer, and determine their specific applications and implications for rural or agricultural development. The review is not exhaustive considering the agglomeration and diversity of literature on this topic. The literature is multifarious and cuts across several areas and disciplines. Hence, boundaries are often vague, and to some extent arbitrary. Nevertheless, the inclusion of selected theories and models in this chapter are guided by usefulness and the purposes outlined here.

This chapter is divided into three major sections. The first section reviews the theories and models related to technology transfer with emphasis on *innovation.* Most of the literature on innovation, and much of that reviewed in this section, generally refers to industrial manufacturing firms. It is provided to give the context of innovation studies before focusing on agriculture. However, this section does outline a few implications of innovation theories—especially *induced innovation* and *innovation diffusion*—for the agricultural research and extension (R&E) system. The second section deals with theories and models that have direct application for understanding the agricultural R&E systems in the developing countries. It also presents some empirical work on these agricultural R&E models. This chapter concludes by drawing a parallelism between the manufacturing based and the agricultural focused studies, and identifies themes emerging from the review of literature.

The central argument of the thesis is that the conventional theories of innovation, diffusion and extension are inadequate explanations of the technology transfer process, but they may have shaped actual technology transfer practice to the extent that agencies and actors concerned have accepted them. In this chapter, I review, compare and contrast

various theories and models relevant to the process of technology transfer. I draw theoretical insights from this analytical work and use them as one of the bases for formulating a program of change to facilitate technology transfer and commercialisation. This program of change becomes the basis upon which alternative models and approaches can be developed.

The chapter pulls together theoretical models from the manufacturing and agriculture sectors. It points to parallels between theorising innovations in the manufacturing sector, and research and extension in the agriculture sector. The review of these models reveals two dominant schools of thought, namely the top-down or linear models of innovation and diffusion, and theories that recognise the evolutionary nature of innovation, the diversity of choices and knowledge processes, and the complexity of the institutional structure of technology transfer.

Analysis of the empirical reference of these theories illustrates that the top-down or linear models both predominate as prescription for actions in institutions within many national agricultural R&E systems in the developing countries, including that of the Philippines, and thus help explain the character of the programs and the behaviour of those institutions.

The theories reviewed in this chapter have their own assumptions, usefulness, applications and limitations. However, I argue that the linear and top-down models of innovation, diffusion and extension are inadequate representations of the more complex and diversified nature of agriculture and its environment in the Philippines. Such simplistic models may obscure from the decision-makers in the agricultural R&E system the actualities and complexities of the technology transfer process and its setting. The intricacies within the immediate and larger environments of the agricultural R&E system, as demonstrated in chapters 3 and 4, suggest the need for technology transfer approaches that are grounded in evolutionary and dynamic theories of innovation, and of research and extension.

2.2 Innovation Theories and Models

A variety of ideas related to technology transfer have been put forward by scholars from various disciplines—economics (including agricultural economics), geography, sociology, communication, political science and others. This implies the multi-disciplinary orientation of technology transfer.

Technology transfer can be associated with the concepts of *innovation, innovation diffusion, and research and extension.* The literature is rich with both theoretical and empirical studies. For instance, on the topic of *innovation diffusion* alone, Rogers[1] noted some 4,000 studies since the 1950s when research on agricultural innovations among US farmers was first made. The literature ranges from very abstract models to very detailed prescriptions on technology transfer, from international to national perspectives, from firm-centred to industry-focused concepts, from quantitative or econometric representations to qualitative explanation of mechanisms, and from statistical surveys to case studies.

This section is focused on and limited to selected literature on innovation which has potential contribution for understanding agricultural or rural development systems. Whenever possible, implications of the theories and models for agricultural policy are discussed.

2.2.1 Innovation Models

Various works on innovation models can be classified into four broad categories, namely traditional linear models, interactive models, firm-centred models and national innovation systems.

The traditional linear model literature has been dominated by the *technology-push, demand-pull* debate. Proponents of the 'technology-push' school of thought consider scientific and technological discoveries as the primary stimulus of innovative activity. Those who adhere to the demand-pull model claim that innovation is driven by market needs.

Schumpeter was one of the early advocates (1940s) of the *'technology-push'* model of innovation. His theory on economic growth was an attempt to be consistent with the *Kondratiev long wave formation.* According to Rothwell and Zegveld,[2] Schumpeter illustrates that for each Kondratiev cycles of 40-50 years, major innovations, wars and harvest failures are forces affecting economic growth. Innovations, however, were regarded as the leading factor in major structural changes in these periods (e.g., steam power and textiles in the first Kondratiev to automobile, semiconductors and electronics in the 4th Kondratiev). Schumpeter puts emphasis on the role of entrepreneurs, monopolies (in his

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[1] Everett Rogers, 'The diffusion of innovations model', in I. Masser and H. Onsrud (eds), *Diffusion and Use of Geographic Information Technologies*, Kluwer Academic Publishers, Dordrecht, 1993, pp. 9-10.

[2] Roy Rothwell and Walter Zegveld, *Reindustrialisation and Technology,* Longman, London, 1985, pp. 28-30.

later works) and product technologies (more than process technologies) in the creation of new industries. In each of the waves, he describes four stages: entrepreneurs taking advantage of the emerging technologies; many entrepreneurs imitating; many firms developing and gradually cutting down on production costs; and re-innovation or new wave of innovations. Rothwell[3] describes Schumpeter's innovation model as a linear progression from the basic research, through applied research to commercial development, and on to diffusion. At the first stage, new inventions or breakthroughs were generated, followed by the 2nd stage in which these inventions were tried, applied, tested and packaged, leading to the 3rd stage in which new products were developed for commercial purposes by firms. Finally, in the 4th stage, products were assumed to find their way into the market-place through the firms. According to Rothwell and Zegveld,[4] there are two versions of Schumpeter's innovation model, namely Schumpeter Mark I and Schumpeter Mark II. The difference between the two lies in their view of 'source of innovation'. Schumpeter Mark I regards science and innovation as an exogenous factor **(Figure 2.1)**. In contrast, Schumpeter Mark II views technological development as endogenous in larger science-based companies **(Figure 2.2)**.

Rothwell[5] observes that during the second part of the 1960s, with greater realisation of the importance of market-place in innovation, the *demand-pull model* of innovation gained prominence. This model assumes a linear need-pull flow in which innovations are believed to be dictated by the customers' needs. Schmookler's time series analysis of patented invention and investment across different industries (railroads, petroleum refining, agriculture machinery and paper making)[6] in the United States has supported this demand-pull hypothesis. His findings suggest that the 'inventive activity in a field tends to fluctuate with economic activity in that field'[7] or as Coombs *et al.*[8] put it, 'upswings in inventive activity responded to upswings in demand'. Schmookler's demand-pull model of

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[3] Roy Rothwell, 'Developments towards the fifth generation model of innovation', *Technology Analysis and Strategic Management*, vol. 1, no. 4, 1992, p. 73.

[4] Walsh *et al.*, 1979, quoted in Rothwell & Zegveld, *op. cit.*, pp. 62-63.

[5] Rothwell, *op. cit.*

[6] Rothwell & Zegveld, *op. cit.*, p. 60.

[7] Jacob Schmookler, 'Technological change and economic theory', in Z. Griliches and L. Hurwicz (eds), *Patents, Invention, and Economic Change*, Harvard University Press, Cambridge, Massachusetts, 1972, p. 74.

[8] Rod Coombs, P. Saviotti & V. Walsh, 'Patterns of innovation', *Economics and Technological Change*, 1987, Macmillan Education, Basingstoke, p. 96.

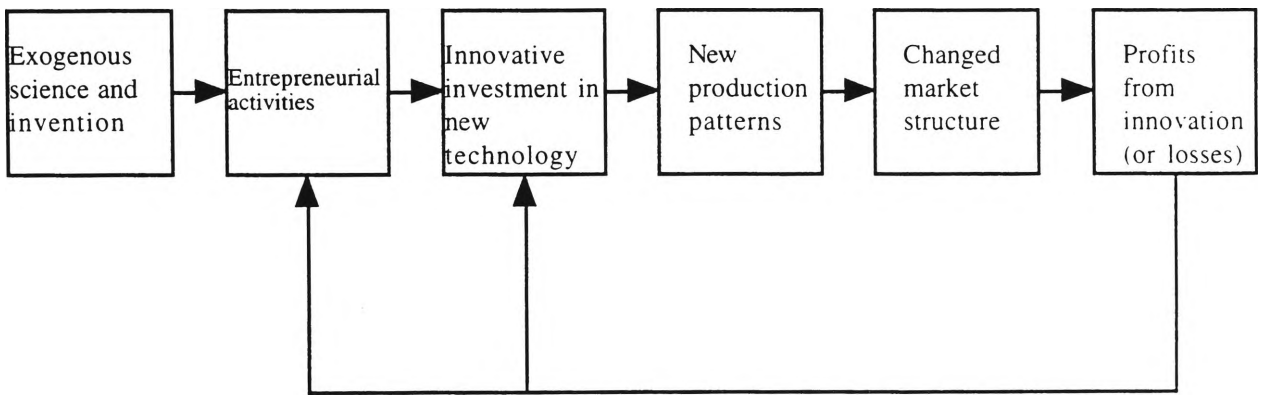

Figure 2.1 Schematic representation of Schumpeter's model of entrepreneurial innovation (Mark 1)

Source: Walsh et al., 1979 based on diagrams of Philips, 1971 quoted in Rothwell and Zegveld, 1985.

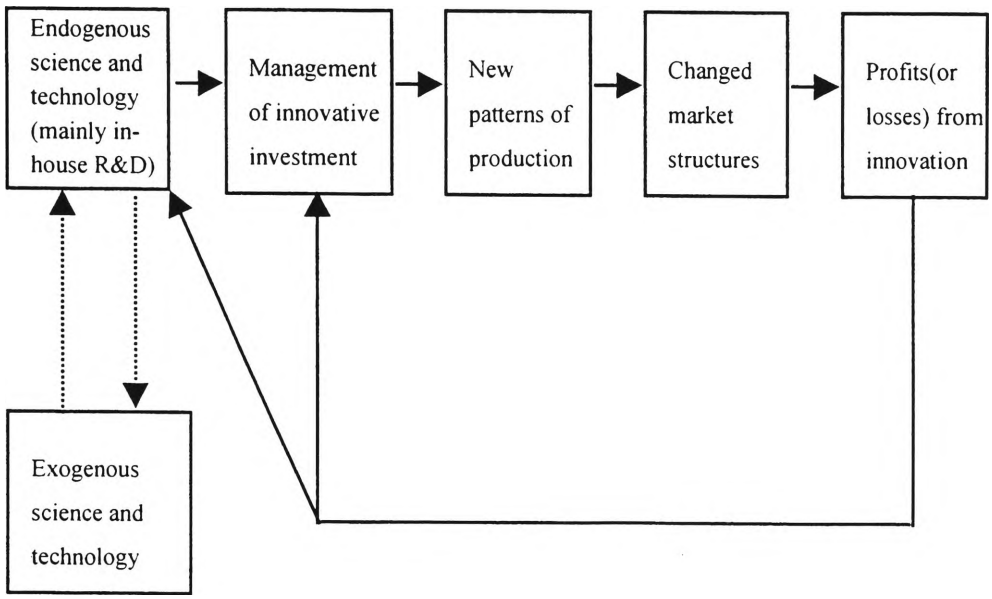

Figure 2.2 **Schematic representation of Schumpeter's model of large-firm managed innovation (Mark II)**

Source: Walsh et al., 1979 based on diagrams of Philips, 1971, quoted in Rothwell & Zegveld, 1985

innovation is represented by Walsh *et al.'s* diagram in **Figure 2.3** as it appeared in Rothwell and Zegveld.[9]

Both technology-push and demand-pull theories of Schumpeter and Schmookler, respectively, have been supported by many subsequent empirical studies focused on firms and industries in capitalist societies. Coombs *et al.*[10] summarise the various attempts at establishing whether science or demand has been responsible for technological development and economic growth. Coombs *et al.*[11] point to Mowery and Rosenberg's observations that their empirical studies tend to support the contention that demand is the most important factor of the innovation process. However, Mowery and Rosenberg doubt the reliability of this conclusion for lack of 'comparability' of the studies.[12] In their final analysis, Mowery and Rosenberg[13] argue that neither technology-push nor demand-pull is 'solely' important but it is the 'coupling' of technology and market that matters.

A more recent analysis of innovation research is contained in a paper by Chidamber and Kon.[14] They review eight major studies on innovation, and classify the works of SAPPHO, Meyers and Marquis, Langrish, and Utterback as demand-pull oriented, and those of Mowery and Rosenberg, Freeman, Casey, and Pavitt as generally technology-push studies. Chidamber and Kon critically analyse the methodologies used by these studies. These methodologies are project focus, case study, economic or national level statistical analysis, and meta-analysis. A major inference Chidamber and Kon make is that differences in 'research objectives or constructs, definitions, and models' make these studies incomparable and that different levels of analysis give different results.[15]

The technology-push and demand-pull models of innovation are observed by various authors to be incomplete representations of the innovation process. Both models assume one-way flow of the innovation process with very little, if not zero feedback loops. They fail to consider and explain the external and internal environments of innovation.

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[9] Rothwell & Zegveld, *op. cit.*, p. 62.

[10] Coombs *et al.*, *op. cit.*, pp. 97-103, citing analyses made by various authors, namely Mowery and Rosenberg, Rothwell, Rothwell and Zegveld, Pavitt, Walsh, Dosi, Freeman *et al.*

[11] *Ibid.*

[12] *Ibid.*

[13] David Mowery & Nathan Rosenberg, *Technology and the Pursuit of Economic Growth*, Cambridge University Press, Cambridge, 1989, p. 9.

[14] Shyam Chidamber & H. Kon, 'A research retrospective of innovation inception and success: The technology-push, demand-pull question', *International Journal in Technology Management*, vol. 9, no. 1, 1994, pp. 94-112, citing the works of SAPPHO, 1974; Meyers and Marquis, 1969; Langrish, 1972; and Utterback, 1974; Mowery and Rosenberg, 1979; Freeman, 1982; Casey, 1976; and Pavitt, 1971.

[15] *Ibid.*

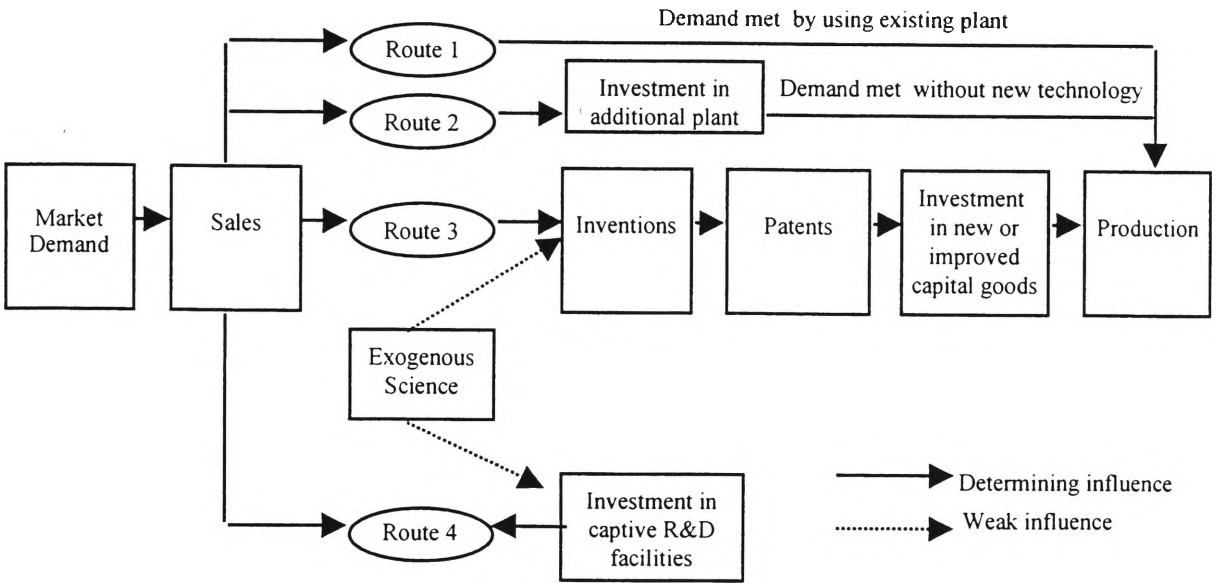

Figure 2.3 Schematic representation of Shmookler's model of demand led invention

Source: Walsh et al., 1979, quoted in Rothwell & Zegveld, 1985

Rothwell[16] presents the other models which were basically *'interactive'* **(Figure 2.4)** and *'firm-centred'* as follows:

- Coupling (3rd generation) model - represents the linking of the firm with S&T and market place, with inter and intra organisational coordination and interaction. However, this is still a sequential process model.
- Integrated innovation process (4th generation) - characterised by increased vertical and horizontal integration and collaboration with other companies including research institutions.
- Systems integration and networking (SIN) model - involving more intense linkages both with primary customers and major suppliers, and emphasising corporate management, development speed, total quality systems and computer aided production.

Other contemporary writings suggest models which are parallel to those discussed above. However, it is worthwhile citing the works of authors considered by Forrest,[17] as these add new dimensions into the model. Mansfield *et al.*'s[18] *five-stage model* of the process of product innovation includes applied research, product specification, pilot plant or prototype construction, tooling and construction of manufacturing facilities, and manufacturing start-up. Their definitions of these stages are made specific enough to allow actual measurement of time and cost, which are traceable in a firm's accounting records. Marketing start-up, although not a numbered stage, is included under items to be costed. The length of time between applied research and date of commercial introduction is also considered. Mansfield *et al.*[19] introduce the idea of time-cost tradeoff function, which is the relationship between the amount spent for innovation and the length of time it would take to develop a new product. In their empirical study, they conclude that spending more money can generally reduce the time it takes a firm to innovate. Their study also indicates that the biggest share of the total cost of innovation is concentrated on the stage of tooling and designing, or constructing manufacturing facilities, and that the longest period of time in the innovation process occurs in the prototype or pilot plant stage.[20]

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[16] Rothwell, *op. cit.*, pp. 73-75.

[17] J. Forrest, 'Models of the process of technological innovation', *Technology Analysis and Strategic Management*, vol. 3, no. 4, 1991, pp. 440-447.

[18] Edwin Mansfield, J. Rapoport, J. Schnee, S. Wagner, & M. Hamburger, *Research and Innovation in the Modern Corporation*, W.W. Norton & Company, Inc., New York, 1971, pp. 111-115.

[19] *Ibid.*, pp. 126-131, 135.

[20] *Ibid.*, pp. 134-135.

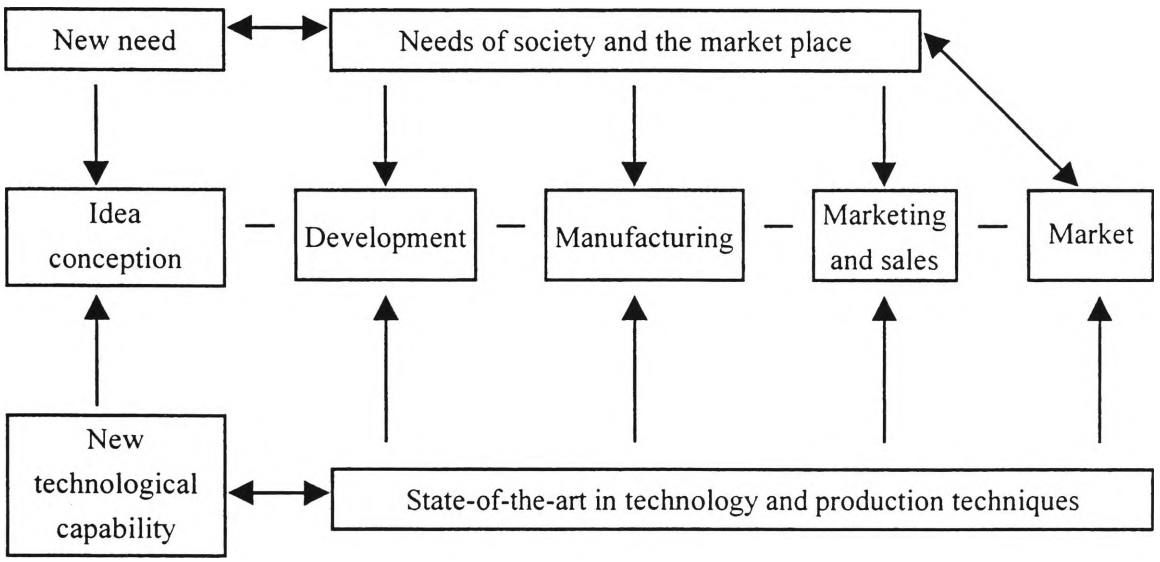

Figure 2.4 Interactive model of innovation process

Source: Rothwell, 1983, quoted in Rothwell & Zegveld, 1985

Gardiner and Rothwell's model[21] regards the innovation process as iterative involving continuous re-designing of products based on customers' feedback to improve performance and reduce costs.

Utterback and Abernathy's model[22] emphasises the change in focus from product technology in the beginning of an industry to one which concentrates on process technology and cost reduction as the industry matures. This model is related to the concept of product life cycle, in which a product is observed to undergo four phases, namely introduction, growth, maturity and decline. The product life cycle **(Figure 2.5)** illustrates the volume of sales of a product over time, starting from a low level of sales during the period of introduction, followed by a growth period characterised by increasing volume of production and sales (as the product is adapted to and improved based on users' needs and as demand increases), followed by a maturity stage where demand levels off as the market becomes saturated, and followed eventually by product decline.

There are ways in which firms or industries can delay product decline or extend product life. Rothwell and Zegveld[23] identify some of these strategies: phasing-in new products as the original product's life is starting to decline; product cost reduction through change in technology to stimulate demand; and introduction of a 'family of products'. Utterback and Abernathy's product/process cycle **(Figure 2.6)** is an extension of the product life cycle model. With a 'productive unit' instead of a single product as their unit of analysis, the model relates the rate or frequency of innovation to the stages of product or process development.

Utterback and Abernathy[24] describe three stages of process development, namely the *uncoordinated, fluid and inefficient stage* with market expansion and redefinition resulting in frequent competitive improvements; the *segmental stage* with production systems aiming for efficiency and becoming more rigid or specialised as price competition gets stiffer, thus production processes tend to be segmented; and the *systemic stage* with processes becoming highly developed, efficient, and integrated, during which state process redesign is difficult and therefore sparse.

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[21] Forrest, *op. cit.*, pp. 443-444.

[22] *Ibid.*, pp. 444-445.

[23] Rothwell & Zegveld, *op. cit.*, pp. 17-19.

[24] James Utterback & William Abernathy, 'A dynamic model of process and product innovation', in Christopher Freeman (ed.), *The Economics of Innovation*, Edward Elgar Publishing Ltd., Aldershot, Hants, England, 1990, pp. 426-427.

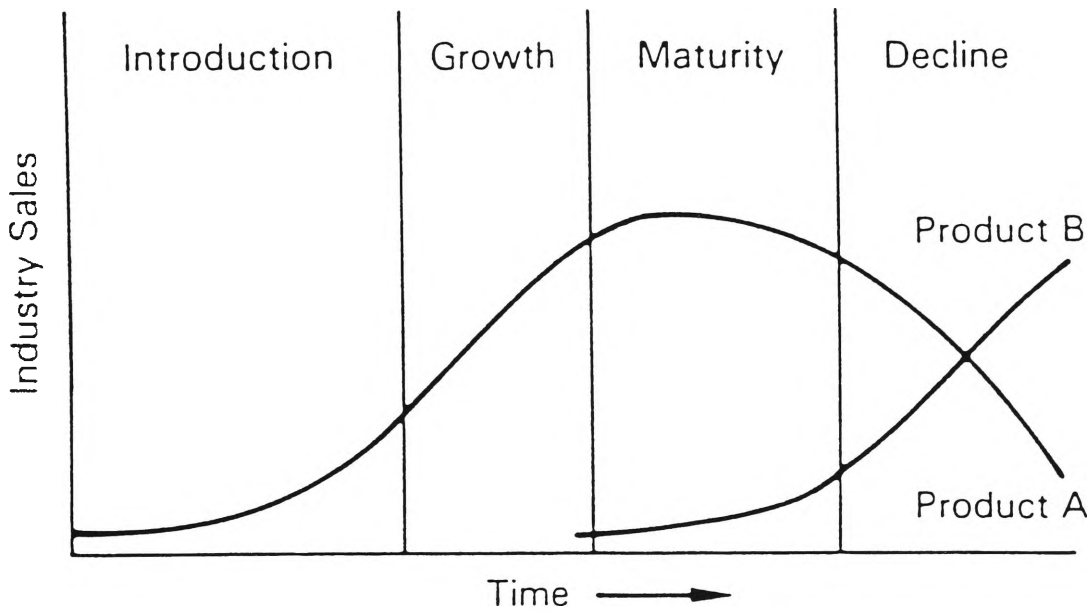

Figure 2.5 The product life cycle: four phase model

Source: Duijn, 1983, quoted in Rothwell and Zegveld, 1985.

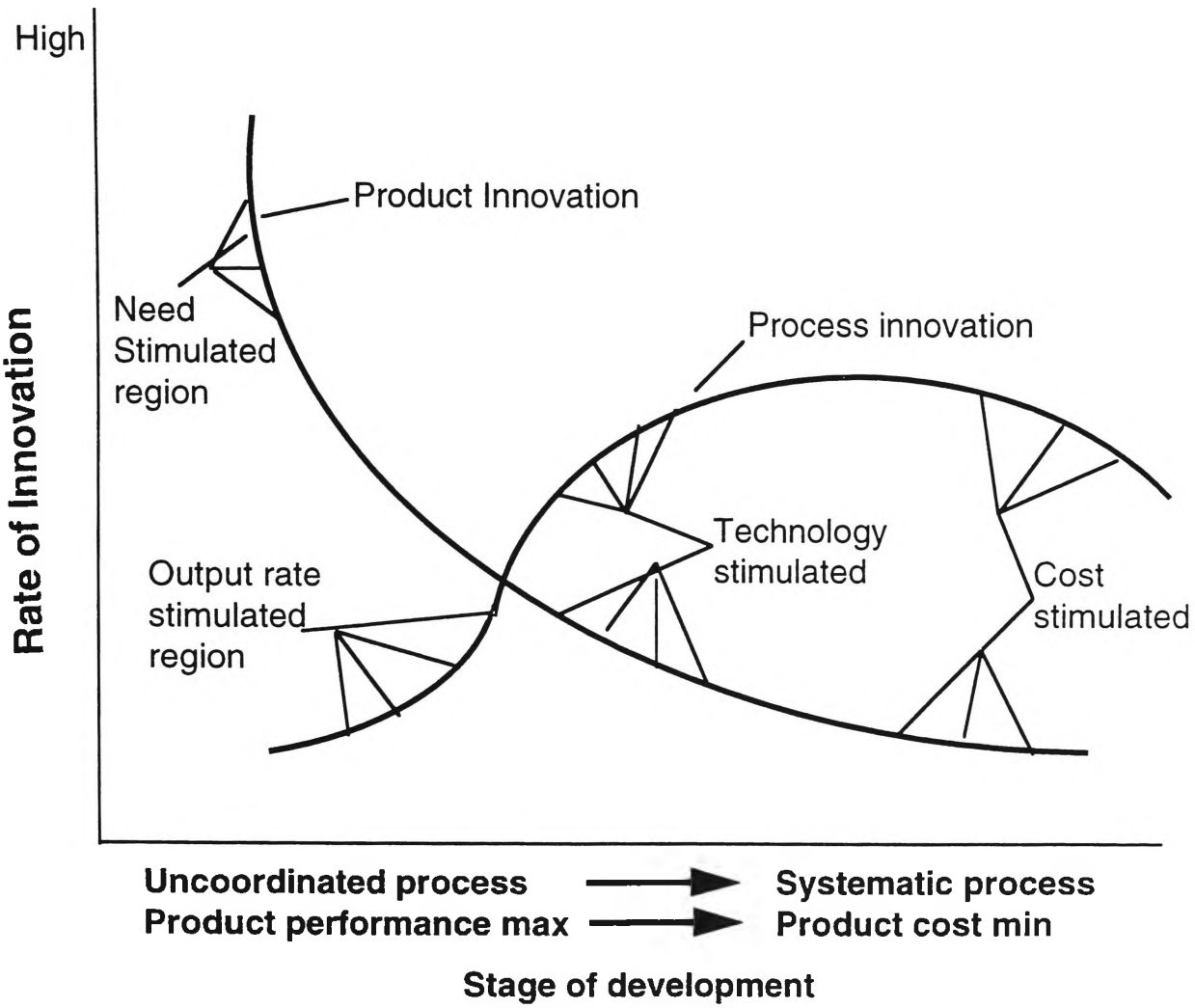

Figure 2.6 **Innovation and stage of development (product/process life cycle)**

Source: Utterback & Abernathy, 1985

The stages of product development are identified as follows: the *performance-maximising stage* during which period the rate of product change is rapid and product innovation tends to be stimulated by new market needs; the *sales maximising stage* with emphasis on product variation as producers gain internal technical capability and as markets become less uncertain; and the *cost-minimising stage* with products becoming more standardised for cost reduction.[25] The stages of process development are viewed by Utterback and Abernathy as corresponding to the stages of product development **(Figure 2.6).** The hypothesis underlying the model is that the proportion of product innovations undertaken by firms is greater during the early life of process and product development. The reverse is the case for process innovations during this stage. However, as the production system becomes more specialised, process innovations become more significant. The product/process cycle model also helps to explain the relationship between innovation process and competitive strategy of firms. It assumes that competitiveness during the early stage of product/process development depends on the introduction of market-oriented product innovations. To sustain competitiveness, however, emphasis will be given to innovations that will improve product performance and manufacturing process. Utterback and Abernathy's framework, as observed by Teece,[26] is appropriate only to 'mass markets where consumer tastes are relatively homogeneous' and less suited to 'small niche markets'.

Other models cited by Forrest[27] include: *Twiss's activity stage model* that recognises the pre-innovation factors such as 'creativity'; and *Schmidt-Tiedemann's theoretical model* that recognises 'milestones' which are business-oriented, and considers important decision points and environmental factors.

With increasing realisation of the inadequacy of both the *technology-push* and *demand-pull models* as wholly explaining the behaviour of firms and industries, innovation scholars have introduced the concepts of *technological paradigm, natural trajectory, technological guidepost* and other similar 'path dependent' models. Based on these concepts, innovation within a firm or industry or sector is no longer a simple matter of responding to changes in demand or scientific breakthroughs. The locus of analysis has

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[25] *Ibid.*, pp. 427-430.

[26] David Teece, 'Profiting from technological innovations: Implications for integration, collaboration, licensing and public policy', in Freeman (ed), *op. cit.*, p. 188.

[27] Forrest, *op. cit.*, pp. 442-446.

shifted to ways in which perceived needs and opportunities are mediated and converted into technological decisions by a particular firm or organisation. Such concepts suggest a specific boundary that limits the range of technological options perceived by a firm and dictates the directions it will take. Dosi[28] describes *technological paradigm* as a 'pattern for solution of selected techno-economic problems based on highly selected principles derived from natural science' or a 'body of knowledge, expertise, selected physical and chemical principles that defines technological opportunities for further innovation and some basic procedures on how to exploit them'. Further elucidating on the definition of *technological paradigms*, Dosi[29] conceives it as 'both a set of *exemplar* (an artefact that is to be developed and improved) and a set of *heuristics* (e.g. Where do we go from here?, Where do we search?)'. In differentiating technological paradigm from Nelson and Winter's concept of *technological trajectory,* Dosi[30] explains that *technological trajectory* is the 'activity of technological progress along the economic and technological trade-offs defined by a paradigm'.

A similar notion has been advanced by Sahal[31] in his *technological guideposts and innovation avenues* theory. In his investigation of the technological progress in aircraft, farm tractor and computer industries, his results seem to indicate that the innovation process follows a 'certain topography of technological evolution'. Sahal specifically states that 'technical progress is... characterised by the existence of...technological guideposts and innovation avenues that lay out certain definite paths of development'.[32] For instance, in his case study of farm tractor industry, Sahal observed that the introduction of Fordson and Farmall models (general-purpose tractors), during the period 1917-1926, provided a basic pattern that guided subsequent developments in tractor designs. He added that, except for numerous refinements, the essential features of these tractors remained the same until a limit to incremental technological development was reached by late 1930s. This led to the development of 'three-point hitch and control system' model, a clear attempt to overcome constraints on further evolution of technology.

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[28] Giovanni Dosi, 'The nature of the innovation process', in G. Dosi, C. Freeman, R. Nelson, G. Silverberg & L. Soete (eds), *Technical Change and Economic Theory*, Pinter Publishers, London, 1988, p. 224.

[29] *Ibid.*

[30] *Ibid.*, p. 225.

[31] Devendra Sahal, 'Technological guideposts and innovation avenues', in Freeman (ed.), *op. cit.*, pp. 442-462.

[32] *Ibid.*

In general, the agricultural sector has been dominated by the *mechanical-chemical paradigm*. This technological paradigm has resulted, for example, in the development of new crop varieties that adapt to specific agricultural machines or chemical inputs (e.g. varieties resistant to weedicide). However, some analysts of agricultural development have predicted the imminent shift from the *mechanical-chemical* to the *biological paradigm* in agriculture, noting, among others, new developments in biotechnology and increasing pressure to adopt environment-friendly technologies. Examples of technological paradigms and natural trajectories that have wide-ranging effect over large number of industries are given by Nelson and Winter,[33] namely mechanisation and exploitation of latent economies of scale (e.g. chemical process industries, power generation), and by Perez,[34] namely microelectronics.

Another way of interpreting technological change through evolutionary processes is put forward by Nelson and Winter. They introduce the *evolutionary model of firm behaviour* and the concept of *selection environment.* The evolutionary theories of innovation have drawn analogies from the evolutionary theory of Darwin. The core of Darwin's theory suggests that species change through a process called natural selection and that they are what they are as an aid to survival. Accordingly, species' diversity and the struggle for existence interact and only the most successful ones survive to reproduce and pass on traits on which their success is based.[35] The theory implies a continuing process of evolution and suggests that selection favours those who are able to adjust to the new order of things. These notions are most appealing to authors like Nelson and Winter who acknowledge the stochastic evolutionary nature of innovation, the diversity and disequilibrium of choices, and the complexity of the institutional structure for innovation.[36]

These ideas are in contrast to the equilibrium and statis assumptions of the traditional theories of economic growth. Nelson and Winter's evolutionary theory of firm behaviour[37] involves the elements of 'organisational routine' and 'search operations'. Organisational routine is defined as 'regular and predictable operations of a firm',

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[33] Richard Nelson and Sidney Winter, 'In search of a useful theory of innovation', *Research Policy*, vol. 6, 1977, p. 58.

[34] Carlota Perez, 'Microelectronics, long waves, and world structural change: New perspectives for developing countries', in Freeman (ed.), *op. cit.*, pp. 1990, 441-463.

[35] Carlota Perez, *When Where Why and How it Happened*, Readers Digest, London, 1993, p. 253.

[36] Nelson & Winter, 'In search of a useful theory of innovation', *op. cit.*, pp. 47-48.

[37] Richard Nelson & Sidney Winter, *An evolutionary Theory of Economic Change*, The Belknap Press of Harvard University Press, Cambridge, Massachusetts, 1982, pp. 14-21.

including skills, procedures and decision rules of a firm that determine its behaviour given external conditions.[38] Search operations are described as the process of evaluating and monitoring existing routines and finding ways to improve them. Routine here is compared with 'genes' in the sense that it is inheritable (firms are what they are in the future according to routines employed in the past) and selectable (firms with certain routines survive better than others). Search processes on the other hand are considered to generate mutations or new set of routines.

In the context of the foregoing discussion, a firm will tend to follow certain routines or decision rules until its targets are satisfied and not simply respond to profit maximising behaviour. If targets are not satisfied, firms will change routine according to their search results and this is where innovation lies. Nelson and Winter[39] do not discount the possibility of the existence and importance of perceived natural trajectories (that innovation has a certain inner logic of its own), and of technological regimes (the frontier of achievable capabilities given a broadly defined way of doing things).[40] Coombs *et al.*[41] illustrate Nelson and Winter's evolutionary model of firm behaviour in a graphical presentation **(Figure 2.7)**.

Nelson and Winter[42] extend their theory to include the concept of selection environment. The *selection environment* is determined by factors exogenous to a firm or sector and by behaviour of other firms in the sector. The concept suggests that choices (innovations or new set of routines) made by firms are influenced by specific selection environments that differ among firms, and among industries or sectors. In general, a selection environment is described by Nelson and Winter as either a market environment, where economic competition leads to the selection of the most successful innovation, one that will possibly be imitated by other firms, or non-market (e.g. public education system, public health service), where actions of these institutions are for the public interests and not necessarily profit motivated. Each selection environment presents different motivations, incentives and criteria for success and rules for competition among firm/sectors/industries. According to this concept, the choice of specific innovations will depend upon the

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[38] *Ibid.*

[39] Nelson & Winter, 'In search of a useful theory of innovation', *op. cit.*, pp. 56-60.

[40] Natural trajectories and technological regimes have the same connotation as technological trajectories and technological paradigms, respectively.

[41] Coombs *et al.*, *op. cit.*, p. 117.

[42] Nelson & Winter, 'In search of a useful theory of innovation', *op. cit.*, p. 61-70.

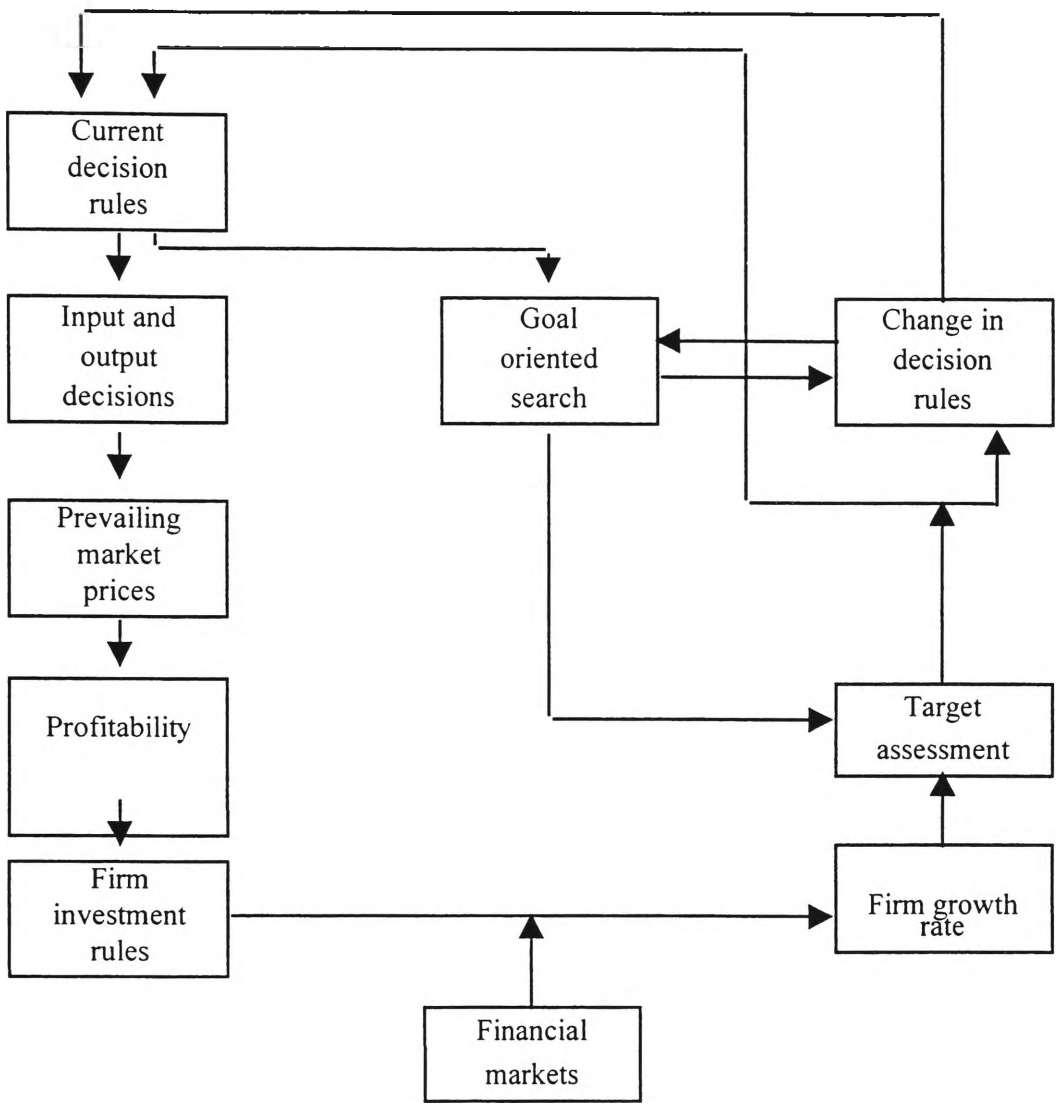

Figure 2.7 Nelson &Winter's evolutionary model of firm behaviour

Source: Coombs, et al., 1987

institutional diversity within which firms/industries/sectors function. This includes the perception of firms regarding what is profitable, consumer preferences and regulatory policies, and mechanisms of information sharing among firms in the imitation process. Imitation is viewed as the primary means by which innovation spreads. Within the general framework discussed above, Nelson and Winter present different sets of models (embodied in a computer simulation program) that focus on key determinants of industry structure and performance under competition 'like ease of imitation, the degree to which large firms restrain investment, and character of the technological change regime'.[43]

To summarise, common to the foregoing concepts is the notion that there exist 'paradigms' with different levels of generality or specificity in various industrial sectors. Innovations within firms or industries are likely to be 'paradigm-bound' and follow a specific path or 'trajectory'. This implies that technological changes tend to be incremental and cumulative anchored on some existing technological base. This will be the case until no further improvements can be made within the boundaries of existing technological paradigms and trajectories, or until an external shock (e.g. an energy crisis) warrants a major technological change. Such major 'discontinuities in the pattern of change'[44] will signal shifts in technological paradigms. In the concepts discussed above, there has been a recognition of the influence of techno-economic factors on innovative activities but only to the extent permitted by a given technological paradigm.

Another useful perspective to understand innovation and innovation policies is the theory of *long waves* or *long cycles*. The long waves theory assumes that the rise and fall phenomenon are indicators of economic growth and that they recur about every 40 to 50 years.[45] It points to the centrality of innovations that have far-reaching effect across a wide-range of industries as the driving force of the economy. Based on observed patterns, many authors claim that the current period is a transition from one cycle, where innovations such as the automobile, semiconductors, electronics, pharmaceuticals dominate the economy, to the next cycle, where innovations such as information technology may dominate. Perez[46] associates this long wave concept with what she calls *'techno-economic paradigms'*. Freeman[47] regards Perez' theory as a 'meta-paradigm' that recognises the pervasive

[43] For a more detailed discussion of the models, refer to *ibid*, chapters IV to VI.
[44] Dosi, *op. cit.*, p. 228.
[45] Rothwell and Zegveld, *op. cit.*, pp. 28-30.
[46] Perez, *op. cit.*
[47] Christopher Freeman, 'Preface to Part II', in Dosi *et al.*, *op. cit.*, pp. 10-11.

consequences of a change in 'technological style' throughout all sectors of the economy. Perez argues that a major structural change is necessary before a new techno-economic paradigm 'can generate a new wave of world-wide economic growth'. She brings a new perspective into the concept with her idea that 'long wave recession is a syndrome of a mismatch between the socio-institutional framework and the new dynamics in the techno-economic sphere'.[48] Already, people are speculating on innovations or cluster of innovations that are likely to bring/push the economy up towards the next wave.

In agriculture, some people assert that biotechnology will lead to an evolutionary growth of the sector. Biotechnology has various applications to a wide range of economic activities especially the chemical-pharmaceutical domain. It has the potential to overcome the limits of technological paradigm based on inorganic and non-renewable resources. But rather than advancing within the agricultural sector, Goodman and Wilkinson[49] expect biotechnology to 'merge the agro-food system with the chemical and pharmaceutical industries to form a bio-industrial processing complex'.

Recent attempts to model the innovation process are found in the works of Nelson and his colleagues on *national systems of innovation (NSI).*[50] Nelson and Winter's evolutionary model of firm behaviour and theory of selection environment appear to provide strong basis for the NSI concept. *NSI* offers a more holistic view of innovation locating it in the context of *national systems* or *nation states.* This is in contrast with the micro perspective of both linear and firm-centred models. Nelson and Rosenberg[51] promote the idea that the technological capabilities of national firms depend largely on the system for national action or the support and interaction of a set of many institutional actors, not only the R&D sector. Therefore, analysis is focused on the roles and interactions of government, universities, firms, marketplace, other sectors of society, and international factors in shaping national technological capabilities. In recent years, there has been a growing interest in the national context of innovation. This is because of the successes of countries espousing it, such as the Japanese and German economies, and the trend towards

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[48] Perez, *op. cit.*, p. 468.

[49] David Goodman & John Wilkinson, 'Patterns of research and innovation in the modern agro-food system', in Philip Lowe, Terry Marsden, & Sarah Whatmore (eds), *Technological Change and the Rural Environment*, David Fulton Publishers, London, 1990, p. 139.

[50] Strictly speaking, one should speak of state systems of innovation. However, the word 'national' is widely used as a synonym for state in this context.

[51] Richard Nelson & Nathan Rosenberg ,'Technical innovation and national systems', in R. Nelson (ed.), *National Innovation Systems: A Comparative Analysis*, Oxford University Press, Oxford, 1993, pp. 3-20.

globalisation, regionalisation and internationalisation. Empirical studies on NSI focus on institutional differences/similarities across nations, specifically looking at institutions and mechanisms supporting innovation in these countries. As Nelson and Rosenberg[52] argue, national differences (e.g. in the mix of industries) and boundaries influence the shape of national systems of innovation.

The *knowledge or learning cycle* models of innovation incorporate the role of knowledge into the innovation process. According to Steen *et al.*,[53] recent attempts at theorising knowledge cycles in the innovation process are represented by the works of Boisot,[54] and Nonaka and Takeuchi[55]. These models emphasise the need for firms to exploit both tacit or uncodified, and explicit or codified knowledge to continually innovate in a cycle of learning. For example, Boisot's learning cycle involves the elements of codification through problem solving, diffusion of the codified information, absorption or decodification of information diffused through the organisation after problem solving, and scanning or the internalisation of tacit knowledge from a larger pool of tacit knowledge **(Figure 2.8).**[56] Iterative collaboration, team-based research, and social networking between firms and R&D organisations can enhance the utilisation of these types of knowledge.[57]

It is interesting to note the various attempts at theorising and modelling *innovation* and their differing claims to applicability. The theories of the firm have provided a framework for understanding the innovative behaviour of firms. Then there are the more macro views of technological change, namely path-dependent or paradigm concepts, and attempts at explaining choice of specific technological paradigm in the context of national systems; knowledge or learning cycles; and the socio-political, economic and ecological dimensions of technological change.

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[52] *Ibid.*, pp. 11, 14.

[53] John Steen, Dallas Hanson & Peter Liesch, 'Collaborative research and development: New insights from cyclic models of the innovation process', *International Journal of Innovation Management*, vol. 2, no. 1, March 1998, pp. 107-121.

[54] M. Boisot, 'Is your firm a creative destroyer? Competitive learning and knowledge flows in the technological strategies of firms, *Research Policy*, vol. 24, 1995, pp. 489-506; Boisot, *Information Space: A Framework for Learning in Organisations, Institutions and Culture*, Routledge, London, 1995.

[55] I. Nonaka & H. Takeuchi, *The knowledge-Creating Company*, Oxford University Press, New York, 1995.

[56] Boisot, 'Is your firm a creative destroyer?', cited in Steen *et al.*, *op. cit.*

[57] Steen *et al.*, *op. cit.*

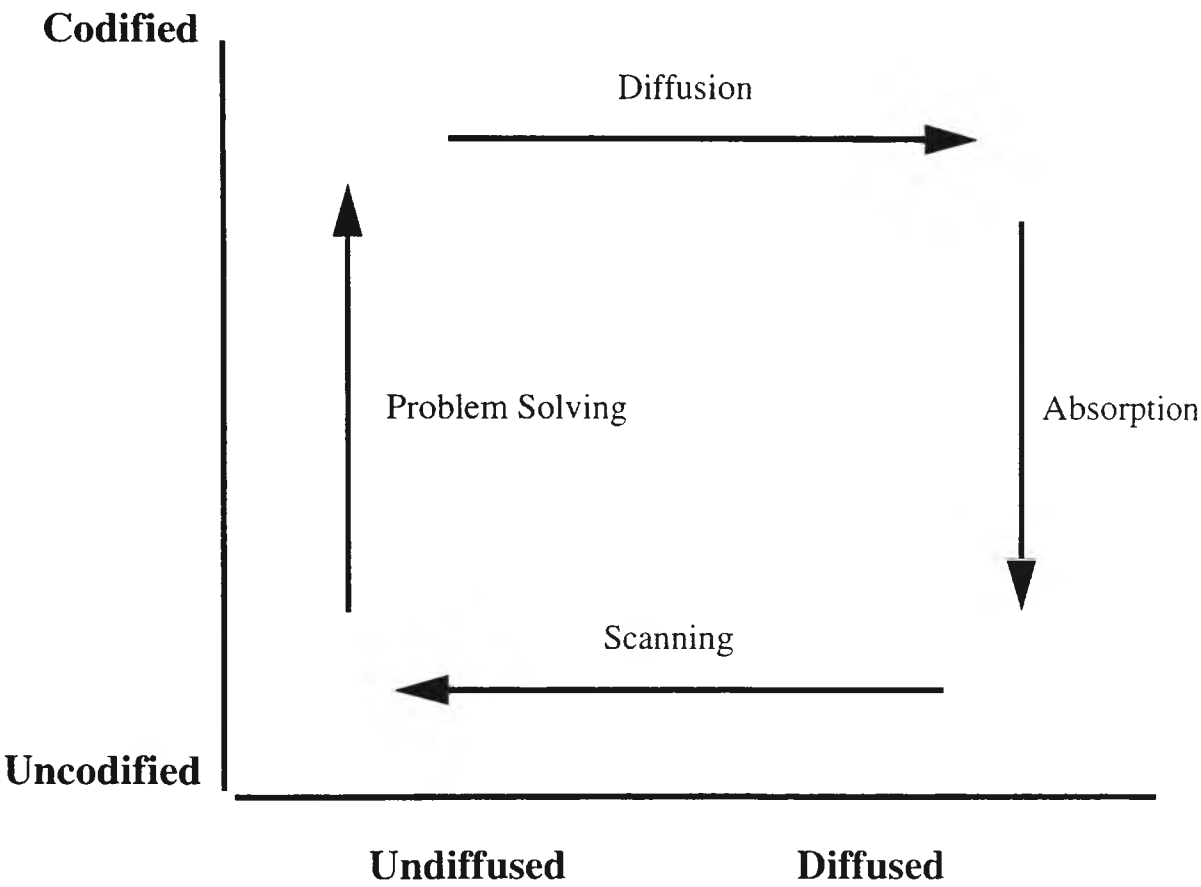

Figure 2.8 Organizational learning cycle

Source: Boisot, 1995, quoted in Steen *et al.*, 1998

2.2.2 Induced Innovation Theory

The beginnings of induced innovation models can be traced from the works of Hicks[58] in 1932, who postulates that changes in relative prices of factors of production will induce inventions that save on the use of the more expensive factor. This theory is contested by Salter[59] in 1961 who argues that entrepreneurs are profit motivated and will try to reduce all their costs. Coombs *et al.*[60] also mention the separate works of Kennedy, von Weizsacker, and Drandakis and Phelps during the 1960s, who all observe that there is a greater tendency to economise on a production factor, the greater its proportion in the production cost. The induced innovation theories generally employ an aggregate framework. For instance, a specific innovation theory may explain technological changes for the entire sector or economy as a whole. The induced innovation theories advanced by Hayami and Ruttan are given more attention in this section, having been developed and tested primarily to understand patterns of agricultural development.

At this point, the neo-classical theory of production, although limited in its capacity to explain the innovation process, shall be briefly discussed as a prelude to the induced innovation concept in which 'factor endowments' are a fundamental consideration. Neo-classical production function is an input-output relationship postulating that output is a function of two major factors, namely capital and labour, considering all other variables constant. It is seen as a series of isoquants, each of which represents the most efficient combinations of factors for a particular level of output[61] **(Figure 2.9).** An isoquant represents a specific level of technology which determines the available factor combinations or techniques to produce a maximum amount of output. The shape of isoquants (Q_1, Q_2) is assumed to be convex because of the law of diminishing returns. Line AB in **Figure 2.9** is referred to as the isocost line indicating all possible combinations of factors that can be used for a fixed sum. As described by Coombs *et al.*,[62] the production function theory assumes that from among the available techniques on the most advanced production function (Q_2—one which is nearest the origin), the firm will tend to choose the

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[58] Vernon Ruttan & Yujiro Hayami, 'Induced innovation theory and agriculture development: A personal account', in B. Koppel (ed.) *Induced Innovation Theory and International Agricultural Development*, John Hopkins University Press, Baltimore, 1995, p. 23; Coombs *et al.*, *op. cit.*, p. 104.

[59] Ruttan & Hayami, *op. cit.*; Coombs *et al.*, *op. cit.*, p. 105.

[60] Coombs *et al.*, *op. cit.*

[61] David Heathfield, *Production Functions*, Macmillan Press Ltd., London & Basingstoke, 1971, p. 18.

[62] Coombs *et al.*, *op. cit.*, pp. 25-26.

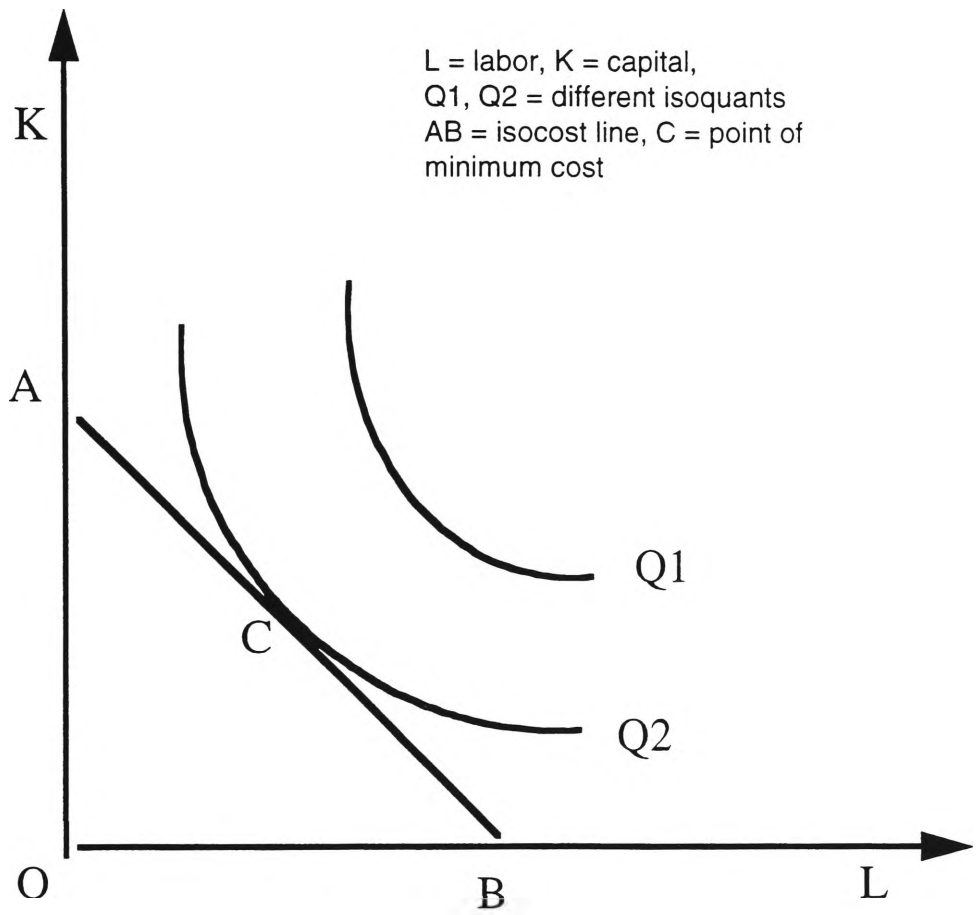

Figure 2.9 The production function

Source: Coombs, *et al.*, 1987

technique that minimises total production costs. This is the point at which the isocost line touches the given isoquant (C). Technical change in this respect is represented by shifts in production towards the origin, identified as either capital saving, labour saving or neutral technical change.

The production function theory has been criticised as lacking in realism and does little to explain the nature of the innovation process. For instance, it assumes zero output on zero input, unlimited substitutability of labour and capital, thus it disregards possible complementarity of these factors, unlimited techniques at a given level of technology, and that only cost-reducing improvements can be described by the theory.[63]

The Hayami and Ruttan induced innovation model is an extension of Hicks' microeconomic theory of the firm which has been further pursued by Ahmed, Hayami, Ruttan, and Binswanger.[64] According to Koppel,[65] the model 'in its fully developed form', speaks of two interrelated concepts, namely: *induced technological innovation and induced institutional innovation*. Technological innovation is viewed as 'induced by changes in factor supplies and product demand, and by institutional change' while institutional innovation is seen as 'induced by changes in factor supplies and product demand and by technical change'.[66] This implies that technical and institutional changes are stimulated by similar forces and are both endogenous to the economic system. In Hayami and Ruttan's earlier works, the *induced technological innovation model* was empirically verified in the macro-economic context of aggregate national factor endowments.[67] Historical experiences of agricultural development in the United States and Japan were examined to demonstrate the theory of *induced technological innovation*. The general observation was that factor prices tend to 'reflect national factor scarcities' such that technologies attuned to specific resource endowments were developed and utilised.[68] Ahmed and Ruttan[69] specified that in the United States, where labour was scarce and land and capital relatively abundant,

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[63] *Ibid.*, pp. 28-29; Heathfield, *op. cit.*, pp. 43-44.

[64] Ruttan & Hayami, 'Induced innovation theory and agricultural development: A reassessment', in Bruce Koppel (ed.), *Induced Innovation Theory and International Agricultural Development*, John Hopkins University Press, Baltimore, 1995, p. 180.

[65] Bruce Koppel, 'Why a reassessment?', in Koppel (ed.), *op. cit.*, p. 3.

[66] *Ibid.*

[67] Iftikhar Ahmed & Vernon Ruttan (eds), 'Introduction', *Generation and Diffusion of Agricultural Innovations: The Role of Institutional Factors*, Gower, Aldershot, 1988, p. 2.

[68] Stephen Biggs & Edward Clay, 'Generation and diffusion of agricultural technology: Theories and experiences', in *ibid.*, pp. 30-31.

[69] *Ibid.*

capital-intensive technologies were promoted. The opposite case was observed in Japan. Accordingly, it was mechanisation technology that accounted for most of the increase in agricultural productivity in the US.[70] In Japan, it was essentially biological technology such as varietal improvement (substituting use of fertiliser for land) that accelerated rapid growth in agriculture.

The application of *induced technological innovation model* has been expanded to encompass the theory of *induced institutional innovation.* Institutional innovation is defined by Ruttan[71] as a 'change in the actual or potential performance of existing or new organisations; in the relationship between an organisation and its environment; or in the behavioural rules that govern the patterns of action and relationships in the organisation's environment'. For example, the institutional innovation model helps to explain the innovative behaviour of research organisations. As stated by Biggs and Clay,[72] research institutions in the US and Japan are expected to meet the needs of producers for technologies conforming with the country's factor endowments, at least in the agricultural sector. To further illustrate the application of the model, it helps to look at Ruttan's[73] explanation, as follows:

> A rise in the price of labour relative to other factors induces technical changes designed to permit the substitution of capital for labour and, at the same time induces institutional changes designed to enhance the productive capacity of the human agent and the control by the worker of the conditions of his employment. A rise in the price of land induces technical changes designed to release the constraints on production resulting from the inelastic supply of land and, at the same time, induces institutional changes leading to greater precision in the definition and in the allocation of property rights in land.

The induced innovation model has been a powerful tool to explain, even justify, the emergence, structure, and innovative behaviour of international and local agricultural R&E systems. However, it has been the subject of many criticisms. The major ones[74] include: a) inability of the model to account for complex political economy dimension to relationships between farmers and agricultural research, and the politics of research problem identification; b) inability to explain innovations where markets tend to fail or in centrally-

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[70] *Ibid.*

[71] Ruttan, 'Generation and diffusion of agricultural technology: Issues, concepts and analysis', in Ahmed & Ruttan (eds), *op. cit.*, p. 85.

[72] Biggs & Clay, *op. cit.*, p. 32.

[73] Ruttan, *op. cit.*, p. 89.

[74] Koppel, *op. cit.*, pp. 11-18; Ahmed & Ruttan, *op. cit.*, pp. 2-3.

planned economies; c) inequalities in agrarian structure often do not reflect shadow values of factors; d) focus on technological change in the aggregate level, (e.g. for the entire agricultural sector rather than for specific crops, farms and regions); e) imported technology or activities of multinational corporations may not correspond to relative factor endowments of individual countries; and f) inability to explain technical change induced by growth in product demand. In partly addressing these criticisms, Hayami and Ruttan in their recent but incomplete work (as it lacks empirical testing) introduce an expanded version of the model **(Figure 2.10).**[75] The new model incorporates cultural endowments and demonstrates the interrelationships among resource endowments, cultural endowments, technology and institutions. Since this type of model is difficult to subject to econometric evaluation, the approach of testing the model has been done through case studies in different countries.

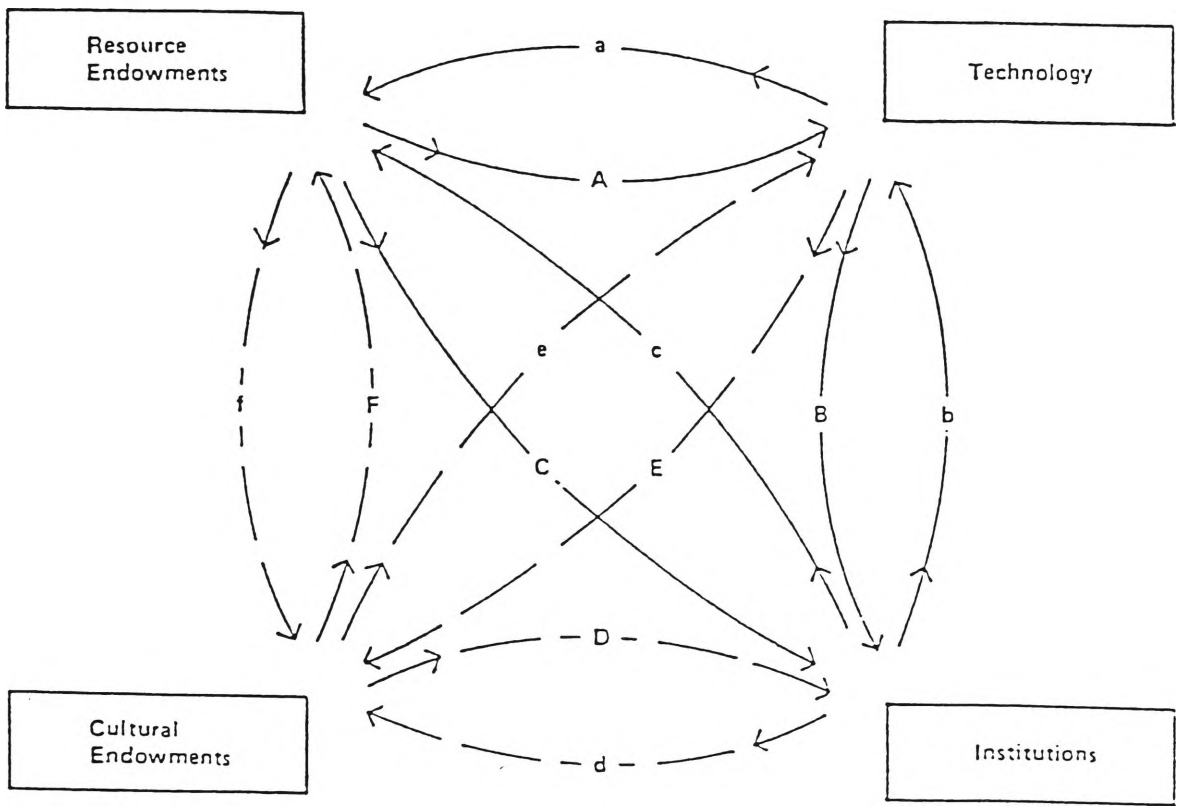
Some implications for agricultural research system can be drawn from the induced innovation model. For one, the case studies conducted by the group of Ahmed and Ruttan[76] indicate that a decentralised agricultural research system in terms of location, funding and management appears to be 'more responsive to the resource and cultural endowments' of a country. This implies that a decentralised system is more effective in supplying technologies to farmers than a centralised system. A general implication of the induced innovation model for agriculture is that the demand for technological change is influenced by a country's resource endowments. Likewise, the capacity of a nation to respond to the demand for technological change is determined to a large extent by its ability to organise and manage institutional changes conducive to agricultural R&D.

2.2.3 Innovation Diffusion Theories

The preceding discussion on innovation theories helps to explain, among others, the origin or inducement of technological change, the behaviour of firms/industries, and their technological decision-making patterns. But technological change, whether incremental or radical, involves the process of diffusion. Therefore, it is only logical to look also at the innovation diffusion theories. *Innovation diffusion* is commonly defined in geography literature as the manner by which innovations spread among members of a social system

[75] Ruttan & Hayami, 'Induced innovation theory and agriculture development: A personal account', in B. Koppel (ed.) *op. cit.*, p. 30.

[76] Ahmed & Ruttan, *op. cit.*, p. 404.



Note: Arrows indicate the effect of one element on another and vice versa.

Figure 2.10 Interrelationships between changes in resource endowments, cultural endowments, technology and institutions

Source: Y. Hayami and V. Ruttan, *Agricultural Development: An International Perspective*, rev. ed., John Hopkins Univ. Press, Baltimore, 1985, p. 111.

over time through the use of communication channels.[77] Diffusion is a major area of interest for geographers because it includes 'basic geographic elements of distance, direction and spatial variation'.[78] Diffusion theories consist of the following basic elements: innovation; communication channels; potential adopters of innovation; and time.

Traditional theories of diffusion are viewed from the adoption perspective, or what Brown[79] referred to as the demand side of diffusion. According to Brown,[80] these theories are represented by the works of Hägerstrand[81] and Rogers,[82] in which adoption of an innovation is seen as the result of a learning or communication process. Important elements controlling this process are seen to be information flows or communication, and the innovativeness or resistance of adopters. Based on this model, adopters are categorised into early adopters, leaders, laggards and others. The behaviour of adopters towards innovation and their reasons for such behaviour (adoption or rejection) are given emphasis. For studies related to firms, the variables that are highlighted are firm size, rate of growth of industry, quality of management and profitability of innovation.[83]

The *epidemics model of diffusion* complements the traditional view of diffusion. Its assumption fit well with the concept of the linear model, that is an innovation generated by a particular organisation is transported and diffused from this organisation to the users as a whole package.[84] As the term implies, the epidemics model compares the diffusion process with the spread of a disease.[85] As the disease spreads, it infects healthy individuals until their number become so small that the rate of infection decreases. In a similar sense, as more firms/individuals adopt innovation, the perceived risks associated with the innovation decreases, the rate of adoption increases until such time that the potential adopters are

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[77] Department of Geography, The Ohio State University, *Diffusion of Innovation*, Discussion Paper Series, USA, n.d.

[78] Lawrence Brown, 'Diffusion research in geography: A thematic account', *Studies in the Diffusion of Innovation*, Discussion Paper no. 53, Department of Geography, Ohio State University, USA, n.d., p. 9.

[79] Lawrence Brown, 'The innovation diffusion process in a public policy context', *Studies in the Diffusion of Innovation*, Discussion Paper no. 58, Department of Geography, Ohio State University, USA, n.d., p. 4.

[80] *Ibid.*, pp. 5-6.

[81] See for example, Torsten Hägerstrand, *Innovation Diffusion as a Spatial Process*, The University of Chicago Press, Chicago, 1967.

[82] See for example, Everett Rogers, 'Aspects of the spatial structure of social communication and the diffusion of information', *Papers of the Regional Science Association*, vol. 16, pp. 27-42; E. Rogers & F. Shoemaker, *Communication of Innovations: A Cross Cultural Approach*, The Free Press, New York, 1971; E. Rogers (ed.), *Communication and Development: Critical Perspectives*, Sage, Beverley Hills, 1976.

[83] Brown, Discussion Paper no. 58, *op. cit.*, p. 9.

[84] Stuart Macdonald, *Information for Innovation, Managing Change from an Information Perspective*, Oxford University Press, Oxford, 1998, pp. 72-86.

[85] Coombs *et al.*, pp. 121-122.

almost saturated. The S-shaped curve of cumulative adoption **(Figure 2.11)** represents the total percentage of those who adopt the innovation at any given point in time and illustrates the speed by which innovation is adopted. The S-shaped curve of innovation diffusion can also be associated with Schumpeter's idea of a 'bandwagon effect',[86] with few entrepreneurs at first followed by slowly growing number of imitators. The epidemics model is also reflected in a mathematical formula '$x\ (t) = 1/[1+exp\ (-a - ßt\ )]$',[87] where a is the point at which the diffusion curve begins to rise, ß the diffusion rate constant or the slope at which the curve rises, $x(t)$ the fraction of potential adopters who have already adopted at time t , and $(1-x(t))$ the fraction of potential adopters not using the innovation yet.

A classic and perhaps most important early research on diffusion pertains to hybrid corn. Advocates of the traditional diffusion model refer to studies on hybrid corn in the United States to demonstrate the robustness of the model. For instance, Rogers[88] cites the works of Ryan and Gross (1943) in Iowa as the most 'influential diffusion study'. When data were plotted cumulatively on a year-to-year basis, the adoption rate revealed an S-shaped curve over time. The study illustrates the interplay of four major elements of diffusion: innovation, communication channels, time and social system. Communication channels, and the farm community as a social system played significant roles in the 'innovation-decision' process.[89]

The traditional theory and epidemics model have been criticised as simplistic and deterministic. Innovation is assumed to be static from points of origin to destination. Macdonald[90] explains that these models have failed to account for 'incremental or subsequent' changes in a particular innovation. Other criticisms of the model include the following: adopter's environment is presumed to be homogeneous; it has an 'adopter-blame' bias implying that if innovation is not adopted, there is something wrong with the adopter; it assumes a fixed population of potential adopters; and it makes no allowance for incremental or subsequent innovation. The model speaks a great deal about who is

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[86] John Hagedoorn, *The Dynamic Analysis of Innovation and Diffusion: A Study in Process Control*, Pinter Publishers, London, 1989, p. 120.

[87] Coombs, *op. cit.*

[88] Everett Rogers, *Diffusion of Innovations,* 4th edition, The Free Press, New York, 1995, pp. 31-35.

[89] *Innovation-decision process* is the 'process through which an individual (or other decision-making unit) passes from first knowledge of an innovation to forming an attitude toward the innovation, to a decision to adopt or reject, to implementation and use of the new idea, and to confirmation of this decision. Defined in Rogers, *ibid.*, p. 20.

[90] Macdonald, *op. cit.*, p. 75.

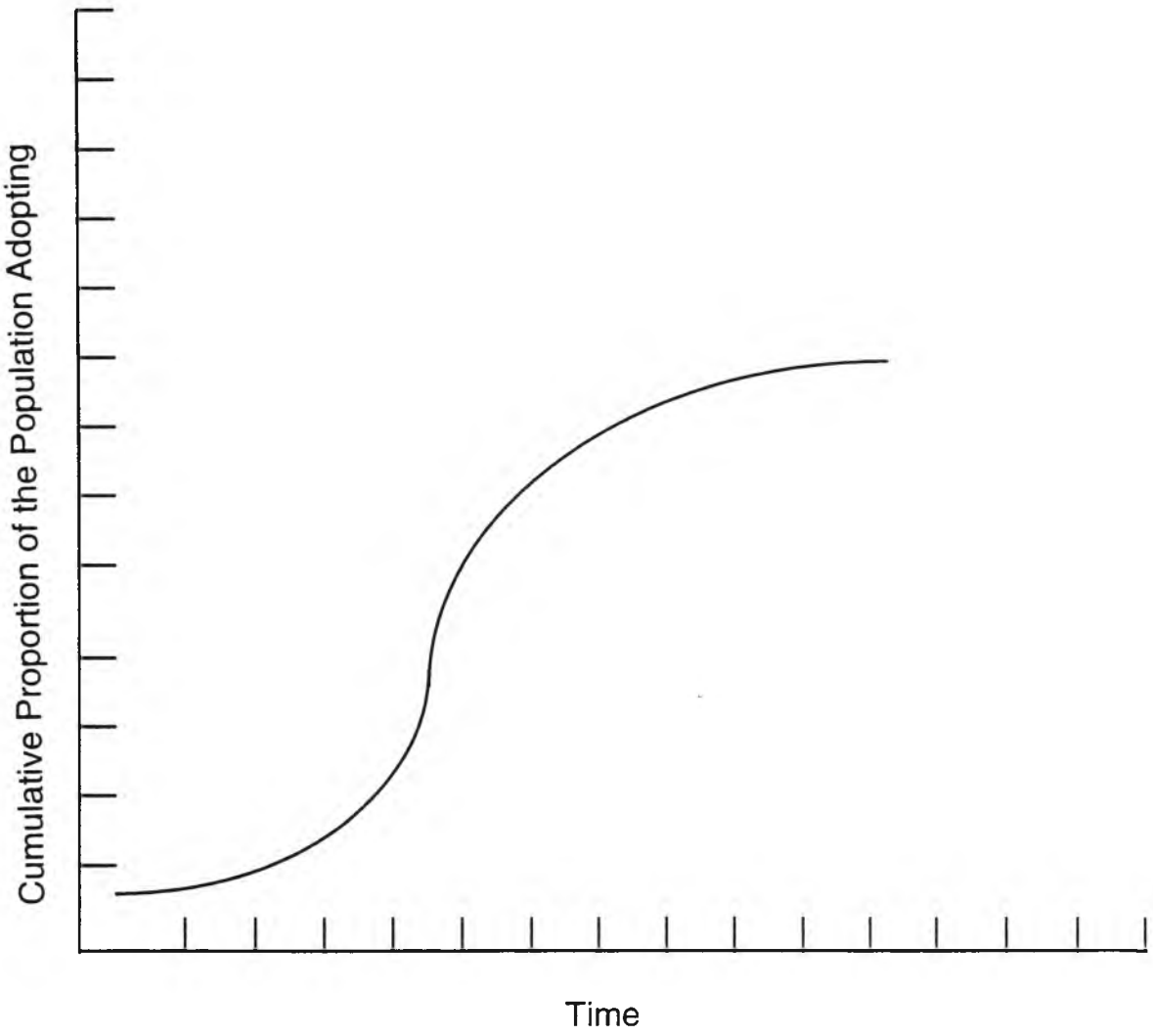

Figure 2.11 The S-Curve for diffusion through time

Source: Brown, Discussion Paper no. 53

adopting, even relating the characteristics of adopter with the rate of adoption, but lacks an explanation of 'how' an innovation is diffused.[91]

Another perspective of diffusion takes into account the supply side of the process. Brown[92] describes this concept as focusing on ways in which potential adopters are provided access to innovation. Its major emphases include the establishment of diffusion agencies and implementation of strategy by these agencies. Attention is shifted from the adopter to the diffusion agency. The locations and services of these agencies determine the rate and pattern of diffusion or when and where innovation will be available. One major weakness of this approach is that, like the epidemics model, it assumes that there is no further innovation taking place throughout the diffusion process.

The more dynamic and evolutionary diffusion theories take into account the following possibilities: the number of potential adopters during the process of diffusion changes and is not fixed; and the technology itself changes during the process of diffusion.[93] According to Brown,[94] these perspectives acknowledge the continuity of the innovation process. Innovations are assumed to be modified and adapted to an 'increasing array of uses and markets'. Learning and adaptation by the potential users of the innovation are also considered. The development perspective has also been incorporated in the more dynamic models of innovation diffusion. In this case, the role of level of development in the diffusion process and the impact of diffusion practices upon individual or collective welfare are considered.[95] Coombs *et al.*[96] refer to the alternative models put forward by Stoneman, David Davies, and Metcalfe. These writers noted the inter-firm differences in these alternative models and the attempt to incorporate the 'supply side' of the diffusion process. They incorporated more sophisticated microeconomic factors, including the possibility of inducement mechanisms, the effects of firm size, decision rules and firm behaviour, and the interaction between technical and demand influences. However, such models have not been as thoroughly tested as the epidemics model.

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[91] *Ibid.*, pp. 75-76.

[92] Rogers, *op. cit.*, pp. 9-17.

[93] Hagedoorn, *op. cit.*, p. 167.

[94] Brown, *op. cit.*, pp. 17-21.

[95] *Ibid.*, p. 27.

[96] Coombs *et al.*, pp. 125-133, citing the works of Stoneman, 1983 & 1984; David, 1975; Davies, 1979; and Metcalfe, 1981 & 1982.

The diffusion theories have influenced some of the major agricultural development programs in the developing countries. Such programs, particularly the green revolution movement, were guided by the *traditional diffusion theory*, which focuses on increasing the rate of adoption of technologies and/or strengthening the diffusion agencies. However, there are some problems with the assumptions of the traditional diffusion theory that have policy implications for agricultural development strategies. The traditional diffusion theory gives emphasis to communications in diffusion strategies. This is based on the premise that potential adopters may be convinced to adopt a technology through communications with emphasis on change/extension agents as the primary means of communication. But since it is humanly and financially impossible to reach all potential adopters, there is a tendency for development agencies to concentrate on the most responsive clients or leaders. The assumption of this diffusion strategy is that information or new techniques will 'trickle-down' from the leaders to their followers. Hence, communication efforts tend to be directed to or favour the progressive adopters or opinion leaders. Objections have been raised against this diffusion strategy because, as critics argue, it has perpetuated inequality in the rural areas by widening the gap between the rich and the poor. Rogers[97] notes that innovations tend to 'trickle across' instead of 'trickle down' because 'interpersonal communication networks' link individuals with similar socio-economic status. Progressive clients are characteristically eager for new ideas, possess the means or capital to adopt new technology, and have easier access to credit. Therefore, they get to adopt innovations earlier than others. By doing so, they gain more competitive advantage and capture higher profits out of the use of innovations. In contrast, the economic gain of late adopters is relatively smaller because innovation adoption becomes a matter of survival rather than advantage chosen. Reliance on traditional diffusion theory also implies the need to focus resources upon a small number of persons. This brings the issue of diffusion inefficiency or minimum return on investment.

The diffusion theory that focuses on *diffusion agencies* (supply side) instead of adopters, promotes the use of marketing or promotional and infrastructure strategies to induce demand and adoption. It suggests policy consideration on where to locate agricultural diffusion agencies. The *dynamic theories of diffusion* suggest the need to

[97] Rogers, 1995, *op. cit.*, p. 430.

periodically evaluate and adjust diffusion strategies and programs to enhance learning/adaptation of technologies.

2.3 Agricultural Research and Extension Models

The field of agricultural research and extension (R&E) has its own tradition in terms of analysing, understanding, modelling, and conceptualising innovation and diffusion. This section reviews the major theories and models according to which agricultural R&E systems in most developing countries can be understood. While the previous discussions on innovation (except the induced innovation and diffusion concepts) are generally focused on the commercial or industrial sector, much of the theoretical and empirical work on agricultural innovation process is based on observations of the public sector and its environment. In particular, they deal more with social, cultural and political environments. Research and extension activities in agriculture in most developing countries have been the responsibility of their governments. This public sector bias has been regarded by Hayami and Ruttan[98] as a major 'induced institutional innovation'. The uncertainties or risks associated with agricultural research and the 'public good' nature[99] of most agricultural technologies make this option socially desirable.

The theories and models covered in this section reflect the dominant thinking and practice in agricultural innovation from the period late 1960s. This period marked the beginning of the development of formal national R&E systems in Asia inspired by the successes of the 'green revolution movement'. The development and expansion of public sector R&E service in most developing countries was financed by loans largely from the World Bank.

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[98] Iftikhar Ahmed & Vernon Ruttan (eds), *op. cit.*, pp. 3, 11-13. Ahmed and Ruttan present statistics showing that in resource-poor countries of Asia and Africa, about 97% of the entire agricultural research is under the public sector responsibility.

[99] Most agricultural research outputs have the 'non-rivalness' and 'non-excludability' features of a public good. Non-rivalness means that the research output is available to everybody at zero marginal cost. For instance, the use of one farmer of 'a new crop rotation pattern that improves crop production and reduces soil erosion' does not prevent other farmers to adopt the same practice. The non-excludability suggests the infeasibility of denying use to those who do not pay for it. A common aspect of agricultural research is that many products are not simple to protect by patent laws. Quoted in Carl Pray and Ruben Echeverria, 'Determinants and scope of private sector agricultural research in developing countries', International Service for National Agricultural Research (ISNAR) Staff Notes, no. 90-82, April 1990, p. 4.

2.3.1 Traditional Linear Model

Röling and Seegers[100] describe the traditional linear models in agricultural R&E as a sequential process starting from science, then to extension and ending with farmers. Examples of the traditional linear models are the following. The *transfer-of-technology (TOT)* model views technology transfer as a one way, top-down process from researchers to the farmers. The *feedback technology transfer* model considers the response of the users to technologies introduced, and regards the feedback function as the sole responsibility of the extension service. However, like TOT, the feedback model assumes that farmers are passive recipients of technologies.[101]

The *technology flow process models* also suggest linear progression in the generation and extension of technologies. Specific examples of this thinking include the *technology innovation process* **(Figure 2.12)** of McDermott as cited by Zuidema[102] and *the research-extension process* **(Figure 2.13)** of Bernardo.[103] These models are integrated by Javier into his *research-extension interface* model **(Figure 2.14)**.[104] The technology flow process models have been regarded as useful for understanding the types of research activities (e.g. basic research, applied research, adaptive research) and for defining interfaces and linkages between research and extension. However, the one-way flow assumption of the models present an incomplete picture of the more complex nature of the R&E system. While feedback arrows are incorporated, they appear to be ineffective features of the models. To cite Biggs'[105] argument, 'funds are not often spent on feedback activities'.

According to Röling and Seegers,[106] the linear model also assumes that 'science is the major source of new ideas'. Biggs[107] illustrates this concept in what he refers to as

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[100] Niels Röling & Stephan Seegers, 'Fitting AKIS to the technology: A diagnostic framework for designing knowledge systems suitable for different innovative outcomes (draft chapter for ISNAR/RTTL 'Synthesis Report' edited by Thomas Eponou), ISNAR, The Hague, October 1991, p. 12.

[101] W. Stoop, 'NARS linkages in technology generation and technology transfer', *ISNAR Working* Paper no. 11, 1988 quoted in V. Asopa & G. Beye, 'Module 8', *Management of Agricultural Research: A Training Manual*, Food and Agriculture Organisation of the United Nations (FAO-UNDP), Rome, 1997, p. 58

[102] Larry Zuidema, 'Managing research-extension linkages', *Research Management in the Philippines*, PCARRD, Philippines, 1988, pp. 328-331.

[103] Fernando Bernardo, Report of the consultation meeting of agricultural research and extension experts, SEARCA, Philippines, 1986.

[104] Emil Javier, 'Recent approaches in the study and management of the linkages between agricultural research and extension', *ISNAR Staff Notes* no. 89-63, quoted in Asopa & Beye, *op. cit.*, p. 50.

[105] Stephen Biggs, 'A multiple source of innovation model of agricultural research and technology promotion', *World Development*, vol. 18, no. 11, 1990, p. 1489.

[106] Röling & Seegers, *loc. cit.*

[107] Biggs, *op. cit.*, pp. 1481-1499.

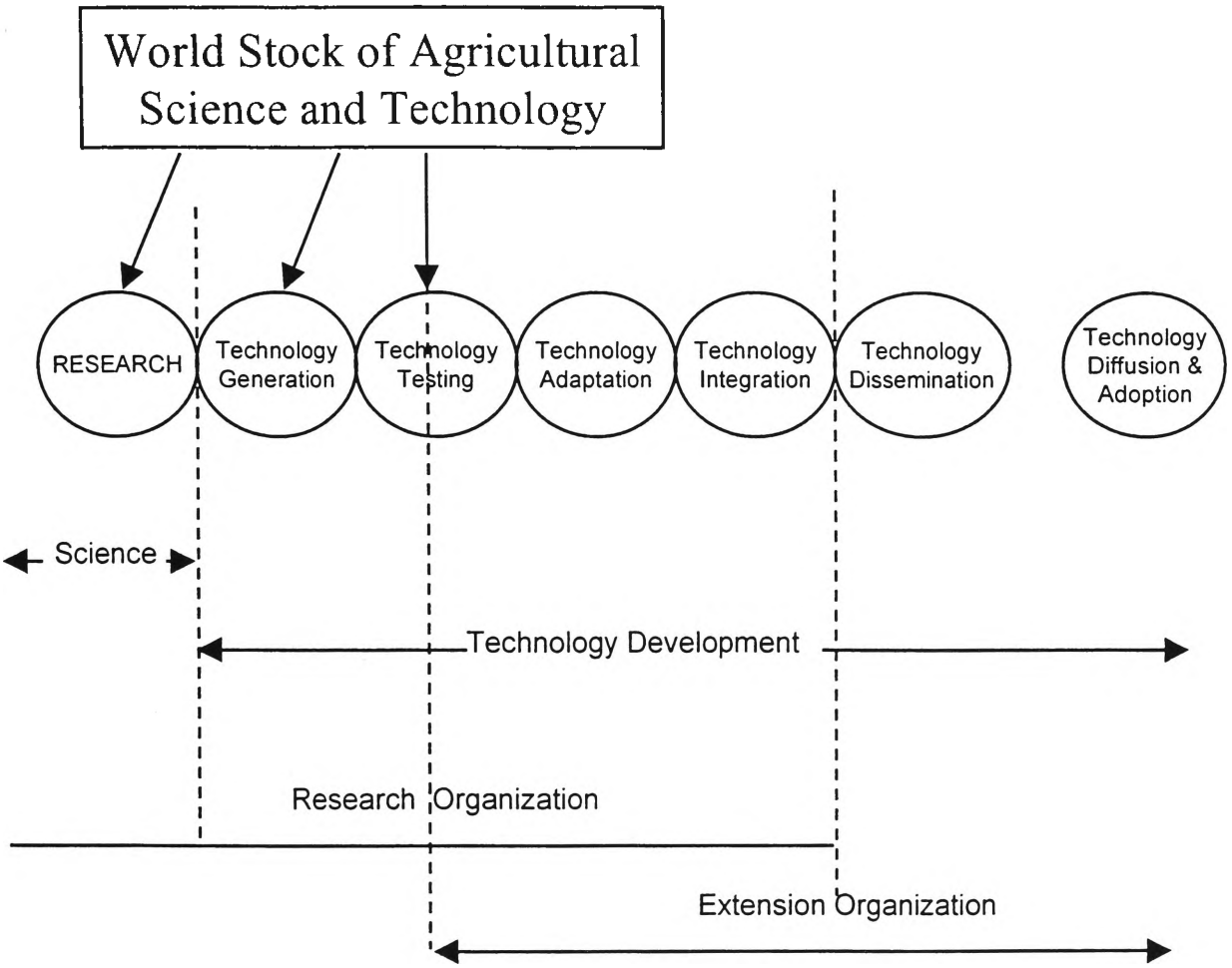
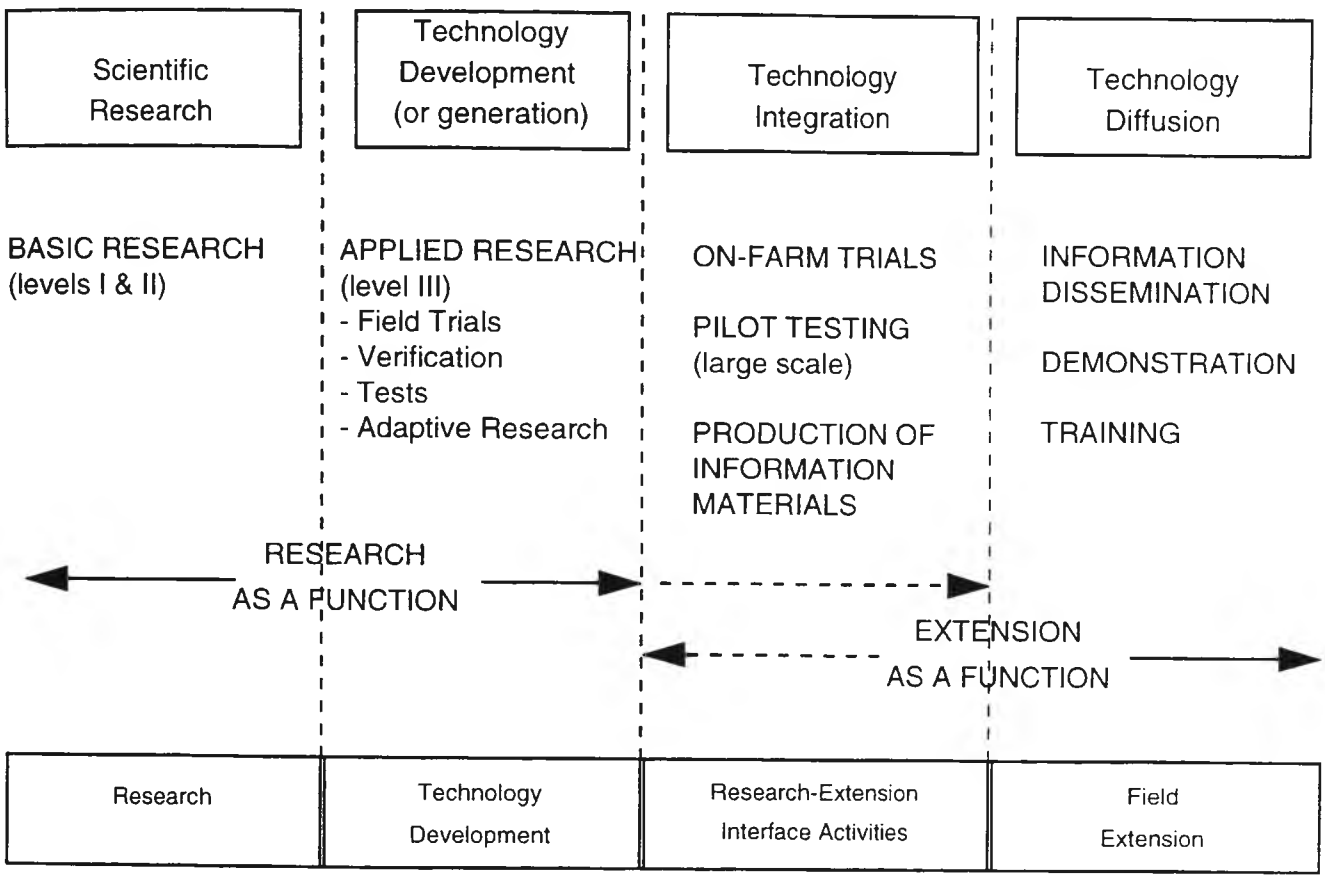


Figure 2.12 McDermott's model of the technology innovation process

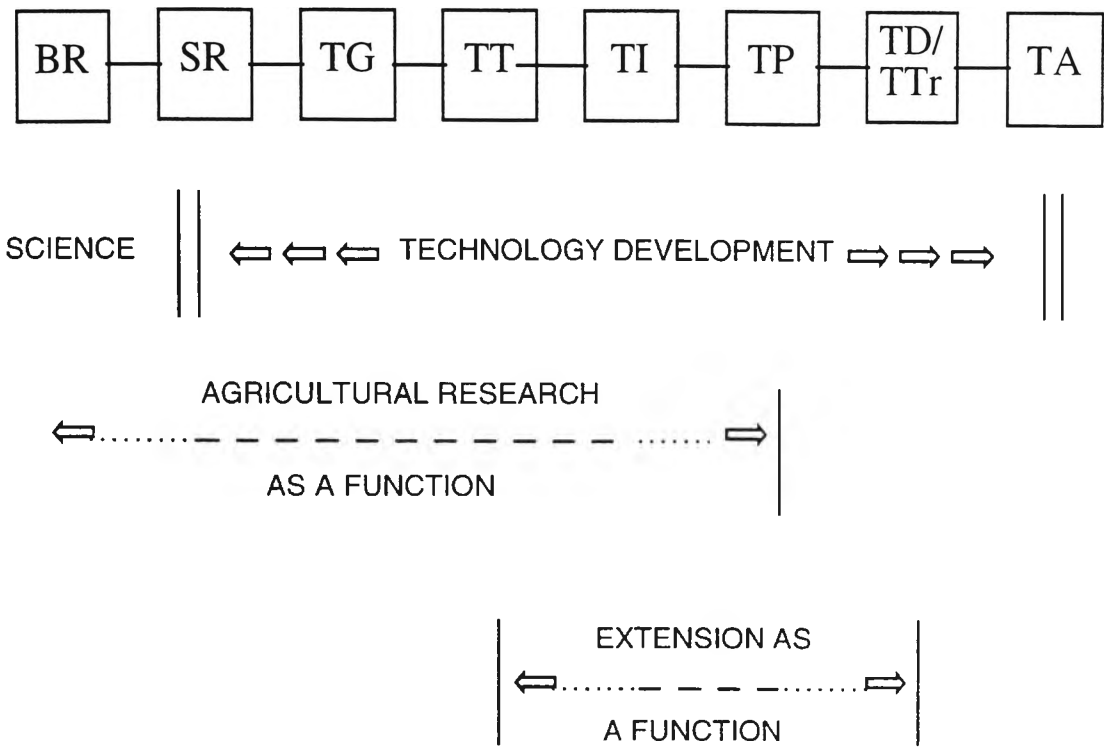
Source: Rivera & Schram (eds), quoted in Zuidema, 1988



Level I - basic research in general sciences such as chemistry, physics and mathematics
Level II - basic research in plant genetics, plant physiology, entomology, plant pathology, nutrition, etc.
Level III - applied research or technology development such as plant breeding, control of insect pests and diseases and fertilizers

Figure 2.13 The Research-extension process

Source: F. Bernardo, Report of the consultation meeting of agricultural research and extension experts, SEARCA, Philippines, 1986.



Key: BR = Basic Research; SR = Strategic Research; TG = Technology Generation; TT = Technology Testing; TI = Technology Integration; TD/TTr = Technology Dissemination and Technology Transfer; TA = Technology Adoption.

Figure 2.14 The research-extension interface in the technology flow process

Source: E. Javier, Recent approaches in the study and management of the linkages between agricultural research and extension, *ISNAR Staff Notes*. No. 89-63, 1989.

central source of innovation model or central model. This model emphasises the transfer of technology from research centres to the rural populace. Biggs' illustration in **Figure 2.15** demonstrates this technology flow. It implies that major innovations in agriculture are generated by the international research centres,[108] and are then passed on to national research centres, on to extension institutions, and down to the farmers level. The *central model* considers the R&E system as hierarchical, with research institutions/groups having specific roles to play. For instance, basic and applied research activities[109] are conducted by international research agencies while adaptive research[110] and extension are considered the responsibility of national centres. In the model, technology development is viewed as a set of stages. This means that technologies generated by scientists at the centre are expected to be adapted in subsequent stages until ready for demonstration to and adoption by the farmers. The process of developing research capability in terms of institutions is also assumed to be sequential. The central model does not reflect the role of socio-political and economic factors in agricultural research and extension.

Röling[111] points to another assumption of the model—the 'commodity metaphor'. The commodity perspective assumes that technology is a single, uniform product which can be transferred to a 'homogeneous mass of consumers'. Farmers are regarded as 'users' of technologies generated by outsiders instead of being perceived as 'active problem solvers'.[112] The commodity metaphor overlooks the fact that 'transformation of a technology' is an ongoing process as it spreads among farmers.[113]

The *training and visit (T&V) approach* to extension is based on the assumptions of the linear innovation and diffusion models. The T&V approach was originally conceived by Daniel Benor.[114] The approach became popular in the 1970s until the early 1980s, with the World Bank investing almost US$2.3 billion for its implementation in more than forty

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[108] International research centres are under the auspices of the Consultative Group on International Agricultural Research (CGIAR).

[109] Basic research involves the development of new knowledge while applied research, the generation of new technologies on the basis of this knowledge to solve specific agricultural problems.

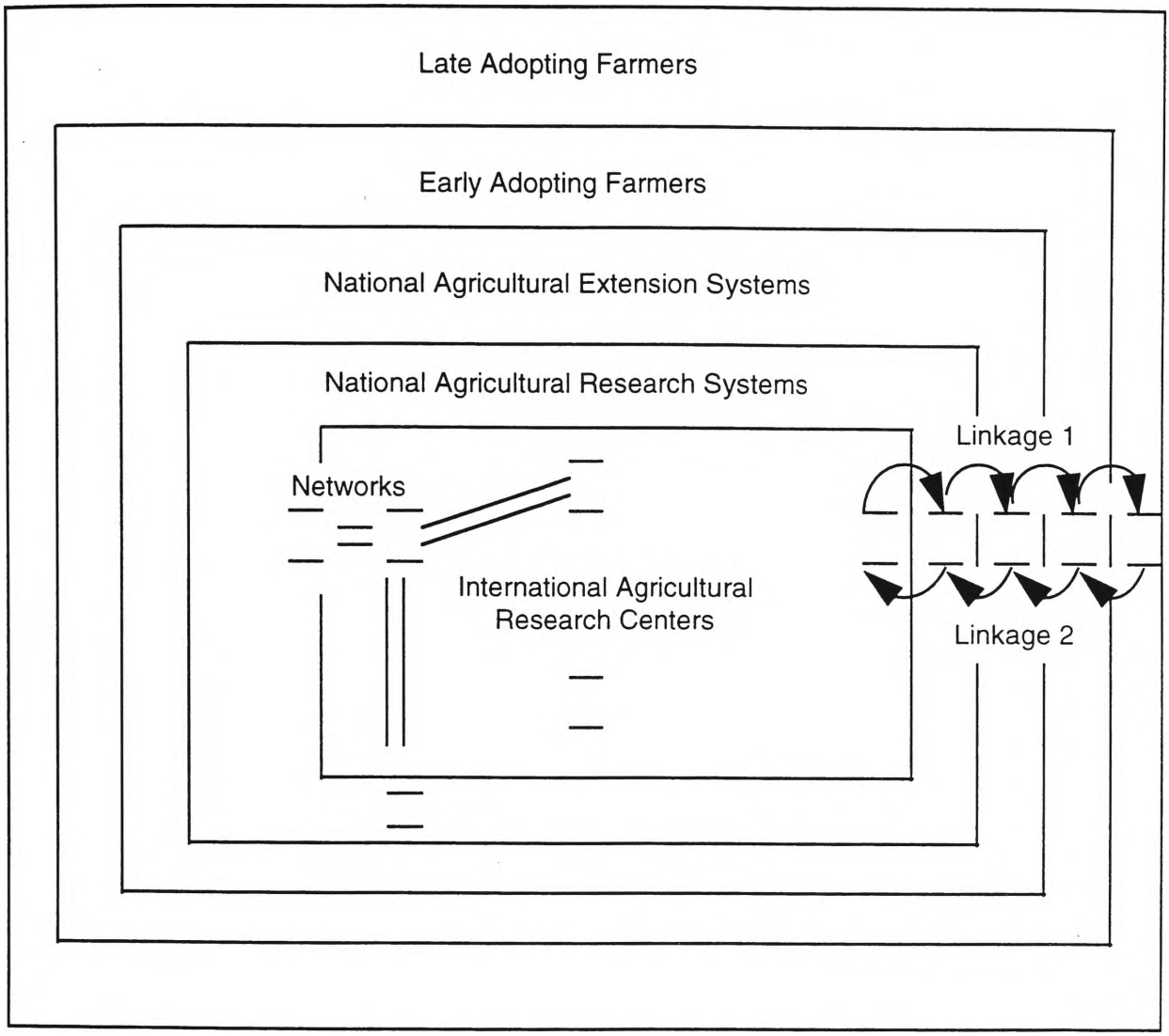
[110] Adaptive research is the process of refining technologies to adapt them more to agro-ecological and socioeconomic conditions of specific producer groups of regions.

[111] Niels Röling, 'Why farmers matter: The role of user participation in technology development and delivery', paper prepared for the International Workshop, Making the Link Between Agricultural Research and Technology Users, the Hague, Netherlands, November 20-25, 1989, pp. 2-4.

[112] *Ibid.*, p. 3.

[113] *Ibid.*

[114] Daniel Benor & J. Harrison, *Agricultural Extension: The Training and Visit Systems*, Washington, World Bank, 1977.



Linkage 1 = Transfer of technology
Linkage 2 = Feedback linkage
Networks = Exchanges of germplasm, other technology and information

Figure 2.15 Institutions of a central source of innovation model or agricultural research and technology promotion

Source: Biggs, 1990

countries.[115] The approach assumes that technologies are relevant, available, and will increase the production level of farmers once transferred to these farmers. The key features of T&V system include among others: a specialisation of extension staff to deliver only technical information and advice; a clear definition of responsibilities in which subject matter specialists (SMSs) are responsible for the content of technical messages while the village extension workers (VEWs) communicate these to farmers; and a clearly defined fortnightly schedule of meetings between extension workers and contact farmers, and training of VEWs by SMSs.[116] The T&V system is an effort to improve the linkage between research and extension. Sims and Leonard[117] noted the approach's concern for 'adoption' more than 'responsiveness'. They noted some of the issues against T&V, as follows: it often represents external interests and priorities (e.g. of foreign donors) more than domestic ones; and the hierarchical structure of T&V limits feedback from subordinates (e.g. about their grievances) and clients.[118]

The T&V approach and the traditional linear model in general have been observed to work best when promoting well-defined technological packages with wide application in simple farming systems. It is most applicable to farming conditions which are relatively homogeneous, which are similar to those of the research stations, and where farmers' resources are adequate. This approach has successfully diffused the green revolution agriculture exemplified by the irrigation/high-yielding cereal/fertiliser technology. However, the T&V approach has limited application to more complex, diversified farming systems, which are likely to require location-specific technologies rather than the generally-applicable extension messages and technology packages of the T&V approach.

2.3.2 Users' Perspective Theory

The user's perspective or need-based theory underscores the importance of generating and transferring technologies that fit the needs and interests of the local farming system conditions. The role of farmers is viewed as that of providing information to outsiders/experts who help identify research needs and opportunities.

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[115] Philip Woodhouse, 'Extension systems for agricultural projects', in Nicholas Maddock & Frank Wilson (eds) ,*Project Design for Agricultural Development*, Avebury, Aldershot, 1994, p. 60.

[116] *Ibid.*, pp. 60-61.

[117] Holly Sims and David Leonard, 'The political economy of the development and transfer of agricultural technologies', in David Kaimowitz (ed.), *Making the Link: Agricultural Research and Technology Transfer in Developing Countries*, Westview Press, Boulder, San Francisco, 1990, p. 61.

[118] *Ibid*, pp. 61-63.

The *farming systems research (FSR) approach* is designed according to the users' perspective theory. It had its beginnings in the late 1970s in response to the limitations of the traditional models of agricultural research and extension. It originated from the early works of the International Agricultural Research Centres (IARCs), notably the International Rice Research Institute (IRRI, Philippines) for rice-based cropping systems, and Centro Internacional de Mejoramiento de Maiz y Trigo (CIMMYT, Mexico) for wheat and corn-based farming systems. IRRI is associated with the 'cropping systems research approach' and CIMMYT with 'on-farm adaptive research approach'.[119] These approaches are observed to be most useful in commodity research, for the introduction of new varieties but tend to neglect other important factors of farm production.

FSR is an attempt to increase the relevance of technology through multi-disciplinary, location-specific research focusing on solving farm-level constraints. Its purpose is to develop and test site-specific technologies to improve the efficiency of specific farming systems. In actual practice, activities include basic research, research-on station, on-farm and multi-location trials, and extension and production programmes.[120] The whole process is mostly managed by researchers and extension workers. Like the T&V system, FSR is frequently seen as representing the interests of external donors and agencies who introduced them. Sims and Leonard[121] note the claim of some observers that FSR is still a 'top-down' approach to the transfer of technology. Despite its good intention, the FSR, in actual practice, has limited avenues for direct participation of farmers in setting research priorities. A multi-disciplinary team identifies the local needs through diagnostic research methodologies, such as the rapid rural appraisal (RRA). Chambers[122] describes RRA as extractive and elicitive of local people's knowledge conducted by outside experts. Some of the modes/methods used by RRA include: secondary sources; semi-structured

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[119] Allan Low , 'Placing improved agricultural technology in the hands of resource-poor farmers', in Nicholas Maddock & Frank Wilson (eds), *Project Design for Agricultural Development*, Avebury, Aldershot, Brookfield USA, 1994, pp. 41-44. The *cropping system research approach* involves five components, namely: environmental description; cropping system design; cropping system testing; component technology research; and preproduction testing. The *on-farm adaptive research approach* includes the following stages: identification of target zones; description and understanding farmer's circumstances; identifying factors for experimentation; conducting on-farm experiments; evaluation; and verification.

[120] Andre Cornwall, I. Guijt, & A. Welbourn, 'Acknowledging process: Methodological challenges for agricultural research and extension', in Ian Schoones & John Thompson (eds), *Beyond Farmer First*, Intermediate Technology Publications, London, UK, 1994, p. 105.

[121] *Ibid.*, p. 60.

[122] Robert Chambers, 'The origins and practice of participatory rural appraisal', *World Development*, vol. 22, no. 7, 1994, pp. 957-959.

interviews; key informants; transect walks and observing (walking with local people through an area); and many other means. A major weakness of RRA, as emphasised by Avtar *et al.*,[123] is that it does not adequately empower local communities to participate in defining their problems and identifying solutions. It does not make effective use of indigenous knowledge to explain aspects of a community's physical, ecological, and sociocultural environments from the point of view of the local residents themselves.

2.3.3 Participation Paradigm

This theory is an expansion of or a step further along the lines of the users' perspective theory. The basic assumption in the *participation paradigm* is that technology users/farmers have their own indigenous knowledge system and much can be gained by the interaction of local knowledge with scientific knowledge. The theory gives primacy to farmers' active participation in all aspects of R&E. Emerging out of this theory are approaches labelled as *farmer-back-to-farmer* by Rhoades and Booth **(Figure 2.16)**, *farmer-first—and last* by Chambers and Ghildyal, and *farmer participatory research* by Farrington and Martin.[124] Chambers *et al.*[125] later refer to all these as *farmer-first approaches,* highlighting the following common elements: analysis of needs and priorities is done by the farmers assisted by outsiders; the primary R&D location is farmers' fields and conditions; outsiders transfer principles, methods and choices to farmers instead of messages and packages of practices; and the 'menu' is not fixed but responds to farmers' needs. The role of outsiders in this approach is to support farmers in analysis, choice and experiment. Therefore, scientists and extensionists involved require new skills as facilitator, consultant, catalyst, convenor, information collector, and planner of interventions, as well as other non-conventional roles. Participatory rural appraisal (PRA) is one of the diagnostic tools used in this approach. PRA, an offshoot of RRA, is described by Chambers[126] as 'more visual, with local people more active' and more facilitating rather than extractive. In terms of methods used, PRA employs more visual representations and

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[123] Kaul Avtar, Draeger Kathryn, Lewis Bernard, 'Methodology for participatory rapid resource assessment with indicators of sustainability', Proceedings of the International Symposium on Systems-oriented Research in Agriculture and Rural Development, Montpellier, France, 21-25 November 1994, pp. 243-244.

[124] Robert Chambers, Arnold Pacey & Lori Ann Thrupp. (eds), *Farmer First: Farmer Innovation and Agricultural Research*, Intermediate Technology Publications, London, 1989, p. xix, citing Rhoades & Booth, 1982; Chambers & Ghildyal, 1985; Farrington & Martin, 1987.

[125] *Ibid.*, pp. xix, 182-183.

[126] Chambers, 'Origins and practice of participatory rural appraisal', *op. cit.*, pp. 958-959.

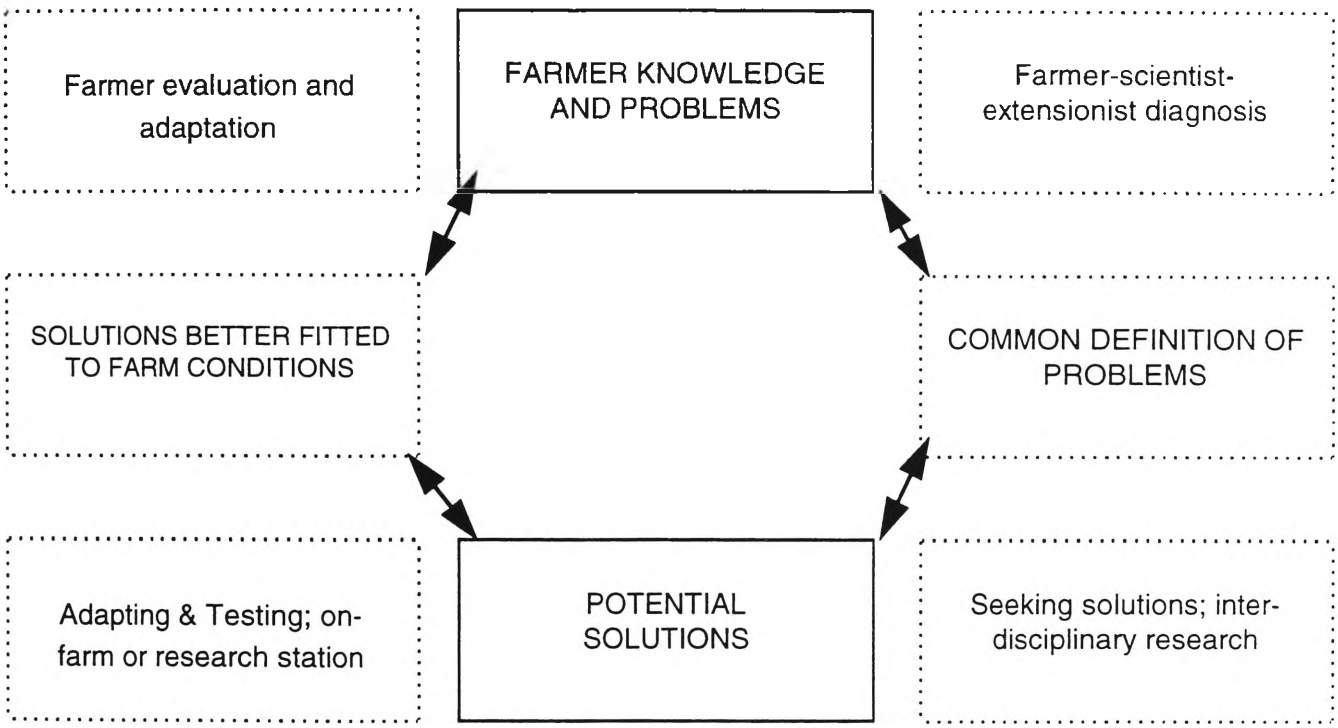

Figure 2.16 'Farmer-back-to-farmer' technology generation and transfer system

Source: R. Rhoades & R. Booth, 'Farmer-back-to-farmer: A model for generating acceptable technology', *CIP Social Sciences Department* Working Paper No. 1982-1, 1982, as quoted in Asopa & Beye, 1997.

analysis by local people, such as mapping or modelling on paper/ground, free listing and card sorting, linkage diagramming, presentations for checking and validation plus some of the RRA methods. One major criticism of PRA, as explained by Avtar *et al.*,[127] is that since it depends largely on indigenous community knowledge, practitioners may not fully exhaust 'the entire range of scientific knowledge potentially available' to address specific problems. Mosse[128] on the other hand argues that the 'participatory orthodoxy' has not adequately dealt with a range of interests and power relations which define the limits and social conditions of participation. He points to the limitations of rapid participatory appraisal techniques in analysing the 'dominance, factional conflicts, patronage relations, leadership struggles and other power relations which determine social conditions of participation itself'.[129]

2.3.4 Knowledge Systems and Actor-Oriented Perspective

The agricultural knowledge and information system (AKIS) analyses the R&E interface from a knowledge system perspective. AKIS is defined by Röling and Seegers[130] as follows:

> The articulated set of actors, networks and/or organisations, which potentially work synergistically to support knowledge processes in agriculture, so as to improve the goodness-of-fit between knowledge and environment, and/or the control provided through technology use.

By knowledge processes, Röling and Seegers[131] give the following examples: 'anticipation, generation, transformation, transmission, storage, retrieval, integration, diffusion, and utilisation of agricultural knowledge, information and technology'. The role of experts is seen as facilitating the knowledge processes. As a diagnostic framework, Röling and Seegers[132] describe AKIS as follows: synergy is the desired state; innovation is the desired outcome; the performance of AKIS is measured in terms of the extent to which it creates access to information and technology; it is a 'soft system'[133] because it is a human activity

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[127] Avtar *et al.*, *op. cit.*, p. 243.

[128] David Mosse, 'People's knowledge in project planning: the limits and social conditions of participation in planning agricultural development', ODI, Network Paper 58, July 1995, p. 2.

[129] *Ibid.*

[130] Röling and Seegers, *op. cit.*, p. 9.

[131] *Ibid.*

[132] *Ibid.*, p. 11.

[133] Checkland and Scholes (in P. Checkland & J. Scholes, *Soft Systems Methodology in Action*, 1990, John Wiley, Chicester) explain that 'soft systems methodology' addresses messy, ill-defined problems which characterised human affairs, while 'hard systems' deal with well-defined problems or look at 'how to do it' when 'what to do' is already defined. Bullow (1989) summarised Checkland's concepts of soft

system whose performance is the result of shared learning and collective decision-making by actors involved. **Figure 2.17** illustrates AKIS involving the interface of top-down and bottom-up flows in linkage processes.

The theory has considerations wider than just the degree of farmer participation. It recognises that the farm and the farmer are among many other actors in agricultural development. Campilan[134] (in justifying why the program entitled 'User's Perspective with Agricultural Research and Development [UPWARD]' has adopted knowledge systems thinking to expand its diagnostic framework) explains that the knowledge system perspective considers not only the content but also the knowledge processes and multiplicity of actors, and their dynamic interrelationships under a given structure and environment. Campbell,[135] the former National Landcare Facilitator, Australia, considers the knowledge system thinking as more relevant to the requirements of 'sustainability' as it attempts to address socioeconomic and biophysical issues, advocates diversity and holistic inquiry, and copes with technical uncertainty and longer time frames over larger areas. Campbell[136] cites some issues raised by critics against knowledge system (KS), as follows: there is a danger that proponents (many of whom are biophysical scientists) may view KS as a tangible 'hard system' rather than as an abstract construct to aid thinking and focus debate; KS is largely descriptive and capable of showing which problems exist within a particular situation but not why and how such problems arise; and there is doubt about the extent to which it can deal with issues of power and conflict. While KS can make practical statements about appropriate balance of power among the different actors, it provides little explanation on how this can be achieved.

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systems methodology (SSM), as follows: 'SSM aims to bring about improvement in areas of social concern by activating in the people involved in the situation a learning cycle which is ideally never-ending. The learning takes place through the iterative process of using systems concepts to reflect upon and debate perceptions of the real world, taking action in the real world, and again reflecting on the happenings using the systems concepts. The reflection and debate is structured by a number of systemic models. These are conceived as holistic ideal types of certain aspects of the problem situation rather than as accounts of it. It is taken as given that no objective and complete account of problem situation can be provided'.

[134] Dindo Campilan, 'Enhancing the user-oriented diagnostic framework through knowledge systems thinking', *Taking Root*, Proceedings of the International UPWARD Planning Conference held in Tagaytay City, Philippines, 4-9 April 1995, p. 150.

[135] Andrew Campbell, 'Participatory inquiry: Beyond research and extension in the sustainability era', Proceedings of the International Symposium on Systems-oriented Research in Agriculture and Rural Development, Montpellier, France, 21-25 November 1994, p. 397.

[136] *Ibid.*

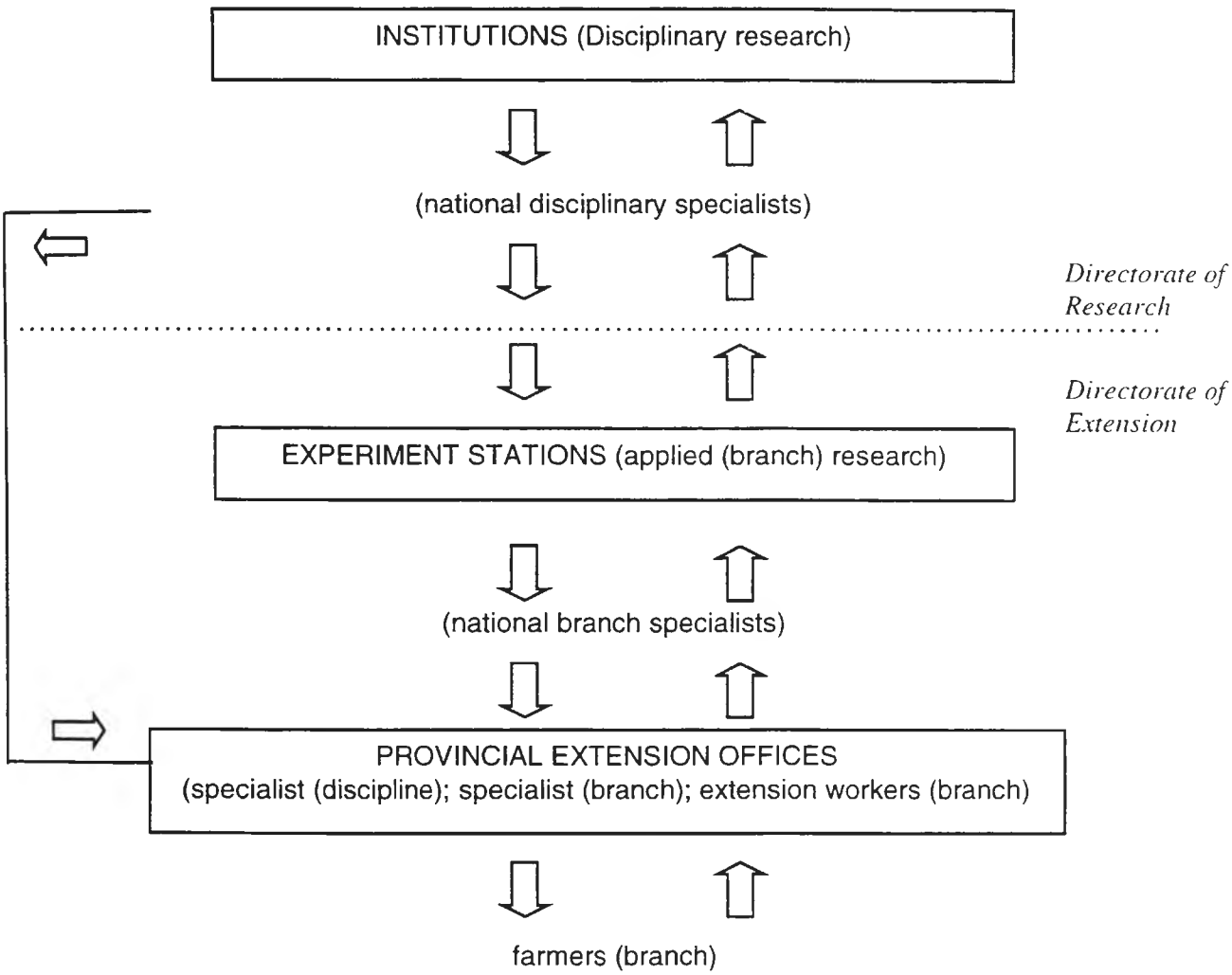

Figure 2.17 AKIS: an agricultural research and extension linkage system

Source: N. Röling, 'The research/extension interface: A knowledge system perspective', *ISNAR Staff Notes* No. 89-48, 1989, as quoted in Asopa and Beye, 1997.

Kaimowitz *et al.*[137] prefer to use the term 'agricultural technology system' instead of KS and define it as 'all individuals, groups, organisations and institutions engaged in developing and delivering new or existing technology'. This is different from Röling's definition in that it makes no assumption that the different institutions in the system work together in harmonious manner.

Other agricultural R&E linkage models that are based on the systems perspective include the agricultural technology management system or ATMS **(Figure 2.18),** and the research and technology transfer linkages framework (RTTL). ATMS refers to 'all institutions, individuals and their interdependent relationships aimed at the generation, assessment and diffusion of improved agricultural technologies in order to increase agricultural production and incomes'.[138] The ATMS model aims to identify opportunities for improving agricultural technology management in a particular country.[139] RTTL is designed for analysing linkages among participants in the national agricultural technology system (NATS). It suggests that political, technical and organisational factors affect the choice, operation and effectiveness of linkage mechanisms within the NATS.[140]

The knowledge system models outlined here have similar themes with some of the innovation concepts presented earlier in this chapter, such as selection environment (Nelson and Winter), national innovation system (Nelson), and knowledge or learning cycle (Boisot, and Nonaka & Takeuchi as quoted by Steen *et al.*). They all deal with innovation in a social milieu.

2.4 Empirical Reference of the Theories and Models

The empirical reference of the theories and models outlined here can be classified into:

- studies of agricultural research-extension systems or a subset[141] thereof and identifying the model that best explains a given situation;

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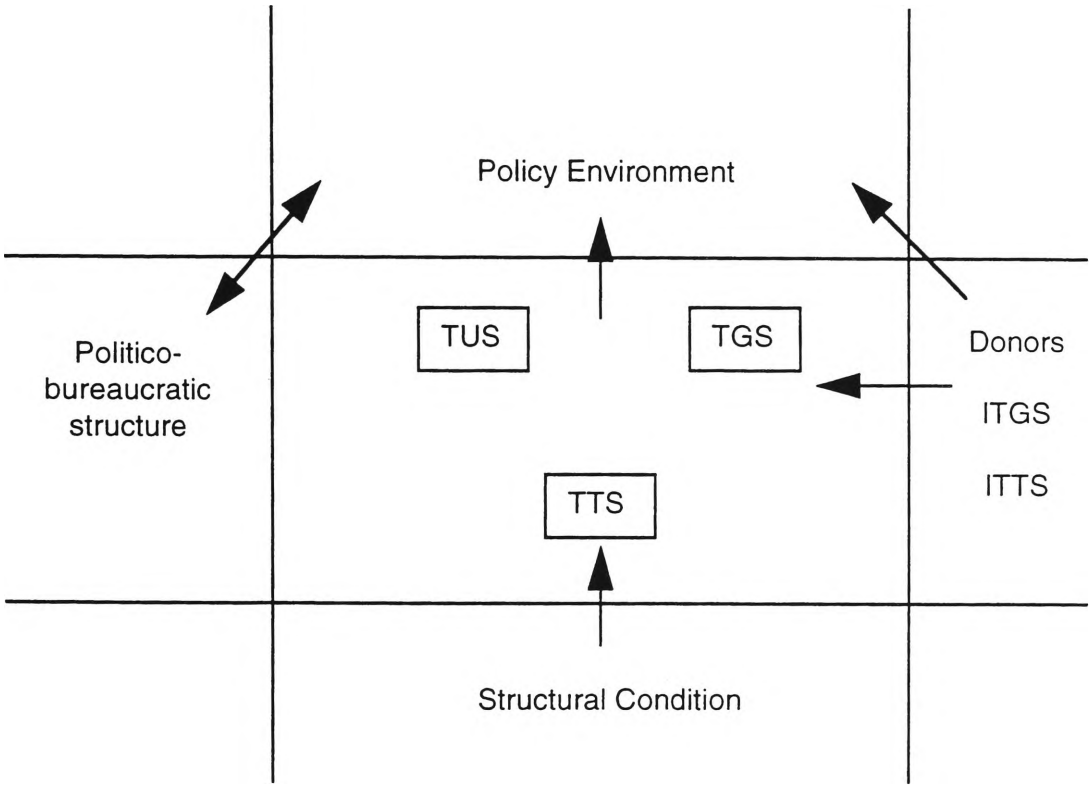
[137] David Kaimowitz, Monteze Snyder, & Paul Engel, 'A conceptual framework for studying the links between agricultural research and technology transfer in developing countries', in David Kaimowitz (ed.), *Making the Link: Agricultural Research and Technology Transfer in Developing Countries*, Westview Press, Boulder, San Francisco, 1990, p. 231.

[138] Javier, *op. cit.*, as quoted in Asopa & Beye, *op. cit.*, pp. 66-67.

[139] Asopa & Beye, *op. cit.*, p. 66.

[140] *Ibid.*, p. 67.

[141] Set of institutions involved in the development and transfer of technologies for a specific domain like region, a commodity, a specific group of farmers, or a specific problem area.



ITGS = International technology generating system. ITTS = International technology transfer system.
TGS = technology generating system. TTS = technology transfer system. TUS = technology using system.

Figure 2.18 ATMS: the agricultural technology management system

Source: H. Elliot, Farming systems in francophone Africa: Methods and results. Paper presented to the Ford Foundation Farming System Seminar, Tunis, Tunisia, 1977, quoted in Asopa & Beye, 1997.

- case studies to illustrate the practical application of the models and theories (e.g. as analytical framework; for research-extension planning, implementation, monitoring and evaluation); and
- models and theories as basis for the design of a research-extension programme or system.

The literature either deals with these theories and models in their totality or focuses on a particular approach, method and tool developed according to a specific theory.

2.4.1 Traditional Linear Model

The are many empirical evidences of the traditional linear innovation or diffusion model. According to Eponou,[142] the linear model explains the existing R&E practices in seven developing countries[143] covered in their study of links between research and technology transfer systems. Likewise, Röling and Seegers,[144] using the same set of case studies in analysing AKIS, conclude that most AKIS in the studies were 'designed and managed' according to the linear model. They claim that the linear model is an implicitly shared perspective among agricultural scientists, economists and administrators in national research systems.[145] This thinking has serious implications for policy and decision-making because it may obscure the decision-makers from the complexities of the agricultural innovation processes.

There is perhaps no better way of demonstrating the 'top-down', traditional linear model in practice than the creation of the IARCs of the Consultative Group on International Agricultural Research (CGIAR). As mentioned, these centres became the major source of new agricultural technologies, which were passed on to national research and extension centres for verification and transfer to farmers. Their existence has been initially justified by the success of the green revolution, in which broad-based technological packages have increased the level of production in many resource-abundant farming areas. Observers credit the technological advances of the research centres and the T&V extension system for rapid dissemination of the green revolution technologies.

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[142] Thomas Eponou, 'Partners in agricultural technology: Linking research and technology transfer to serve farmers', *ISNAR Report No. 1*, International Service for National Agricultural Research (ISNAR), March 1993, p. 28.

[143] Including Colombia, Costa Rica, Côte d' Ivoire, Dominican Republic, Nigeria, Philippines and Tanzania.

[144] Röling and Seegers, pp. 12, 16.

[145] *Ibid.*, p. 16.

Eponou[146] notes that almost all the technology transfer systems financed by the World Bank in Africa and Asia have used the T&V approach. The implementations of the approach in these countries are well documented and it soon became evident that the T&V system has served the interest of large and middle-sized farmers better than the small resource-poor farmers.

2.4.2 User's Perspective Theory

As mentioned previously, the IARCs were active with FSR during late 1970s through the 1980s. As observed by Shaner *et al.*,[147] the IARCs were encouraged by the findings, recommendations, and CGIAR acceptance of the Technical Advisory Committee Report of 1978, which contained reviews of the farming systems research and development (FSR&D) programs throughout the world. Some of the IARCs with farming systems in their mandates include the following: IRRI; CIMMYT; International Crops Research Institute for Tropical Agriculture (ICRISAT, India); International Institute for Tropical Agriculture (IITA, Nigeria); International Livestock Centre for Africa (ILCA, Ethiopia); International Potato Centre (CIP, Peru); International Centre for Agricultural Research in Dry Areas (ICARDA, Lebanon); and International Centre for Tropical Agriculture (CIAT, Colombia).[148]

Many of these IARCs provided training on FSR&D methodologies to the national agricultural research systems (NARS) in Africa, South Asia, Southeast Asia, and Latin America. Collaborative farming systems programmes were undertaken between IARCs and NARS. The adoption of FSR approach in most NARS was generally supported by outside funding.[149] For instance, in the Philippines, FSR gained prominence through the implementation of the World Bank supported project entitled 'Agricultural Support Services Project' during the period 1983 to 1990. Experiences of various countries with the FSR approach are many, and well documented. For example, the Australian Centre for International Agricultural Research (ACIAR)[150] published the farming systems research

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[146] Eponou, *op. cit.*, p. 11.

[147] Willis Shaner, Perry Fred Philipp, & W. Schmehl, 'Appendix 3-A: Review of FRS & D activities', *Farming Systems Research and Development: Guidelines for Developing Countries*, Westview Press, Boulder, Colorado, 1981, pp. 237-239.

[148] *Ibid.*

[149] F. Anderson & J. Dillon, 'Farming systems research at the International Agricultural Research Centres and other international groups', in Joseph Vincent Remenyi (ed.), *Agricultural Systems Research for Developing Countries*, Australian Centre for International Agricultural Research, ACT, 1985, p. 145.

[150] Joseph Remenyi (ed.), *Agricultural Systems Research for Developing Countries*, Australian Centre for International Agricultural Research, ACT, 1985, pp. 96-141.

experiences of Australia, PNG, Indonesia, Philippines, Malaysia, Thailand, South Asia (Bangladesh, India, Nepal) and the IARCs. Another collection of country experiences with FSR, done by SEAMEO,[151] cover countries in South East Asia. One important observation about FSR is put forward by Norman and Collinson.[152] They claim that donor agencies hastily supported FSR type of work even before the methodologies for resource-efficient ways of implementing FSR were fully established. As the *FSR approach* has been used in the NARS, some modifications and improvements were made to fit specific objectives of various government and non-government institutions concerned.

2.4.3 Participation Paradigm

Agricultural conditions in most countries in Asia, Saharan Africa and Latin America are described as 'complex in its farming systems, diverse in its environments, and risk-prone'.[153] The traditional linear model has shown itself to be not appropriate for this type of agriculture. It is thus countries in Africa, Asia and Latin America where many participatory research and extension approaches have been implemented and tested. One such compilation of experiences was documented in the workshop entitled, 'Farmers and Agricultural Research: Complementary Methods'.[154] The case studies included in this documentation are India, Nepal, Bangladesh, the Philippines, Indonesia, Colombia, Dominican Republic, Peru, Brazil, Kenya, Botswana and Zambia. Some of the major themes of the cases presented include the following:

- farmers' ability to experiment and innovate themselves, indicating the need for less focus on technology packages and more on 'basket of choices';[155]
- approaches in which farmers take more part in the analysis and identification of research priorities and in the conduct of their own experiments;[156]
- practical ways in which farmers can participate in on-farm research;[157] and

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[151] SEAMEO Regional Center for Graduate Study and Research in Agriculture, *Proceedings of the Regional Consultative Seminar-Workshop on Farming Systems Research*, SEARCA, Philippines, June 30-July 21 1986.

[152] D. Norman & M. Collinson, 'Farming systems research in theory and practice', *ibid.*, pp. 16-29.

[153] Chambers, Pacey, and Thrupp, *op. cit.*, p. xviii.

[154] *Ibid.*, p. xiii. This workshop was held at Sussex, UK in 1987 and attended by practitioners who are developing new participatory research methods.

[155] *Ibid.*, p. 3.

[156] *Ibid.*, p. 55.

[157] *Ibid.*, p. 109.

- changes in the organisation of research and extension (on a project basis) to link formal and non-formal research and development.[158]

Some examples of the topics presented by the authors are as follows:[159]

- rice cultivation in India which demonstrates how farmers select their varieties and how their criteria differ from those of scientists;
- local knowledge for agroforestry and native plants in Africa;
- crop ethnohistories, local networks or interest groups, and farmer experimentation for better problem identification for adaptive research in Dominican Republic;
- group treks (scientists and farmers together) in Nepal to identify location-specific research problems;
- community appraisal, community organisation and process documentation using various methods in the Philippines;
- diagramming and mapping to aid analysis;
- systems diagramming to help farmers decide on-farm research;
- experience with group techniques in Colombia;
- innovator workshops in Bangladesh;
- farmers' groups for technology development in Botswana; and
- participatory technology validation in highland communities of Peru.

There is also considerable material on accounts about the use of participatory tools and techniques that include among others: participatory rural appraisal;[160] participatory rapid appraisal;[161] and rapid appraisal of agricultural knowledge systems (RAAKS).[162] The Food and Agriculture Organisation (FAO) has its own experiences with people's participation projects (PPP) starting with seven PPPs in Africa (Ghana, Lesotho, Kenya, Swaziland, Tanzania, Zambia and Zimbabwe) throughout the 1980s and in Asia (Thailand, Sri Linka

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[158] *Ibid.*, p. 165.

[159] *Ibid.*, pp. 9-13, 14-23, 61-67, 68-72, 73-76, 77-92, 93-100, 127-149.

[160] Chambers, *op. cit.*, pp. 953-969; Chambers, 'Participatory rural appraisal (PRA): Challenges, potentials and paradigm', *World Development*, vol. 22, no. 10, 1994, pp. 1437-1454; Chambers, 'Participatory rural appraisal (PRA): Analysis of experience', *World Development*, vol. 22, no. 9, 1994, pp. 1253-1268.

[161] Ricardo Ramirez, 'Participatory rapid appraisal of farmers' agricultural knowledge and communication systems', Proceedings of the International Symposium on Systems-oriented Research in Agriculture and Rural Development, Montpellier, France, 21-25 November 1994, pp. 675-676.

[162] Paul Engel & Monique Salomon, 'RAAKS: A participatory action-research approach to facilitating social learning for sustainable development', Proceedings of the International Symposium on Systems-oriented Research in Agriculture and Rural Development, Montpellier, France, 21-25 November 1994, pp. 206-211.

and Pakistan) by the end of the 1980s.[163] Only three of these PPPs were directly implemented by farm extension agencies, and these were observed to have been the most successful.[164]

While experiences with participatory R&E are many, they remain limited in scope, unlike the T&V system and FSR approach, which gained national attention in many developing countries during the 1970s and 1980s. One explanation for this hesitation on the part of national governments to adopt the more participatory approach has been put forward by Oakley.[165] Oakley explains that 'participation' implies grassroots movement, dialogue and debate—factors which are difficult to fit into the bureaucratic set-up of most national governments.

2.4.4 Knowledge Systems and Actor-Oriented Perspective

As a relatively new concept, references about the practical application of actor-oriented approach and knowledge systems (KS) are still limited. They include the works of Röling,[166] Röling and Seegers,[167] and some case studies or field research by twelve institutions from Africa, Asia and Latin America.[168] The case studies are compiled in the book entitled *Beyond Farmer First.*[169] They address issues of *power, knowledge* and *agricultural practice.* They view KS in the context of a multiplicity of actors (e.g. farmers, development workers, extensionists, researchers) and networks (e.g. resource poor farmers, men/women) through which specific information or a particular technology is communicated and negotiated.[170] Examples of the case studies using the KS perspective include the following:

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[163] John Rouse, 'Experiments with democracy', *Technology Transfer and Research and Extension Linkages*, Food and Agriculture Organisation (FA0)

[164] *Ibid.*

[165] Peter Oakley, 'Bottom-up versus top-down: Extension at the crossroads', *Technology Transfer and Research and Extension Linkages*, Food and Agriculture Organisation (FA0), n.d.

[166] Niels Röling, 'The emergence of knowledge systems thinking: A changing perception of relationships among innovation, knowledge process and configuration', *Knowledge and Policy: The International Journal of Knowledge Transfer and Utilisation*, vol. 5, no. 1, Spring 1992, pp. 42-64.

[167] Röling & Seegers, *op. cit.*

[168] These were commissioned in 1991 by the programme, 'Sustainable Agriculture of the International Institute for Environment and Development (IIED), London.

[169] Ian Scoones & John Thompson (eds), *Beyond Farmer First: Rural People's Knowledge Agricultural Research and Extension Practice*, Intermediate Technology Publications, London, UK, 1994.

[170] *Ibid.*, p. 3.

- Landcare programme in Australia, a case of demand-led research and extension support[171] (according to Scoones and Thompson, it is the largest and most effective locally driven resource management programme in the world[172]);
- The case of Hawkesbury Agricultural College (The University of Western Sydney), which underwent a major change from a conservative, top-down to a flexible, people-centred, systems-oriented learning institution for agricultural science;[173]
- A range of methodologies (including their strengths and weaknesses) that help analyse 'differences' in order to understand competing interests, alliances and social networks for more flexible learning, analysis and development[174] (reflected in the cases of participatory methodologies for village-level watershed management planning in India, the case of the integrated pest management Field School in Indonesia, merits and limitations of farmer experimentation in Central America, Mali, Northern Ghana);
- Illustrations of contrasting interests of different internal and external actors in development programmes and potential for conflict and compromise in Zimbabwe and Peru;[175] and
- Case studies in Guinea, West Africa to demonstrate how social dimensions of local complexity is important to understanding how rural livelihoods are composed.[176]

As far as the status of farmer participatory research within IARCs of CGIAR is concerned, there is an apprehension raised by Fujisaka.[177] He observes that while IARCs such as IRRI, CIMMYT, International Centre for Research in Agroforestry (ICRAF), West Africa Rice Development Association (WARDA), and CIP have continued to undertake participatory research activities, the present funding and policies of CGIAR may limit

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[171] A. Campbell, 'Community first: Landcare in Australia', *op. cit.*, pp. 252-257. Landcare is a grassroots movement in Australia involving more than one thousand voluntary community groups aimed at developing more sustainable systems of land use. Landcare is supported by a national ten-year funding programme. Some activities of Landcare groups include: field days and farm walks; demonstration projects (land degradation rehabilitation works); flights over a group area and/or tours to Landcare groups in other regions; development of a catchment or district plan which identifies land degradation problems; development or purchase of land conservation equipment for hire to members; research and development trials with state agencies, universities and agribusiness; production of educational pamphlets, videos and manuals.

[172] Scoones & Thompson, *op. cit.*, p. 182.

[173] Richard Bawden, 'Creating learning systems: A metaphor for institutional reform for development', in Scoones & Thompson, *op. cit.*, p. 258-263.

[174] Scoones & Thompson, *op. cit.*, pp. 97-177.

[175] *Ibid.*, pp. 57-74.

[176] *Ibid.*, pp. 75-79.

[177] Sam Fujisaka, 'Will farmer participatory research survive in the International Agricultural Research Centres?', *ibid.*, pp. 227-235.

these activities in the future. For instance, there is pressure for IRRI to shift its research focus to more strategic and more basic approaches, such as biotechnology, geographic information systems and modelling. These new developments in IARCs will call for more active commitment of NARS and NGOs in the conduct of the needed farmer participatory research.

Table 2.1 summarises the theories and models with more specific applications to the agriculture sector. It outlines the approaches that can be identified or that have emerged out of these theories and models. The same table indicates the conditions in which these approaches were observed to be most useful and their limitations.

In recent years, there have been new initiatives in agricultural R&E based on the more dynamic models. However, these efforts have been limited in scope, and constrained by funding, resistance from some actors involved, and other institutional or structural rigidities. Another possible reason for the limited use of the more dynamic models is because they are rich with rhetoric, which may be difficult to translate into action.

Some inferences can be derived from the review of agricultural R&E theories, models and approaches. The paradigm or theory that one takes determines one's view of the roles the different actors play in agricultural R&E. These assumptions in turn influence the choice and development of approaches employed. The actual experiences and constraints encountered in the implementation of these approaches serve as lessons learned for the design of new theories and approaches. The different approaches to agricultural R&E requiring different types of skills are appropriate in different situations. For instance, as the level of complexity and uncertainty (e.g. rainfed or marginal farms), the number of stakeholders and perspective, and the interdependence of technical, economic and social issues all become more complicated, there is an increasing need for people skills, use of participatory approaches, use of interdisciplinary teams, more facilitation and others.

2.5 Conclusion

There is an implicit evolutionary phase in the agricultural R&E literature that has parallels with the more manufacture-focused literature. For example, the development of ideas toward concepts such as national innovation systems is similar to the knowledge systems in agricultural R&E. The linear model of agricultural R&E parallels the technology-push innovation model and the innovation diffusion theory. The user's perspective theory with its focus on the farmers' needs can be associated with the demand-

Table 2.1 Summary of theories and models related to agricultural innovation

Model/Theory	Major Approach	Applications	Weaknesses
1. Traditional linear model Assumptions: • Farmers are users of technologies generated by outsiders instead of being active problem solvers. • Reason for non-adoption of technologies is farmers' ignorance	*Training and visit (T &V) approach* Purpose: • To disseminate available technologies assumed to be relevant through extension education Key features: • Hierarchical and highly structured with clearly defined roles of research and extension workers: -subject matter specialists (SMSs) prepare technology packages and train extension workers on them -extension workers deliver technology packages through contact farmers	Relatively homogeneous farming conditions similar to those of research stations and where farmers' resources are adequate	Not applicable to more complex and diversified farming systems

2. Users' perspective theory Assumptions: • Role of farmers viewed as providing information to outsiders who help them identify research needs and opportunities • Reason for non-adoption of technologies is farm-level constraints	*Farming systems research (FSR) approach; rapid rural appraisal(RRA) as diagnostic tool* Purpose: • To generate and transfer technologies that fit the needs of local farming system conditions Key features: • Multidisciplinary, location specific research focusing on solving farm-level constraints • Whole process mostly researcher and extension worker-managed	Commodity research (e.g. rice-based farming systems) and introduction of new varieties	Direct participation of farmers in setting research priorities limited
3. Participation paradigm Assumptions: • Farmers have own stock of systematised indigenous knowledge available for assimilation and incorporation. • Much can be gained by the interaction of local with scientific knowledge • Reason for non-adoption of technology is inappropriate technology	*Farmer-first approach; participatory rural appraisal (PRA) as diagnostic tool* Purpose: • To encourage farmers' active participation in all aspects of research and extension; to generate choices for farmers to experiment, adapt and innovate Key features: • Analysis of needs and priorities done by farmers assisted by outsiders • Outsiders transfer principles, methods, and choices instead of packages • 'Menu' is not fixed but responds to farmer's needs	Wide applications in complex, diverse and risky farming environments	Interests and power relations not properly dealt with

4. Knowledge systems and actor-oriented perspective Assumptions: • Existence of multi-layered fragmentary diffuse knowledge with complex, inequitable, discontinuous interactions between actors and networks (local & external). • Role of experts seen as facilitating of "knowledge processes". • Farmers are viewed as creative investigators and analysts.	*Relatively new concept-'Beyond farmer first'* Purpose: • To acknowledge the multiplicity of actors and networks and their dynamic interrelationships Key features: • Incorporates a sociopolitically differentiated view of development where age, gender, ethnicity, class and religion are considered. • Addresses socioeconomic and biophysical issues, advocates diversity and holistic inquiry, and copes with technical uncertainty and longer time frames over larger areas.	More relevant to requirements of sustainable development	Limited empirical studies Largely descriptive and capable of showing which problems exist but not why and how such problems arise

pull innovation model. The innovation models such as national innovation systems, selection environment, and knowledge or learning cycles recognise the evolutionary nature of innovation, the diversity and disequilibrium of choices, and the complexity of the institutional structure of innovation. These models are congruent with the participation paradigm, actor-oriented perspective, and knowledge system thinking in agricultural R&E.

A major theme that emerges in this chapter is the observed dominance of the traditional innovation and diffusion models as depicting agricultural R&E systems. That they do not provide an adequate explanation of the complex, diversified, unpredictable and interactive nature of agriculture and agricultural R&E system is a major insight derived from the discussions in this chapter. This implies the need to search for and encourage alternative or complementary systems, strategies and techniques for agricultural R&E in the context of the more evolutionary or dynamic models of innovation. It suggests the importance of flexibility in the R&E structure and policies. For one, the budgetary constraints in most developing countries have increased the pressure for governments to limit funding for public research. This brings into the picture NGOs, the private sector and other non-traditional actors. Agricultural R&E system will increasingly rely on these groups for innovations and technology transfer. However, this will require major institutional changes in the present R&E system of most developing countries.

CHAPTER 3

POLITICAL ECONOMY CONTEXT OF THE AGRICULTURE SECTOR AND TECHNOLOGY TRANSFER

3.1 Introduction

This chapter presents an analysis of the larger context within which the agriculture sector operates. Much of what happens within the agricultural sector, including its technology transfer strategies, can be explained or influenced by the domestic economic and political factors on one level and the global economy on the other. In recent years, the capacity of nation-states to meet the needs of its citizenry for economic security, political representation, physical safety and cultural identity has been observed to be increasingly challenged by global capitalism.[1] With globalisation, the economies of nation-states are more and more integrated into the world capitalist markets. Various super international bodies such as the World Bank, International Monetary Fund and the World Trade Organisation, and multilateral trade agreements such as the World Trade Agreement (WTA)[2] and in particular, the agreement on Trade Related Intellectual Property Rights have emerged to promote and coordinate international economic relations and integration. Therefore, the legitimacy and sovereignty of nation-states are increasingly threatened because domestic policy issues are becoming more subjected to these international organisations and agreements.

This chapter examines the political economy environment of the Philippine state in order to gain a better understanding of the development of the agriculture sector. This contextual understanding is important for the analysis of the technology transfer process in the agriculture sector. Some of the questions explored in this chapter are the following. What are the Philippine state's strategies for development with emphasis on its industrialisation and agricultural development objectives? What are the major policies and actions of the state in relation to these objectives? To what extent are these actions constrained or facilitated by the different local and global interests? What do these actions,

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[1] Roland Axtmann, 'Collective identity and the democratic nation-state in the age of globalisation', in Ann Cvetkovich and Douglas Kellner (eds), *Articulating the Global and the Local*, Westview Press, Colorado, 1997, pp. 43-44.

[2] Previously known as General Agreements on Trade and Tariffs-Uruguay Round (GATT-UR).

policies, and local and global forces mean for the agriculture sector and technology transfer?

Analysis of the political economy of the Philippines provides useful insights into the complexity of the larger environment of the technology transfer process. A good understanding of the development theories discussed in chapter 1 (e.g. dependency theory, neoclassical theory) is important in this type of analysis.

A closer look at the Philippine political economy reveals the different domestic and global forces that shape the Philippine agriculture sector and its processes such as technology transfer. It leads to the conclusion that various contradictions, constraints and conflict of interests within the Philippine political economy have directly or indirectly limited the development of the agriculture sector and its ability to provide technology transfer or extension service. The basic structure and conditions for the successful implementation of agricultural development programs have often been compromised in favour of the industrialisation objective of the Philippine government. In recent years, this industrialisation policy has been export-oriented and foreign investment-led. Economic policies have often been made conducive to foreign capital at the expense of small farmers and the environment.

The structures of the Philippine agriculture sector and the agricultural research and extension (R&E) system have been historically influenced by foreign intervention. For example, the World Bank supported the implementation of two technology transfer strategies that overhauled the entire Philippine agricultural R&E system in the 1970s and the 1980s. These were the training and visit (T&V) approach to extension and the farming systems research approach. The T&V approach, which is based on the conventional model of innovation, was a direct prescription by the World Bank to many developing countries including the Philippines to promote the green revolution movement.

There are some factors in the Philippine political economy that, if viewed in the positive light, could offer opportunities to the agriculture sector. The World Trade Agreement that liberalises agricultural trade provides new market opportunities to local agricultural producers. The role of technology transfer is crucial because the local producers urgently need technology options that would enable them to compete with their counterparts from other countries. The local government code, which decentralises the extension service from central to local government units (LGUs), has the potential to deliver more need-based and relevant extension service because of the proximity of the

LGUs to the farmers. However, the technology transfer skills of the LGUs must be enhanced to prepare them for their new role.

This chapter argues for the use of technology transfer approaches that could deal with the challenges presented by the domestic and global political economy. It suggests the need for actors within the agricultural R&E to become more aware of the various political economy issues and opportunities so that benefits from technology transfer could be maximised and cost of negative consequences minimised.

3.2 Overview of the Philippine Economy

3.2.1 History of the Philippine Economy

During the immediate post-World War II period, the Philippines had the most impressive economic growth record in Southeast Asia. Until the end of the 1950s, the Philippine economy registered the highest growth in Gross Domestic Product (GDP) per capita relative to other market economies in the region.[3] The Philippines showed great promise for industrialisation during this time because its literacy level was higher than its neighbouring countries in Asia. Its 'exposure to formal democratic processes and western entrepreneurial ideology' during the American occupation was also seen as an advantage for the country.[4] However, since the 1960s, the Philippine economy had lagged behind those of its neighbours in Southeast Asia. Economic growth has been slow and frequently interrupted by major domestic crises and external shocks.[5] **Figure 3.1** shows how poorly the Philippine economy had performed compared with other developing Asian countries in terms of GDP growth rate. The average growth of GDP in the country declined from 5.9 percent during the period 1965-1980 to 1.8 percent in 1980-95.[6] External shocks in the 1970s, such as oil price hikes and the increase in world interest rates, led to serious terms-of-trade losses in the Philippines.[7] Furthermore, the political turmoil that heightened during the 1980s, induced among others by the assassination of Benigno Aquino, resulted in

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[3] Temerio Rivera, *Landlords and Capitalists: Class, Family, and State in Philippine Manufacturing*, The University of the Philippines Press and Center for Integrative and Development Studies, Diliman, Quezon City, Philippines, 1994, p. 1.

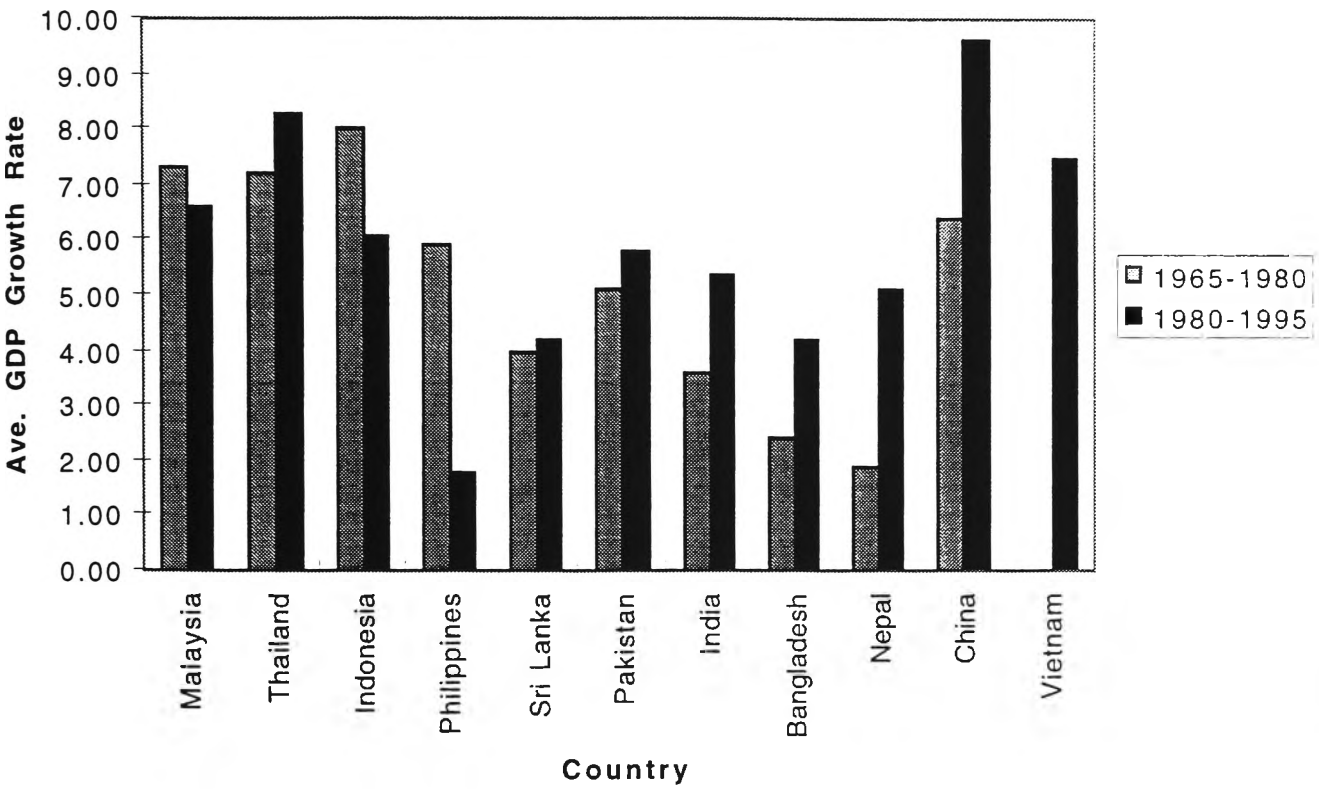
[4] *Ibid.*

[5] Rob Vos and Josef Yap, *The Philippine Economy: East Asia's Stray Cat?: Structure, Finance and Adjustment*, Institute of Social Studies, the Hague, MacMillan Press Ltd., Great Britain and St. Martin's Press, Inc., New York, 1996, p.11.

[6] Arsenio Balisacan, 'Policy reforms and agricultural development in the Philippines', *ASEAN Economic Bulletin*, vol. 15, no. 1, April 1998, p. 79.

[7] Vos and Yap, *loc. cit.*

Figure 3.1 Average GDP Growth Rate of Developing Asian Countries



Sources:

Asian Development Bank, Key Indicators of Asian Pacific Counties, 1995 & Asian Development Outlook 1997 & 1998; World Bank, World Development Report (1990; 1995); Food and Agriculture Organisation, Agricultural Policy Analysis for Transition to a Market-Oriented Economy in Vietnam, FAO Economic and Social Development Paper 123 (Rome, 1994) quoted in Arsenio Balisacan, 'Policy reforms and agricultural development in the Philippines', ASEAN Economic Bulletin, vol. 15, no. 1, April 1998, p. 79.

massive flight of capital and decrease in foreign loans.[8] As the balance of payments worsened, and the World Bank and the IMF structural adjustment policies were adopted,[9] the Gross National Product (GNP) of the country was at its record low levels, averaging -4.9 percent during the period 1983-85.[10]

The following conditions characterised the state of Philippine economy for the period 1960s to early 1990s:

- Huge foreign debt servicing that limited the government's spending for basic services such as education, social services and infrastructure;
- Declining levels of investments;
- Low savings generation resulting in poor capital formation;
- High import dependence and low export levels;
- Low revenue collection which was among the lowest in Asia; and
- Inadequate science and technology. [11]

For the first time since the debt crisis in the 1980s, the Philippine economy showed signs of recovery during the period 1994 to 1997. The Philippines achieved remarkable rates of growth with GDP growth of 4.30, 4.80, 5.70, and 5.10 percent for the years 1994, 1995, 1996 and 1997, respectively.[12] Exports, imports and investments were steadily increasing.[13] There were expansion of consumption, a reduction of external indebtedness, and a decrease in the public sector account deficit.[14] A series of political and economic reforms were credited for such economic turnaround in the Philippines. Since the restoration of the Philippine democracy in 1986, economic reforms such as liberalisation, deregulation of the domestic economy, and privatisation have been carried out by the leaders of post-Marcos regimes. Growth in exports has been induced by increase in foreign

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[8] Romeo Bautista, *Impediments to Trade Liberalisation in the Philippines*, Gower, Aldershot, Brookfield, USA for the Trade Policy Research Centre, London, 1989, pp. 1-2.

[9] The debt crisis in the 1980s further weakened the bargaining power of the Philippine government *vis-a-vis* foreign lenders. It became vulnerable to the changes in the sentiments of foreign lenders and had little choice but to comply with the restrictive policy measures imposed by WB and IMF.

[10] Vos and Yap, *op. cit.*, p. 12.

[11] Felicito Payumo, 'Abandoning the pork-barrel state, rethinking economic policies', *Kasarinlan: A Philippine Quarterly of Third World Studies: Rethinking the State and the Economy*, vol. 1, no. 1, Third World Studies Center, University of the Philippines, 3rd Quarter 1994, pp. 9-11.

[12] Political and Economic Risk Consultancy, Ltd.-PERC, Country risk report: Philippines, http://asiarisk.com/phil.html, accessed on 15 January 1999.

[13] Philippines-back in business: National economy, http://www.tky.hut.fi/-remburssi/projects/philippines/economy.htm, accessed on 14 January 1999.

[14] *Ibid.*

direct investment (FDI), more liberalised foreign exchange policies, and the resolution of the power crisis.[15]

Unfortunately, the remarkable economic growth of the 1990s has not been sustained due to the widespread financial crisis in Asia that started in 1997. Asian countries suffered from collapsing stock markets and devaluation of currencies, which made their exports more expensive and less competitive in the world markets.[16] In the region, the Philippines was the country least affected by the recent Asian crisis. In 1998, only the Philippines and Singapore achieved positive growth rates in the Asian region, just enough to keep the country out of recession. The economic reforms and the political legitimacy[17] enjoyed by the Philippine government in recent years were claimed to have enabled the country to survive the Asian crisis.[18]

3.2.2 Structure of the Philippine Economy

In the Philippines, only a small segment of the labour force is employed in manufacturing; the majority of the population is engaged in agriculture and urban informal services.[19] The manufacturing subsector involves mainly the processing of primary or agricultural products with some assembly of electronics products for foreign companies.[20] The agriculture sector involves the cultivation in small landholdings of food crops such as rice, maize, coconut, cassava, vegetables and various tropical fruits. It also includes export crops such as banana, pineapple and sugarcane grown in plantations, tobacco and abaca. Livestock and poultry are raised for local consumption. Coconuts are the leading export crop, mainly in the form of coconut oil. A more detailed discussion of the nature of the agriculture sector in the Philippines is presented in section 4.2 of chapter 4.

The industry sector that includes manufacturing, mining, construction and public utilities has been relatively underdeveloped compared with the newly industrialising

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[15] *Ibid.*

[16] OTN explores Asia's economic crisis: Why did it happen, http://www.megastories.com/seasia/why/why.htm, accessed on 20 October 1998.

[17] The restoration of freedom and democracy since 1986 has resulted in a more stable political environment in the Philippines. There has been a perceived increase in confidence of the Filipino people in the government, and the legitimacy of the political regimes after Marcos have improved since.

[18] The first 100 days of the Estrada Presidency, 08 October 1998, http://www.erap.com/100 days/speech.htm, accessed on 20 October 1998; Political and Economic Risk Consultancy, Ltd.-PERC, Country risk report: Philippines, http://asiarisk.com/phil.html, accessed on 15 January 1999; John Shaw and Maggie Macrae, 'Steady Eddy's impressive legacy', *International Business Asia*, 29 May 1998, vol. 6, no. 10, p. 12(2).

[19] Vos and Yap, *op. cit.*, pp. 16-17.

[20] 'Overview: Republic of the Philippines', http://www.abisnet.com/philippines.htm, accessed on 14 January 1999.

countries of Asia.[21] The industry sector's contribution to GDP was 35.3 percent in 1970 and barely increased since then up until 1992.[22] Its share to total employment fluctuated between 11 to 13 percent for the period 1960 to 1990.[23] The employment share of manufacturing was only 10 to 12 percent between 1960 to 1990.[24] Agriculture, including forestry and fisheries, is still the most important sector because it directly employs almost half of the Philippine workforce—61 percent in 1960 down to 46 percent in 1995.[25] Its contribution to export earnings has remained at significant levels although it plunged from 86% in 1965 to about 30 percent in 1990.[26] These trends do not approximate the commonly-observed structural changes in modernising growth where a shift from traditional agriculture to modern manufacturing would occur during the initial stages of growth.[27]

3.2.3 Modes of Production

Different modes of production ranging from various forms of the pre-capitalist to the capitalist mode coexist in the Philippines. There are different positions taken by different analysts on the issue of which mode is dominant in the Philippines society. The advocates of the capitalist thesis claim the following: most of the surplus labour is appropriated by means of wage exploitation; commodity production predominates; and most labourers are without landholdings.[28] Those who argue that the semi-feudal mode continues to prevail in the Philippine society cite the following reasons: the ruling classes extract most of the surplus labour by means of land rent; the economy lacks heavy

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[21] Rene Ofreneo, 'Philippine industrialisation and industrial relations', *State of the Nation Reports*, no. 12, The University of the Philippines Press and Center for Integrative and Development Studies, Diliman, Quezon City, Philippines, 1995, p. 2.

[22] Vos and Yap, *op. cit.*, pp. 13-14.

[23] Sectoral employment shares, 1960-1990, National Statistics Office, Philippines.

[24] *Ibid.*

[25] *Ibid.*

[26] Balisacan, *op. cit.*, pp. 78-79.

[27] Vos and Yap, *op. cit.*, p. 13.

[28] R. Santos, *Beyond the Surface: A Theoretical Framework for the Analysis of the Mode of Production and Social Formation in the Philippines*, Alternate Forum for Research in Mindanao (AFRIM), Inc., Davao City, Philippines, 1990, pp. 1-2.

industry; a big comprador bourgeoisie[29] is the dominant class; and industry does not tend to accumulate because of monopoly.[30]

The rural Philippines is largely semi-feudal in structure despite attempts of different administrations to effect land re-distribution or transfer of income to the landless through various land reform laws. The semi-feudal unpaid labour is at the same time semi-colonial since it is directed at promoting the foreign monopoly capitalists. Monopoly capitalism, largely through multinational corporations, did somehow develop a capitalist mode in the Philippines in the following industries: food; textiles; clothing; machinery; equipment; chemicals; pharmaceutical's; and other agribusiness fields. However, the Filipino capitalists and entrepreneurs generally end up as junior partners of these corporate giants.

3.2.4 Class Segments and their Economic Interests

The Philippine society can be classified into different class segments, namely the rural elite involving the old and the new rich,[31] landed and non-landed capitalists in manufacturing and industry,[32] the peasantry and the rest of the labour force. The two most dominant social classes in the Philippines include the traditional land-owning oligarchy, and the landed and non-landed capitalists in industry or the business elite. The following statistics illustrate the social inequality that has pervaded the country and the dominance of the Philippine elite: the top 5.5 percent of all landowning families own 44 percent of all arable land in the country; the richest 15 percent of all families account for 52.5 percent of all the nation's income; and in 1991, only 10 corporations accounted for 26 percent of all revenues, 40% of all net income, and 34% of the total assets of the top 1000 corporations.[33] The influence of the Philippine oligarchy has extended into the country's political system, with about 60 to 100 political clans controlling all elective positions at the national level.[34]

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[29] 'Comprador bourgeoisie' are landlords assuming the personality of big businessmen or native agents directly employed by a foreign establishment or transnational corporation. They may own plantations or large farm estates where farm workers or tenants pay rentals and where large number of hired wage labourers are organised under a central management are employed.' Cited in Ephraim Romero and Virgilio Esguerra, *Agrarian Reform Taxation and Cooperatives (A Social Science Perspective)*, Center for Human Rights and Peace Studies Series no. 1, National Bookstore, Inc., Philippines, 1991. p. 49.

[30] Santos, *loc. cit.*

[31] 'The traditional landlords are those who obtain their income from the extraction of rent like the sugar farm owners. The new rural elite includes the new breed of landowners like the corporate and commercial local farms, rural bankers, farm input dealers, tractor lenders, merchants, rice dealers, warehouse operators, millers, big importers, distributors of agricultural inputs, handicraft industrialists and others.' Cited in Romero and Esguerra, *op. cit.*, p. 60.

[32] Rivera, *Landlords and Capitalists: Class, Family, and State in Philippine Manufacturing, loc. cit.*

[33] Jose Almonte, 'The politics of development in the Philippines', *Kasarinlan: Philippine 2000: Dream or Delusion,* Third World Studies Center, University of the Philippines, Quezon City, vol. 9, nos 2 and 3, 1993-1994, p. 112.

[34] *Ibid.*

One of the most significant results of the colonisation of the Philippines was the emergence of the agrarian elite.[35] The landowning elite was observed to have obtained their economic foundation from production for the US market. The Philippine products, notably sugar, could enter the US market free of duty.[36] However, the nature of the oligarchy has changed from a cohesive landholding elite, generated by the Spanish and American colonial policies, to a more diversified elite after World War II. This diversification was the consequence of the imposition of the import-substitution industrialisation (ISI) policies in the 1950s to 1960s, implementation of the export-led industrialisation strategy in 1970s, the centralisation of economic resources by the Philippine government under Marcos, and the influx of foreign investors.

There were four class segments noted within the Philippine elite during the Marcos regime, namely crony capitalism, state capitalism, those who produce for the domestic market (ISI manufacturers), and those who produce for the world market (exporters).[37] The cronies were largely private but depended on their close ties with the President to advance their own private ends. Their main political-economic interests were the maintenance of a capitalist, class-divided economy and the continuation of the Marcos regime. Government monopolies were created to take control of several important sectors of the economy. For instance, state-trading monopolies for sugar and coconut were established and entrusted to Marcos' landed-capitalist friends.

The ISI policy during the 1950s created an entrepreneurial group, largely but not exclusively Filipino, that depended on government protection for their economic well-being. However, judging this sector as highly protected and inefficient, the Marcos government embarked on an export-oriented industrialisation program. The program was supported by the World Bank (WB) and the International Monetary Fund (IMF). While the power and economic interests of the ISI entrepreneurs were significantly eroded, they have persisted through the years. Some ISI manufacturers were attacked by the regime not because of their ISI activity but because of their perceived political opposition against the government.

The exporters of both manufactured products and raw materials were a mix of foreign direct investors and locally-owned enterprises under contract for multinational

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[35] Gary Hawes, *The Philippine State and the Marcos Regime: The Politics of Export*, Cornell University Press, New York, 1987, pp. 125-126.

[36] *Ibid.*

[37] *Ibid.*, pp. 135-142.

corporations. It is in the interest of these groups to see the continuous lowering of tariffs, barriers to foreign investment and wages. The landed elite in the agroexport sector collaborated with Marcos in return for their continued class rule in the countryside.[38] Up to this day, they have succeeded in maintaining their positions in society and the political scene.

Post-Marcos governments (under Aquino and Ramos) have sought to abolish crony capitalists and diminish the role of the state capitalists through their privatisation programs.[39] These administrations have committed to reducing the control of the oligarchy over the Philippine economy through comprehensive market-oriented reforms.

On the other hand, the peasantry has stratified into a small sector of relatively well-off owner-cultivators, the amortising tenants who were awarded certificates but who still carry the burden of paying for their lands and expensive farm inputs, the lessees, and the remaining sharecroppers who labour under feudal conditions.[40] In capitalist-run plantations such as in banana, pineapple, sugar and other export crop industries, farmers have become wage labourers. However, the population of landless rural poor who do not benefit at all from the agrarian reform program has remained at a significant level.

The development of the class segments within the Philippine economy is further discussed in section 3.4. It is important to be aware of these economic groups and their respective interests to understand agricultural development and technology transfer in the Philippines. These groups could be any of the following: direct participants in the agribusiness sector; beneficiaries of technology transfer programs; or obstructions to a more equitable agricultural development.

3.3 Overview of the Philippine State

3.3.1 Colonial History of the Philippine State

The Philippines was colonised by Spain for over three centuries, from 1564 to 1898.[41] This was followed by nearly forty years of American occupation from 1898 to 1935; ten years of Filipino self-government under American control; and three years of

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[38] *Ibid.*, pp. 129-130.

[39] *Ibid.*, p. 159.

[40] Renato Constantino, *The Nationalist Alternative* (rev. edn.), Foundation for Nationalist Studies, Inc., Quezon City, 1990, pp. 68-69.

[41] Stanley Karnow, *In Our Image: America's Empire in the Philippines*, Ballantine Books, New York, 1989, pp. 9-10.

Japanese rule during World War II.[42] The Philippines finally achieved independence in 1946.[43]

The colonial history of the Philippines had deprived the Filipinos of an indigenous national character. Instead, it produced a mixed cultural identity characterised by contradictions and uncertainties that existed long after the colonisers left the country.[44] For instance, since gaining independence from the Americans, the attitude of Filipinos towards the United States has alternated between 'imitation and resentment, subservience and defiance, adulation and contempt.'[45] American colonial mentality has been manifested in the Philippines' educational system, political system, government and economic institutions, and people's lifestyle. On the other hand, an example of the Filipinos' display of nationalism and resentment against the US was the clamour for the removal of the US bases from the country in the 1980s. While colonialism was a very unfortunate experience for the Filipinos, it had some benefits, too. The Filipinos have a facility for languages, particularly English. They have become more flexible and can easily adapt to and identify with different cultures. With globalisation, speaking English, flexibility and adaptability are helpful for international communication.[46]

The long history of colonialism in the Philippines has perpetuated four social features that had influenced the nature of the modern Philippine state. These include a dominant land-owning and export-based oligarchy; a tradition of clientelist politics; a history of popular opposition movements and uprisings;[47] and a continuing dependence on foreign external resources.[48]

3.3.2 The Philippine Government

The Philippine government is at present based on a freedom Constitution characterised by elections, competing political parties and a relatively free press. The

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[42] John Shaw and Maggie Macrae, 'Steady Eddy's impressive legacy', *International Business Asia,* vol. 6, no. 10, 29 May 1998.

[43] *Ibid.*

[44] *Ibid.*

[45] Karnow, *op. cit.*, p. 15.

[46] Mina Ramirez, Serafin Talisayon, and Edgardo Espiritu, 'The Philippines as knowledge center in the Asia-Pacific', *Occasional Monograph 5—Asian Social Institute*, Asian Social Institute Printing Press, Metro Manila, 1994, p. 4.

[47] For example the leftist insurgents called Hukbalahap of the 1950s who took up arms against rural poverty; the armed communist-led peasant uprising that nearly toppled the central government of Marcos during 1970s and early 1980s; and the Muslim rebels of Mindanao.

[48] Temerio Rivera, 'The state and industrial transformation: Comparative and local insights', *Kasarinlan-Rethinking the State and the Economy*, Third World Studies Center, University of the Philippines, Quezon City, vol. 10, no. 1, Q3 1994, p. 61.

Constitution provides for a bicameral Congress with a Senate of 24 members and a House of Representatives of a maximum of 250 members.[49] The President is the Head of state, Commander-in-Chief of the Armed Forces, and controls all the executive departments, bureaus and offices.[50] The President is elected by the people every six years.[51] The present system of government includes the legislature, executive bodies, judiciary, bureaucracy, local government and public corporations.[52] The executive, legislative, and judicial branches of government share powers within a scheme of checks and balances.

The Philippine government started with the 1935 democratic Constitution based on American congressional model and institutions. This American style Constitution[53] lasted until 1972 when martial law was declared by the then incumbent President Ferdinand Marcos.[54] The authoritarian martial law government eliminated the old landlord-dominated Congress. It adopted a one political party system, centralised the police, imposed censorship on the press and took over public utilities.[55] Liberal democracy was restored in February 1986 and has since been the constitutional framework of the modern Philippine governments.[56] The new Constitution has shifted significant powers from the executive to the legislature.

3.3.2.1 The Bureaucracy

The Philippine administrative system is based on the Western organisational model—the Weberian bureaucracy. In the Philippine government context, the term bureaucracy refers to the departments or ministries, bureaus and other instrumentalities of government through which the different government policies, programs and projects are

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[49] Sections 1 to 2 and Section 5 under Article VI, 'Legislative Department', *The 1987 Philippine Constitution.*

[50] Sections 1, 17, and 18 under Article VII, 'Executive Department', *The 1987 Philippine Constitution.*

[51] Section 4 under Article VII, *The 1987 Philippine Constitution.*

[52] Raul de Guzman, Mila Reforma, and Elena Panganiban, 'Local government', in Raul de Guzman and Mila Reforma (eds), *Government and Politics of the Philippines,* Oxford University Press, Singapore, 1988.

[53] The 1935 Constitution, while democratic in form and type of government structures, did not develop a democracy identical with its American Constitution model. The 1935 Constitution provided for a strong central government and concentrated powers on the executive (emphasis on the State) in contrast with the decentralised structure of the American political system (emphasis on the rights of the individual). Cited in Amando Doronila, *The State, Economic Transformation and Political Change in the Philippines: 1946-1972*, Oxford University Press, Singapore, 1992, pp. 35-40.

[54] Harold Crouch, *Economic Change, Social Structure and the Political System in Southeast Asia: Philippine Development Compared With the Other ASEAN Countries*, Southeast Asian Studies Program and Institute of Southeast Asian Studies, Singapore, 1985, p. 41.

[55] See for example Crouch, *op. cit.*, p. 45 and Karnow, *op. cit.*, pp. 356-370, 379-383.

[56] Doronila, *The State, Economic Transformation and Political Change in the Philippines: 1946-1972*, *op. cit.*, p. 1.

carried out.[57] The bureaucracy provides services to the Filipino people in the areas of health, agricultural extension, irrigation, construction, maintenance and improvement of roads and other public works, electricity, and water services.[58] Bureaucracies in the Philippines may be classified in terms of major branch of government, level of government, functional categories or sectoral concerns, and those created as provided for in the Constitution **(see Appendix 3.1).** The Philippine bureaucracy has undergone major modifications and changes particularly when a new leader takes over the reins of government.

3.3.2.2 Local Government

There are five levels of local government in the Philippines: the barangay, the municipality, the city, the province and the region. The barangay is the only indigenous local government unit in the country whose origin can be traced to a pre-Spanish institution.[59] Local governments exercise legislative, executive, administrative and governmental (primarily intended for promoting public welfare) functions within their respective jurisdictions.

The Philippine local government structure had been characterised by hierarchy and centralism, largely the result of colonial imposition.[60] Moves for decentralisation were evident during the period 1946-1972, but this trend was reversed in favour of centralisation when martial law was declared in September 1972.[61] In 1991, the Local Government Code (LGC) was enacted. It provides for greater local autonomy through devolution of responsibilities, authorities and powers from national to local government units (LGUs). The Code has been regarded as a radical and significant legislation, involving complex structural, administrative and political reforms. The proponents of the LGC view this policy as the most potent mechanism for decentralising power and achieving faster development. The LGC critics, on the other hand, are worried about decentralised corruption, incompetence of local official, and other uncertainties in its implementation. The Code provides for countervailing forces against corruption and incompetence by

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[57] Raul de Guzman, Alex Brillantes Jr., and Arturo Pacho, 'The bureaucracy', in de Guzman and Reforma (eds), *Government and Politics of the Philippines*, *op. cit.*, p. 180.

[58] *Ibid.*

[59] de Guzman, Reforma, and Panganiban, *op. cit.*, p. 208.

[60] Proserpina Tapales, 'Devolution and empowerment: The Local Government Code of 1991 and local autonomy in the Philippines', *State of the Nation Reports no. 7*, University of the Philippines Press and Center for Integrative and Development Studies, Philippines, 1993, p. 7.

[61] de Guzman, Reforma and Panganiban, *op. cit.*, pp. 208-209.

prescribing membership of non-government organisations (NGOs) in all local boards and councils. However, the existence of such channels for NGO participation may not necessarily guarantee an effective intervention by civil society in the government's political process. There remains a wide gap between policy and practice when it comes to the actualisation of NGO participation.[62]

3.3.2.3 Public Corporations

Public corporations[63] have been organised and operated in the Philippines because of actual or presumed weaknesses of the market. But there were exceptions, particularly when powerholders realised the advantages[64] of the corporate structure for the consolidation of economic and political powers. Such was the case during the Marcos administration when the number of public corporations bloated from 60 in 1970 to 301 in 1985. The number of public corporations was reduced to about 78 in 1986 as part of the economic reform program of the Aquino government.[65] The public corporations had eaten up a huge portion of the government's resources. During the period 1975 to 1984, the public corporations accounted for an average of 18% of the total national government expenditure for the period.[66]

3.3.3 Civil Society

Civil society in the Philippines during the colonial period had very little opportunity to develop and intervene in official decision-making. Instead, the colonial experience of the Filipino people stimulated the formation of revolutionary and militant groups. All throughout the Spanish colonial rule, many revolts and armed struggle occurred.[67] These revolts were led by 'peasant brotherhoods' who aspired to free themselves from hardships of feudalism.[68] The Muslims of Mindanao and the mountain

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[62] Marlon Wui and Ma. Glenda Lopez (eds), *State-Civil Society Relations in Policy-Making*, Philippine Democracy Agenda, vol. 2, The Third World Studies Center, University of the Philippines, Quezon City, 1997, p. 7.

[63] Defined as 'a public or government institution performing business, or alternatively, a business enterprise entrusted with certain socially-relevant goals'. Cited in Maria Fe Villamejor-Mendoza, 'Towards deepening public enterprise reforms: Alternatives beyond privatisation', in Proserpina Tapales and Nestor Pilar (eds), *Public Administration by the Year 2000: Looking Back into the Future*, University of the Philippines, Quezon City, 1995, p. 348.

[64] For example, flexibility, autonomy and preferential treatment.

[65] Juanita Amatong, 'The Philippine experience in the monitoring and supervision of government-owned and/or controlled corporations', in Tapales and Pilar (eds), *op. cit.*, p. 313.

[66] Villamejor-Mendoza, *op. cit.*, p. 355.

[67] Amado Guerrero, *Philippine Society and Revolution*, TA KUNG PAO, Hong Kong, 1971.

[68] Jose Abueva, 'Philippine ideologies and national development', in de Guzman and Reforma, *op. cit.*, pp. 34-35.

people in the various Philippine islands maintained resistance.[69] During the American regime, trade unions and peasant associations emerged to fight against US imperialism and feudalism. They formed the core of the Communist Party and Socialist Party of the Philippines in the 1930s.[70] The organised actions of these groups, such as labour strikes and agrarian unrest, had set the stage for the 'full-scale rebellion' of the HUKBALAHAP (Anti-Japanese People's Army) and Communists in the late 1940s and early 1950s.[71]

Civil society in the contemporary Philippines includes the NGOs, people's organisations (POs), social movements and civil organisations that mediate the citizen's relationship with the state. The constitutional and legal framework of the post-Marcos governments has provided new avenues through which civil society can influence state governance. While there are built-in mechanisms by which the government and civil society can interact, problems regarding the utilisation and effectivity of these means of interaction persist. Utilisation of these mechanisms can be maximised if the citizens become more aware of the political processes involved in decision-making and the means by which they could intervene in the process.[72]

In designing a technology transfer strategy, it is important to understand the relationship between civil society and the state and their varying interests. An effective technology transfer strategy must engage both the state apparatus and civil society in a way that would advance the cause of the rural population.

3.3.3.1 NGOs

According to Ocampo,[73] NGOs in the Philippines can be classified into four types, namely a) sectoral people's organisations, b) issue advocacy groups, c) service agencies and d) popular coalitions. Sectoral people's organisations may involve, among others, the following: women; industrial workers; farmers; teachers; church people; youth and students; doctors; lawyers; tribal Filipinos and nationalist businessmen. Some of the problem areas addressed by the issue advocacy groups are foreign debt, freedom from nuclear power and military bases, human rights and militarisation, prostitution of women and children and environmental protection. Examples of service agencies are those

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[69] Guerrero, *op. cit.*, p. 17.

[70] Abueva, *op. cit.*, p. 48.

[71] *Ibid.*, p. 42.

[72] Wui and Lopez, *op. cit.*, p. 19.

[73] Danilo Ocampo, 'NGOs and the bureaucracy: A collaboration in search of a framework', *Kasarinlan*, Third World Studies Center, UP, Quezon City, vol. 5, no. 3, 1990, pp. 66-67.

engaged in community organising, those assisting in the implementation of socioeconomic projects in the community and non-government research agencies. Popular coalitions are formal temporary alliances among sectoral or multi-sectoral organisations that seek to promote common objectives or demands at a particular time (such as Freedom from Debt Coalition, Coalition for Peace, Congress for a People's Agrarian Reform).

Many authors have claimed that the Philippines has the most developed and vibrant NGO movement among the ASEAN countries. NGOs began to emerge in the 1950s to attend to the needs of the people at the grassroots level.[74] Many of these NGOs were religious missions and farmer organisations such as the Federation of Free Farmers[75] established in 1953.[76] They intervened in the rural areas because the government at that time could not seem to cope with the political chaos confronting the country.[77] In the 1970s, during the martial law regime, more NGOs were organised. They initiated livelihood projects and organised peasants and workers against the abuses of the authoritarian state. The many 'cause-oriented NGOs' during this period were also the principal actors that supported the 'people power' which ended the authoritarian rule of Marcos in 1986.[78] The Philippine NGO movement gained more enthusiasm during the Aquino government. They were also motivated by the entry of new social movements from the First World concerned with issues related to environment, peace and gender.[79]

NGOs in the Philippines have an advantage over their counterparts in other countries because, at the level of policy, their role has been officially recognised. The 1987 Philippine Constitution provides the legal basis for the participation of NGOs and POs in the policy-making processes of the state,[80] particularly in the government's social development efforts.[81] This policy has been actualised in the 1991 Local Government Code

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[74] Segundo Romero, Jr. and Rostum Bautista, 'Philippine NGOs in the Asia Pacific context', in Tadashi Yamamoto (ed.), *Emerging Civil Society in the Asia Pacific Community*, Institute of Southeast Asian Studies and Japan Center for International Exchange, Singapore, 1996, p. 187.

[75] The Federation of Free Farmers still exists with some 200,000 farmer members.

[76] Romero and Bautista, *op. cit.*, pp. 187-188.

[77] Teresa Encarnacion, 'Southeast and Northern Asian NGO experiences: Intervening in state-led economic miracles', *Kasarinlan-Rethinking the State and the Economy*, Third World Studies Center, University of the Philippines, Quezon City, vol. 10, no. 1, Q3, 1994, p. 84.

[78] Romero and Bautista, *op. cit.*, p. 188.

[79] Encarnacion, *op. cit.*, pp. 84-85.

[80] Examples of NGOs' participation in government include the following: NGOs are represented in the local development councils (at least 1/4 of the total membership must come from NGOs); NGOs representatives are members of various sectoral inter-agency planning subcommittees and are participants in public hearings and consultations about the Philippine Development Plan; NGOs undertake project studies and assist farmers in marketing their products.

[81] *The 1987 Philippine Constitution*, Section 23 Article II—The State shall encourage non-governmental, community-based or sectoral organisations that promote the welfare of the nation; Section 15 Article

(LGC) or the Local Autonomy Act. The LGC provides for the sectoral representation of NGOs in the local government councils. It mandates the local government units (LGUs) to undertake joint rural development and social welfare projects with NGOs and POs.[82] The government has encouraged NGO participation in government processes by providing incentives such as duty and tax-free donations, income tax exemption, education and training.[83]

NGOs in the Philippines are engaged in action projects, policy advocacy activities, research, training, community organising, resource mobilisation and management and networking.[84] They can claim some modest successes in terms of influencing public policy or advancing their causes. To name a few:

- The anti-US bases movement won a major victory when the Philippine government, under Aquino, finally decided for non-retention of the US bases in the country;[85]
- The Feedmillers Association in the country has influenced government decisions on whether to import corn; and
- The farmers-co-operative movement has become partners of government in most of its rural development programs.

Other struggles, such as on debt, structural adjustment and agrarian reform issues, have not been as successful. In the GATT-UR or WTA debates, the NGOs made headway not so much in convincing the authorities to reject or limit the commitments of the Philippines to WTA, but in bringing up the matter to a wide public debate.[86]

Despite the attention that the NGOs are getting, a lot of their potential has remained untapped. It has been observed that most NGOs still act as networks of convenience, mainly for fund accessing.[87] While most NGOs are engaged in trading, marketing and rural

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XIII—The State shall respect the role of independent people's organisations to enable the people to pursue and protect, within the democratic framework, their legitimate and collective interests and aspirations through peaceful and lawful means; Section 16 Article XIII—The right of the people and their organisations to effective and reasonable participation at all levels of social, political and economic decision-making shall not be abridged. The State shall, by law, facilitate the establishment of adequate consultation mechanisms.

[82] *Local Government Code 1991*, Section 34 (Role of POs and NGOs), Section 35 (Linkages with POs and NGOs) , and Section 36 (Assistance to POs and NGOs).

[83] Ocampo, *op. cit.*, pp. 70-71.

[84] Romero and Bautista, *op. cit.*, pp. 193-194.

[85] The anti-US bases movement mobilised the biggest mass action/demonstration since the EDSA revolution in 1986, thus putting a lot of pressure to the Executive and the Legislative.

[86] Jocelyn Cajiuat and Aurora Regalado, 'Dynamics of civil society and government in the GATT-UR debate in the Philippines: Lessons for policy advocacy', *Philippine Democracy Agenda: State-Civil Society Relations in Policy-making*, The Third World Studies Center, University of the Philippines, Diliman, Quezon City, Philippines, 1997, p. 194.

[87] Ronald Llamas, 'We're trying to learn from our mistakes', in J. Gershman and W. Bello (eds), *Re-examining and Renewing the Philippine Progressive Vision*, Papers and proceedings of the FOPA

finance, there has never been a network of national or local NGOs uniting on the issues of traditional cartels[88] and alternative rural financing.[89] Therefore, the potential for real development work has not been maximised.

3.3.3.2 Progressive Movements

The Philippine progressive movement was once the most formidable threat to the government. This movement had its roots from the revolutionary forces during the colonial period. During the Marcos dictatorship, the movement included, among others, the National Democratic Front (NDF), the Communist Party of the Philippines (CPP), New People's Army (NPA) and Muslim rebels in Mindanao.[90] The movement went deep underground and concentrated on armed warfare during the Martial Law regime. After the fall of the dictatorship, the movement was observed to be organisationally, politically and ideologically unprepared.[91] Even then, the movement continued to assert its armed struggle, but it soon found itself marginalised and less recognised in the new political landscape. However, some sectors of the progressive movement adjusted their practice and concepts. They employed political intervention strategies that were more appropriate under the new democratic system. The NGOs and POs previously organised by the progressive movement were central to these formations.

The governments under the new freedom Constitution have pursued the strategy of reconciliation with the progressive movement and have continued to negotiate peace with the Muslim rebels of Mindanao. The improved investment climate in the Philippines during the 1990s was attributed by the Ramos government to the relatively stable political environment due to the nationwide drive to eliminate insurgency. However, for as long as poverty and inequality problems in the rural areas are not properly addressed, the progressive movements will continue to exist and struggle for a just society.

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conference, San Francisco Bay Area, California, 1993, p. 34.

[88] Cartel on rice and corn distribution and marketing has existed in Binondo, Manila. The cartel has reportedly controlled up to 90% of the distribution, thus enabling it to dictate market prices. Their market dominance has been made possible by their financial resources and the trade volume that they handle. Citing Manila Bulletin in Aida Librero and A. Rola (eds) in *Agricultural Policy in the Philippines: An Analysis of Issues in the Eighties*, UPLB, PCARRD, Los Banos, Philippines, pp. 186-197.

[89] Llamas, *loc. cit.*

[90] FOPA, 'The dual crisis of the Philippine progressive movement', in Gershman and Bello (eds), *op. cit.*, pp. 13-14.

[91] *Ibid.*

3.3.3.3 Quasi-Government Organisations

Quasi-government organisations (QGOs) have proliferated across and within the Philippine bureaucracy. The common reasons for creating QGOs include the following:

- The inadequacy of the existing government administrative apparatus to cope with the new demands of development;
- The traditional problems of civil service such as hierarchy based on authority rather than expertise, rigid recruitment procedures, and cumbersome procedures for disbursement of funds; and
- The lack of entrepreneurial skills and technical expertise.[92]

There are some documented positive results of creating QGOs in the country. For example, the Philippine rice production program in 1966 could have been implemented by the Department of Agriculture but the decision-makers at that time opted for an *ad hoc* agency.[93] The Rice and Corn Production Coordinating Council (RCPCC) was created and staffed with qualified personnel with the necessary expertise. The RCPCC was later credited for the successful Rice Production Programme of government. The Presidential Commission on Good Government (PCGG) was formed immediately after the restoration of democracy in the Philippines. The PCGG was an *ad hoc* body created because of the urgency and critical nature of the task of recovering the ill-gotten wealth of the Marcoses. Both the PCGG and the RCPCC were abolished after some time. While the existence of QGOs at a certain point in time are deemed necessary, government efforts and resources would have been more effective if they had focused more on making the existing bureaucratic structure more efficient.

3.4 Political Economy of the Philippine State at Different Political Regimes

Throughout Philippine history, both the domestic and the global political economy have played an important role in influencing the country's economic, political and social structures. The Philippine state has always been caught in the tension among the various interest groups and class segments within the country. The IMF[94] and the WB[95] have had

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[92] de Guzman, Brillantes and Pacho, *op. cit.*, p. 200.

[93] *Ibid*, p. 201.

[94] The IMF was visualised both as facilitator in promoting international trade relations among countries, and a fiscaliser by providing short-term loans to countries experiencing balance-of-payments deficits (those short of foreign currencies to finance imports). All loans from IMF are accompanied by conditionalities addressed to a debtor country's financial system to get its own book of accounts in order and ensure loan repayment.

virtually an unbroken influence over the economic policy and direction of the Philippine state since the balance-of-payment crisis in 1962. The IMF, the WB and the US government collaborated to support the first export-oriented industrialisation attempt of the Philippine government in the late 1960s and especially after the declaration of martial law.[96] Since 1979, the Philippine governments have been under structural adjustment programs (SAP)[97] imposed by IMF and WB. As a signatory to the WTA,[98] the Philippines moves towards greater trade liberalisation and submits itself to another international body—the World Trade Organisation (WTO). The WTO oversees the implementation of WTA and the agreed rules of trade and economic relations between contracting parties. In addition to international trade groups, the Philippine state is also a member of different regional trade organisations and collaborations, such as the Association of Southeast Asian Nations (ASEAN) and its ASEAN Free Trade Area (AFTA), and the Asia Pacific Economic Cooperation (APEC).

To illustrate the interplay among different internal and external forces in the political economy of the Philippine state, the next sections of this chapter focus on the analysis of the different attempts of the Philippine state at industrialisation and rural development. Industrialisation and agricultural or rural development have been two of the major development goals of the Philippine governments. Other development concerns of the Philippine state are unemployment, poverty, income distribution, education, health, and peace and order. Poverty and income distribution are closely linked with agricultural development since the majority of the population rely on the agriculture sector for their livelihood. For lack of space, the analysis in this section concentrates only on policies and actions related to industrialisation and rural development.

3.4.1 Colonial Economic Policies

When the Philippines was under the Spanish rule during the 19th century, the cultivation of sugar along with hemp, copra, and tobacco became popular. This production trend was induced by the big demand for such commodities in Europe and America during

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[95] The World Bank focuses on the more developmental aspect of project lending initially to reconstruct the economies of Europe and Japan. Votes in both IMF and WB are allocated based on each country's capital contribution. This means bigger fund contribution would merit a corresponding increase in voting shares. To date the US, UK, West Germany, France and Japan hold about 40 percent of the votes.

[96] Hawes, *op. cit.*, pp. 143-144.

[97] The main elements of SAP include among others, reduced government spending, tight money supply, increased interest rates, currency devaluation, privatisation, export promotion and increased taxes.

[98] The Philippine Senate ratified the country's participation in GATT-UR or WTA on 14 December 1994.

the industrial revolution.[99] The Spanish government instituted liberal economic policies in the Philippines to promote the production of export crops to meet the market demand.[100] Since then, sugar had become a major source of economic and political power in the Philippines. The big sugar plantation owners and millers[101] accumulated huge profits from sugar exports during the Spanish era at the expense of the landless peasants who became tenants and labourers.[102] This inequitable practice altered the social structure in the sugar-producing areas in the Philippines. The gap between the rich and the poor in these areas had increasingly widened until the collapse of the sugar industry beginning in the 1980s. Another consequence of the production of cash crops such as sugar and tobacco was the massive conversion of rice lands into plantations, resulting in food shortages and importation.[103]

During the American rule, the Philippine economy was dominated by the US economic interests through the preferential access it has on the Philippine market.[104] American products could freely enter the country in the same way that the Philippine products, mainly mineral resources and agricultural crops, enjoyed a duty free market in the United States. Sugar production continued to flourish under the American regime through this privileged market access. The American monopoly over the Philippine economy continued even after the declaration of political independence of the Philippines from the US in 1946. This was made possible through the passage of the Bell Trade Act or the 'Free Trade Act'. This Act gave equal rights to Americans in exploiting the natural resources and public utilities of the Philippines.[105] While Filipino capital investments increased significantly against foreign capital, the Philippines remained an export-oriented economy catering to the raw material input needs of the US market.[106] Local manufacturing

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[99] Karnow, *op. cit.*, pp. 60-61.

[100] *Ibid.*

[101] These consisted of both local property owners, foreign investors, and the monastic orders who were proprietors of large estates.

[102] Karnow, *loc. cit.*

[103] *Ibid.*

[104] Emmanuel de Dios and Joel Rocamora (eds), *Of Bonds and Bondage: A Reader on Philippine Debt*, Transnational Institute, Philippine Center for Policy Studies, and Freedom from Debt Coalition, Philippines, 1992, pp. 203-204.

[105] Cornelia Aldana-Benitez and Conchita Posadas, in Ernesto Valencia (ed.), *TNCs in the Thick of Everything: IBON TNC Book Series*, IBON Philippines, Databank and Resource Center, Manila, 1994, p. 183.

[106] The signing of the Laurel-Langley Agreement in 1954 facilitated the growth of the export sector but limited the composition of exports to sugar, copra and coconut oil, logs and lumber and other products needed by the US market. The Agreement gave ready US markets (at good prices and low tariffs) to these products. Cited in *ibid.*, p. 184.

and other economic sectors did not develop because resources were invested in the export sector only.[107] The landed elite and foreign investors who profited from the export sector became the dominant social class in the Philippines during this period. They procured luxury goods from the US instead of using their earnings for expansion and diversification of the sector. Heavy importation of US manufactured goods continued while the other sectors of the economy remained underdeveloped. This eventually led to the first balance-of-payment crisis in the Philippines.

3.4.2 Import Substitution in the 1950s and 1960s

Industrial development in the Philippines was first induced by the post-war balance-of-payments crisis in 1949-1950. This forced the government to drastically intervene in the economy by launching the import-substitution industrialisation (ISI) policy. Import and foreign exchange controls were enforced to promote the growth of import-substituting industries. Through the ISI program, importation of non-essential and luxury goods was restricted while importation of production inputs was allowed.[108] Filipino entrepreneurs and American firms, who were previously distributors of imported products and who opened subsidiaries in the Philippines, participated in the program. This led to the establishment of an inward-looking manufacturing sector producing light consumer commodities and luxury goods. The ISI campaign did not produce basic heavy industries, apart from steel integration industry, which up to then had not been fully developed.[109] At first, the ISI strategy encouraged rapid growth in the manufacturing sector, but this was short-lived and limited in scope in the type of industries promoted.[110]

The agriculture sector was heavily penalised during the ISI period. Earnings and surplus from the traditional exports such as sugar and copra were used to support the ISI industries. Public spending for agricultural productivity-enhancing investments such as technologies, rural education, rural infrastructure and forest management have been limited in relation to the contribution of the agriculture sector to national income and employment.[111] The overvalued local currency and high tariffs that nurtured the ISI

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[107] Benitez and Posadas, *op. cit.*, p. 187.

[108] IBON Philippines, 'Industrialisation: The attempt', *IBON Facts and Figures*, vol. 12, no. 22, 1989, p. 4.

[109] *Ibid.*

[110] *Ibid.*; Ofreneo, *op. cit.*, pp. 3-4; IBON Philippines, 'IMF-WB: 50 years of global devastation', *People's Policy and Advocacy Studies, IBON Special Release*, no. 8, July 1994, pp. 3-5.

[111] Congressional Commission on Agricultural Modernisation, *Modernising Agriculture*, Congress of the Philippines, Metro Manila, 1997, p. 4; UPLB Rural Development Study Team, *Philippine Rural Development: Problems, Issues, and Directions*, University of the Philippines Los Banos, 1991, p. 34.

industries restricted the growth of the agriculture sector. Many of the products covered by high tariffs and import bans were agricultural inputs such as fertiliser, seeds and farm machineries.[112] Therefore, income of the local farmers was severely affected.

Meanwhile, the well-protected manufacturing sector did not develop industries that were competitive in the world market. For one, the domestic market was limited because of the lack of purchasing power of Filipinos, many of whom depended on agriculture for their income. The ISI industries had little incentive to cut production cost and innovate.

A large part of the ISI sector were controlled by foreign investors and multinational corporations (MNCs),[113] mostly American firms. These MNCs entered into partnerships with the local capitalists and large Filipino landlords. Through time, the MNCs have diversified their presence in the Philippines, from mainly foreign direct investment (FDI) until mid 1960s to subcontracting, joint ventures, licensing, franchising and management contracts. Technology choices among joint ventures were generally made by the MNCs. These technologies were observed to be very simple involving the final stage of the manufacturing process.[114]

The trade deficit problem persisted and worsened at the end of 1950s. This problem was aggravated by the increasing dependence of domestic industries on imported machinery, raw materials, tools, and parts and processes. The trade deficit crisis led to the introduction of decontrol schemes in the early 1960s aimed at rationalising industry and encouraging exports. This represented the country's first episode of liberalisation. The IMF, group of exporters, and the American Chamber of Commerce pushed for an open economy policy to avert the balance-of-payment crisis. Because of these pressures, the Philippine government was forced to go to the IMF and accept its recommended policies of peso devaluation, foreign investments promotion and export-oriented production.[115] The increasing influence of the IMF over the domestic policy-making process was supported by the Western-trained technocrats in the bureaucracy.[116] On the other end were the Filipino industrialists whose political clout rested in the old Congress, the media, and some

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[112] Dante Canlas, 'Institutional challenges of global market reform', in Cayetano Paderanga, Jr. (ed.) *The Philippines in the Emerging World Environment: Globalisation at a Glance*, University of the Philippines-Center for Integrative and Development Studies and U.P. Press, Philippines, 1996, p. 44.

[113] MNCs or transnational corporations are very large enterprises whose operations span the globe. They are based in one country but their factories, plantations, and mining sites are located in many countries in the world.

[114] Doronila, *The State, Economic Transformation, and Political Change in the Philippines, 1946-1972, op. cit.*, p. 55.

[115] Ofreneo, *op. cit.*, p. 4.

[116] *Ibid.*

government agencies. They campaigned against further lowering of protection to local industry.[117] Therefore, the government tried to maintain the industry's import-substituting orientation through tariff protection program. The Philippine economy under the decontrol program did not recover because there was so much ambivalence on the economic directions the Philippine government would take.

During the second half of the 1960s, the Marcos administration adopted expansionary monetary and fiscal policies in support of a large-scale economic development plan. The government resorted to heavy borrowing from both internal and external sources to finance this project. However, a combination of continuous protection policies and ambitious development plans resulted in a renewed foreign-exchange crisis in the late 1969. The policy response was to float the Philippine peso in early 1970 and eliminate some of the exchange controls which had been instituted since 1967 and partially replaced by higher tariffs.[118]

As mentioned in section 3.2.4, the ISI episode caused the diversification of the Philippine social structure. The manufacturing industry nurtured during the ISI period was dominated by three groups as follows: the exporting landed elites, and mining and logging concessionaires who diversified into manufacturing; big merchant-traders; and non-landed capitalists such as entrepreneurial professionals, technicians and small traders.[119] These groups exercised oligopolistic control over the manufacturing sector. They entered into joint venture projects and collaborated with the MNCs that opened subsidiary assembly plants within the tariff protection policy. Their extensive linkages with foreign capital and international market increased their economic and political clout. The government was often caught between the interests of supporters of ISI and EOI, and this resulted in indecisiveness and economic stagnation.[120] The declaration of martial law in 1972 resolved the policy confusion and the breakdown in elite cohesion in favour of the export sector.[121]

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[117] *Ibid.*

[118] Geoffrey Shepherd and Florian Alburo, 'Liberalising foreign trade: The Philippines', in D. Papageorgiou, M. Michaely, A. Choksi (eds), *Liberalising Foreign Trade: Korea, the Philippines and Singapore*, vol. 2, Basil Blackwell, Oxford, 1991, pp. 207-213.

[119] Rivera, *Landlords and Capitalists: Class, Family, and State in Philippine Manufacturing, op. cit.*, pp. 27-28.

[120] Ofreneo, *op. cit.*, p. 5.

[121] Hawes, *op. cit.*, p. 20.

3.4.3 Export-Oriented Industrialisation in the 1970s and Trade Liberalisation Episode 1981-1985

Upon the declaration of martial law in 1972, the authoritarian government adopted the export-oriented industrialisation (EOI) program as a central state policy. The congressional system, which was dominated by the landholding elite and was a site of major conflicting economic and political interests, was abolished. With the old Congress closed, freedom to participate in the political process repressed, and economic and political powers concentrated in the President, it was easy to implement EOI-friendly policies. For instance, labour strikes were prohibited, wage levels were forcibly reduced, government subsidies for consumer goods eliminated, and incentives for new foreign investment provided. The IMF and WB fully supported the EOI program. They assisted in forming the 'Consultative Group of Creditor Countries' to help finance EOI-related projects.[122] Three major world events signalled the era of export-orientation as a development model among nation-states, namely the recovery of the economies of Western Europe and Japan, which meant that IMF and WB had the resources to assist the rest of the world; the rapid decolonisation of most of Africa and Asia; and the failure of ISI strategy in many countries.[123] Consequently, the Philippines became a recipient of huge amount of loans from multilateral and development agencies during the period of martial law.

The EOI program in the beginning of the 1970s focused on the creation of labour-intensive industries and acceleration of non-traditional exports.[124] It involved the development of infrastructure for export-oriented industries such as export processing zones through the use of foreign loans.[125] Incentives to further encourage investments in export industries were provided through the Export Incentives Act of 1970 and the establishment of the Export Processing Zone Authority in 1972.

A series of reforms were instituted, including government reorganisation and a new rural development push. A massive agricultural production program on rice and corn using green revolution technology was launched to provide cheap food and ensure a low real wage level.[126] Subsidised credit schemes[127] were introduced by the Marcos administration

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[122] Ofreneo, *op. cit.*, p. 6.

[123] IBON Philippines, 'IMF-WB: 50 years of global devastation', *People's Policy and Advocacy Studies, IBON Special Release*, no. 8, July 1994, p. 5.

[124] Ofreneo, *op. cit.* and Vos and Yap, *op. cit.*, p. 149.

[125] *Ibid.*

[126] Vos and Yap, *op. cit.*, p. 149.

[127] Called Masagana 99 for rice and Maisagana 77 for corn.

to ensure the success of the rice and corn program. The World Bank provided a large loan to the Philippine government in support of these schemes. The loan was used to implement the training and visit (T&V) extension methodology that would disseminate the green revolution technology. It enabled the government to provide subsidised credit to farmers for the purchase of HYV seed, pesticides, fertiliser, herbicides and agricultural machineries. The World Bank loan also provided the Philippine government the means to make bold changes in the structure of the Department of Agriculture (DA). The reorganisation of the DA was deemed necessary to suit the requirements of the T&V delivery system.

The boldest attempt by the Philippine state at passing agrarian reform law[128] was made during the period 1965 to 1972. The whole country was declared as 'land reform area'. The landholding retention limit was lowered from 75 hectares to 24 hectares.[129] During the martial law regime, the land reform coverage was limited to rice and corn lands, and the landholding retention limit was lowered to 7 hectares.[130] However, in both cases the government lacked the commitment and did not allocate sufficient funds to carry out the program.[131]

The agrarian reform program during this period was accompanied by a vigorous campaign for co-operative development. Participation in agricultural co-operatives became one of the prerequisites to land ownership. Agricultural co-operatives were used to ensure that agrarian reform beneficiaries would pay their land amortisation. The co-operatives were utilised as channels for credit delivery. The effectiveness of this strategy in co-operative development is assessed in chapter 5.

The martial law government directly participated in the economy, including the agriculture sector. This intervention led to crony and state capitalism[132] or market-distorting privileges for specific individuals or firms. In 1974, a monopoly to control the domestic trading and export of sugar was established. This monopoly was extended to include the

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[128] These are government policies meant to innovate or modify the agrarian structure by making changes in rural institutions including credit and marketing institutions, and the redistribution of land property right. Cited in Romero and Esguerra, *op. cit.*, pp. 72-73.

[129] Romero and Esguerra, *op. cit.*, pp. 78-79.

[130] *Ibid.*

[131] *Ibid.*

[132] Crony capitalism involves the use of official government position to advance private economic interests. Most of the cronies during martial law were not government officials but private citizens who had close personal friendship with the president or first lady. State capitalism involves state-owned enterprises managed by technocrats and professional managers. Cited in Hawes, *op. cit.*, pp. 136-139.

power to set prices paid to sugar planters and millers.[133] The monopoly was carried out at the time when the preferential access to the US market ended and when world market price for sugar began to decline.[134] These local and international events meant great losses for the industry as a whole. The sugar workers were the hardest hit by these events. Faced with military repression and low wages, workers of the sugar industry started to show dissent. This led to many cases of violence against sugar workers. Meanwhile, the sugar monopoly provided a new source of revenue for the government and became a centre for capital accumulation.[135]

A monopoly was also introduced in the coconut industry. Control of the coconut industry was centralised in the hands of a single government agency. The agency started to collect levy from coconut farmers in 1973 for a replanting program, research and development, extension services, and other development projects.[136] However, the levy was turned over to the organisation of big landlords of the industry,[137] who used the money mainly for their private use. For instance, part of the levy was used to fund the purchase of a bank, through which a private milling and marketing company was created.[138] This company was a big threat to independent oil millers. It captured almost three-quarters of the country's coconut-milling capacity and used its purchasing power to further decrease producer prices.[139]

There were other trade monopolies created or accorded to specific private firms such as in wheat in addition to rice and corn, on importation of meat from Australia and New Zealand, production of newsprint, satellite communications transmissions, gambling operations, and others.[140]

The martial law also ushered in the growth of state enterprises. State managers and technocrats took over the operations of Philippine Airlines, multinational oil companies and privately-held steel mills. The state-owned financial institutions were used to bail out

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[133] Hawes, *op. cit.*, p. 95.

[134] *Ibid.*, p. 94.

[135] *Ibid.*, p. 96.

[136] *Ibid.*, p. 70; Shepherd and Alburo, *op. cit.*, pp. 228-229.

[137] The landlords obtained a favoured government-protected position in the sector through powerful friends of the First Family.

[138] Shepherd and Alburo, *op. cit.*, p. 228.

[139] Emmanuel de Dios (ed.), *An Analysis of the Philippine Economic Crisis,* University of the Philippines Press, Quezon City., 1984, pp. 49-51, quoted in Shepherd and Alburo, *op. cit.*, p. 228.

[140] *Ibid.*, pp. 41, 49-51; Gerardo Sicat, 'A historical and current perspective of Philippine economic problems', Address delivered before the 21st Annual Meetings of the Philippine Economic Society, PICC, Manila, 08 December 1984.

ailing but important companies including the crony-controlled enterprises that were not successful.[141] These state-owned banks were themselves bankrupt by early 1980s. The failure of these banks led to a severe cut in policy-guided credit schemes, to the detriment of the farmers and urban entrepreneurs.[142]

Unlike the sugar and coconut industries, the fruit industry has been historically dominated by the MNCs. The MNCs and their allies[143] were not considered by the martial law government as a major political threat. Therefore, the government, through the National Development Corporation (NDC), facilitated the acquisition of vast tracts of land for banana and pineapple plantation establishment and expansion of the MNCs.[144] The alliance between MNCs and NDC displaced a lot of small landholders and ethnic minorities. The alliance used force through the military on several occasions. The health, education and housing needs of workers in the plantations were seriously wanting. Under martial law, workers were not allowed to form unions and the minimum wage rate set by government was insufficient.

The agriculture sector suffered much during the period of martial law because trade monopolies captured the gains from the sugar, coconut, meat, rice and corn industries, instead of the surplus being available to improve the condition of small farmers. Meanwhile, there was evidence to show that MNCs in both agribusiness and manufacturing have been contributing to foreign exchange shortage. MNCs of the past and the present have relied heavily on imported machineries and intermediate inputs to operate their factories. Imports from parent companies are ways by which MNC subsidiaries can repatriate profits to their related companies.[145] If MNCs remit profits to their parent companies in large volumes, the country's balance-of-payment position will be severely affected.[146] Furthermore, MNCs have been borrowing huge amount of funds from the local banking system to finance their acquisitions and expansion projects. The Philippine laws have allowed foreign firms to finance at least 50 percent of their operations from borrowed

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[141] Hawes, *op. cit.*, pp. 137-138.

[142] Vos and Yap, *op. cit.*, p. 154.

[143] The MNCs worked closely with landlords who on their own were politically powerful and supporters from inside the government such as the then Ministry of Agriculture, the National Economic and Development Authority, and Board of Investment who encouraged the giving of incentives for foreign investors.

[144] Benitez and Posadas, *op. cit.*, pp. 76-78; Hawes, *op. cit.*, pp. 122-124.

[145] Benitez and Posadas, *op. cit.*, pp. 62-63.

[146] *Ibid.*, pp. 65-67.

funds.[147] In terms of technology transfer, studies showed that US MNCs perform their R&D activities primarily in the US or other developed countries and only about less than one percent by their subsidiaries in the developing countries.[148]

The implementation of the first phase of the EOI resulted in a policy of wage control since labour strikes were forbidden by martial law.[149] Real wages declined during the martial law years and continued to fall until 1987.[150] The Philippines became self-sufficient in rice by end of the 1970s. There was rapid growth in the economy in the 1970s but the source of growth was mainly external, from foreign loans and investments.[151] However, by the early 1980s, the economy was again in a severe balance-of-payment crisis. Earnings from EOI industries were not sufficient to cover the declining earnings from primary products (such as export crops, minerals and timber) and the increasing cost of foreign debt servicing.[152]

Confronted with a combination of the second oil shock of 1979-80 and the balance-of-payment crisis of 1983, the authoritarian government accepted the structural adjustment loan from the World Bank. The loan was conditional upon the implementation of adjustment measures, which called for greater liberalisation, removal of the remaining protection to ISI industry, and several austerity measures. The timing of SAP coincided with unfavourable external economic developments such as recession in 1980-83, depression in 1983-85, world interest rates increase, and declining prices of leading agricultural exports.[153] The SAP affected everyone in the economy, with the poor suffering the most because government services were reduced as part of the austerity measures. A combination of economic hardships and the growing political unrest in the Philippines culminated in the overthrow of the 20 year-authoritarian regime in 1986.

3.4.4 Trade Liberalisation Episode 1986-1992

The first government under restored democracy continued to push for economic liberalisation. The government deepened the SAP's implementation by reactivating import liberalisation program, removing some of the state-supported monopolies, and embarking

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[147] *Ibid.*, pp. 67-70.
[148] *Ibid.*, p. 35.
[149] Vos and Yap, *op. cit.*, p. 149.
[150] *Ibid.*
[151] Ofreneo, *op. cit.*
[152] *Ibid.*
[153] Ofreneo, *op. cit.*, p. 7.

on a privatisation program.[154] It used the Industrial Estates (IEs)[155] formula to attract foreign investors. However, while credited for having facilitated the restoration of democratic institutions,[156] the administration's term closed with the country's growth rate not reflecting the pattern observed in the other Southeast Asian countries. There was impressive growth in GNP from 1986 to 1988. However, the period 1989-1991 was troubled, exacerbated by consequences of the failed coup attempt of December 1989, the earthquake in 1990, the eruption of Mount Pinatubo in 1991, and intermittent drought and flood in various parts of the country.[157]

A neoclassical interpretation of the kind of liberalisation and export-oriented growth under the Aquino government is described as follows: 'the same equilibrium between protectionists and free-traders pervaded within the cabinet, blocking attempts toward liberalisation during the first years of the government'.[158] To illustrate, the protectionist lobby was able to pressure the President to change the executive order for dismantling tariff walls of some 1,200 categories of imported goods. The government finally agreed to proceed with liberalisation of about two-thirds of the 1,200 items, leaving 400 items unliberalised.[159] The protected domestic producers continued to lobby for the postponement of the liberalisation of the remaining 400 items and successfully delayed the process until April 1988.

The Aquino government eliminated trading monopolies in agriculture and reduced the power of state capitalists. According to Balisacan,[160] fertiliser distribution and importation was liberalised; price controls on rice, poultry products and pork were removed; import trade in wheat, flour, and animal feeds was opened to the private sector;

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[154] *Ibid.*

[155] The Board of Investment's definition of an IE is a 'large and suitable tract of land which has been subdivided and developed primarily for the use of a community of industries and provided with roads, water supply, electrical and communication facilities, sewerage and drainage systems and other infrastructures'. The most familiar IE to the Filipinos is the export-oriented estates known as export processing zones (EPZs). The other types of IEs being promoted in the Philippines include science and technology parks, technology incubation centres and S&T centres. A major criticism against the EPZs is that there were few important technologies transferred by foreign firms in the IEs since these estates lured only light and medium industries. Cited in IBON Philippines, 'Industrial estates: A lure for development', *IBON Facts and Figures*, vol. 13, no. 23, 1990, pp. 1-3.

[156] For example, the three branches of government (the legislative, executive and judicial) were re-activated. the media blossomed, and the NGOs proliferated.

[157] Bruce Tolentino, 'Imperatives for sustainable industrialisation', *State of the Nation Reports*, no. 9, University of the Philippines Press and Center for Integrative and Development Studies, 1993, p. 9.

[158] Walden Bello, 'Revisioning Philippine industrialisation', Mindanao Focus Journal, no. 32, Alternate Forum for Research in Mindanao, 1993, p. 8.

[159] David Timberman, *A Changeless Land: Continuity and Change in Philippine Politics*, Institute of Southeast Asian Studies, Singapore, 1991, p. 339.

[160] Balisacan, *op. cit.*, p. 82.

and the National Food Authority was divested of its powers over non-grain activities. However, the deregulation of agriculture was slow and incomplete because laws necessary to effect deregulation involved not only the executive branch of government but also the legislative and judicial branches.

In terms of rural development, the major reforms introduced were the Comprehensive Agrarian Reform Program (CARP), Local Government Code (LGC), Countryside Agro-Industrial Development Strategy (CAIDS), and Magna Carta for Small Farmers.

The CARP is a social amelioration program of the Philippine government that started in July 1987. It was supposed to be implemented in three phases within a period of ten years.[161] The program is called 'comprehensive' because of the following features:

- The land distribution component cut across tenurial arrangements, from agricultural leasees to those directly working on land;
- CARP covered both private and public agricultural lands including those controlled by MNCs and corporate landowners; and
- The program was time-bound unlike other previous agrarian reform policies.[162]

However, CARP's implementation has been very slow and problematic. CARP is based on the comprehensive agrarian reform law that was passed by the landlord-dominated Congress. The World Bank[163] noted that CARP was loaded with many loopholes. It was full of inherent flaws that the landowners, and domestic and foreign investors could use to preserve or advance their interests. One study estimated that about 75% of private agricultural lands would be excluded from CARP because of the law's retention limit of '5 hectare plus 3 hectares for each legal heir'.[164] MNCs are allowed by CARP to lease back lands transferred to farmer-beneficiaries, hence corporate landowners can maintain control of their properties. Examples of specific provisions that are in favour of the landowners and foreign and domestic investors are listed in **Appendix 3.2.** These provisions have excluded some 254,000 hectares from land redistribution. Furthermore, the implementation of CARP has been constrained by its huge budgetary requirement, the inaccurate inventory of lands and the limited technical capacity of agencies involved.

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[161] Republic Act No. 6657, Republic of the Philippines.

[162] Sentro Para sa Tunay na Repormang Agraryo (SENTRA), 'Market-oriented CARP: A recipe for failure', *Agrarian Trends*, Special Issue, SENTRA, Philippines, September 1997, p. 7.

[163] The World Bank Policy Research Report, *The East Asian Miracle: Economic Growth and Public Policy*, Oxford University Press, New York, 1993, p. 169.

[164] Romero and Esguerra, *op. cit.*, p. ix.

Through the LGC, the research and extension services have been devolved to the local government units (LGUs) to improve the efficiency of agricultural production. However, the national government has not provided sufficient institutional support, technical guidance and funding to the LGUs to ensure a strong, decentralised extension system. The intention of the LGC has been to develop local capability for development. However, the development process has remained top-down with national government agencies dictating the direction of rural programs. The implications of the LGC for agricultural research and technology transfer are discussed further in Chapter 4.

The CAIDS was conceptualised in 1989 to be the main strategy for rural industrialisation involving the public and private sectors, but there were no concrete guidelines for CAIDS' implementation. The strategy was for the CAIDS concepts to be integrated into the development programs of the various sectoral government agencies. However, within these sectoral programs, CAIDS was generally considered in concept and did not necessarily form the basis for program implementation.[165] The organisational structure at the local levels to achieve agro-industrialisation was not clearly defined in CAIDS.

The Magna Carta for Small Farmers stipulates that the importation of agricultural products that are produced locally in sufficient quantity is prohibited unless certified by the Department of Agriculture.[166] It provides that farmers must have access to credit at a subsidised interest rate and that a government price support system for certain commodities be created. These provisions were viewed as inconsistent with the deregulation objectives of the Aquino government.

The Aquino government decided to honour the country's debt commitments—accumulated because of the excesses of the previous regime—to the disappointment of some sectors of society. The political economy of the Aquino government was laden with conflicts of interest, inefficiencies and lack of co-ordination among various government agencies.[167] The struggle for power among the economic, development and fiscal policy-makers of government resulted in policies that were directly in conflict with the market-oriented policies.

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[165] David Gorrez, Review and assessment of rural development programs and projects in the Philippines: Countryside Agro-industrial development strategy (CAIDS), Report to the National Economic and Development Authority, Philippines, March 1994, unpub.

[166] Republic Act 7607, Magna Carta for Small Farmers, 1992, Republic of the Philippines.

[167] Vos and Yap, *op. cit.*, p. 162.

3.4.5 Trade Liberalisation Episode 1992-1997

The Ramos administration underscored trade liberalisation in its policy reform package. The major policy reforms of the government included the following: imposition of laws that rule out monopolies; encouragement of foreign investment through the Foreign Investment Act of 1991; accelerated import liberalisation and rationalisation of non-tariff protection; deregulation of foreign exchange transactions and the banking sector; tax reform packages; rationalisation and privatisation of government-owned or controlled corporations; and greater budgetary support for social services.[168] The reform measures sought to address the system of privilege and protection involving the state-oligarchy.[169] The oligarchy was viewed as the major impediment to the development of the country. This strategy worked on the assumption that greater reliance on the market would remove the political source of oligarchic power. One valid apprehension about this strategy was that, in the absence of a sizeable entrepreneurial class (especially in agriculture) to replace the oligarchy, market-oriented reforms would advantage the same oligarchy they sought to break.[170] At best, the strategy could only 'discipline' this oligarchy by forcing them to become more efficient.

The rural development strategies of the Ramos administration were incorporated in its Social Reform Agenda. In effect, these strategies were not much different from those instituted during the Aquino administration. Agricultural development was operationalised based on the concept of 'comparative advantage' because of the changes in the global and regional economic order. The government implemented the Key Production Area (KPA) approach to agricultural development. Under this program, priority was given to the planting of high value crops in areas where they were most suitable to grow. The acreage devoted to rice and corn was deliberately reduced to areas where these commodities have the best agro-climatic conditions for optimum growth and productivity. Land freed from rice and corn production were devoted to high value or export crops. However, this KPA

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[168] IBON Philippines, 'The 1993-1998 Medium Term Philippine Development Plan: Against commitments and paths to development, where is the MTPDP leading us?', *IBON Facts and Figures*, vol. 16, no. 3, 1993, p. 3.

[169] The Philippine oligarchy or elite includes personages, families and clans of influence who dominate the Philippine economy. Some members of the elite can trace their roots back to the local officials during the Spanish era. Most of them were Spanish and Chinese mestizos who became wealthy by accumulating land or in finance and commerce. The concentration of wealth in the hands of the few has allowed these families to dominate politics and government since the Philippines gained independence in 1946. Cited in Timberman, *op. cit.*, pp. 36-37.

[170] Nepo Malaluan, 'Philippines 2000 and the politics of reform', *Kasarinlan: Philippines 2000: Dream or Delusion?*, vol. 9, nos 2 & 3, Third World Studies Center, UP, Quezon City, Philippines, 4th Quarter 1993-1st Quarter 1994, pp. 40, 47-48.

policy, along with the minimal government support on irrigation, post-harvest facilities, feeder roads and others, have been blamed for the food shortages experienced in recent years.[171]

It was during the period 1994 to 1997 that the Philippines began to achieve significant economic growth. It is also during this era that the Philippine government acceded to the WTA. This means not only that the Philippine state has the IMF, WB, other multilateral agencies, and the MNCs to negotiate with, but it has been subjected to the rules set by the WTO. A more detailed analysis of WTA, its implication for domestic policy-making process, the policy responses of the government with respect to WTA rules, and its impact on the agriculture sector are presented in section 3.6.3. Other regional economic integration groups and agreements are featured in section 3.6.2. Particular attention is given to WTA because agricultural trade, which was not previously included in the GATT rules, will now be subjected to liberalisation.

In conclusion, the political economy of the Philippine state for the past 50 years has been dominated by industrialisation as a development policy and has been generally biased against agriculture. Ironically, however, each industrialisation episode had been unsuccessful in achieving the desired economic growth for the country, except briefly in the mid 1990s. Even when the country has showed signs of economic recovery due to the structural reforms instituted by the recent Philippine governments, sustained growth appears to be unachievable. The increase in GNP of 5.5% in 1994 was caused not so much by rapid capital formation and increased production or exports but more so by factors which were 'short-term in character' (such as large power plants), 'speculative' (such as investments in construction and real estate projects), and 'seasonal' (such as good weather in 1994).[172]

Although agricultural development has always been part of the Philippine government agenda, the basic structure necessary for its successful implementation has been grossly lacking. While some rural development efforts have succeeded, maintaining their gains at a level where competitiveness can be achieved has not been fully realised. Judging by the failed attempts at passing genuine agrarian reform laws and the bias of

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[171] Renato Constantino, *The Invisible Enemy-Globalisation and Maldevelopment*, Foundation for Nationalist Studies, Quezon City, Philippines, 1997, pp. 96-97.

[172] IBON Philippines, 'The Philippines finally taking off?', *IBON People's Policy and Advocacy Studies*, Special Release, January 1995, pp. 3, 12.

economic policies against the rural sector, the Philippine state has lacked the commitment to a more equitable distribution of economic benefits.

In recent years, Philippine governments have been trying to correct the overall bias of economic policies against agriculture. However, by this time, the agriculture sector has seriously deteriorated.[173] This situation has prevailed at a time when productivity and competitiveness are needed to survive the globalisation of technological and commercial development.

3.5 Relative Autonomy of the Philippine State

The Philippine state has historically been the site of struggle among various social classes arising from conflicting economic interests. Within the elite itself, during the authoritarian regime, there were at least four class segments competing for control of the state. However, the Philippine state was not a total captive of the social forces that seek to dominate the economy and the political scene. According to the study made by Doronila,[174] the Philippine state had some 'room to exercise relative autonomy'[175] *vis-a-vis* the dominant social classes in the country and the policy preferences of foreign interests for the period 1946 until the collapse of democracy in 1972. For one, while the 1935 Constitution embodied a liberal democracy philosophy, it gave legitimacy to state intervention.[176] It provided for a strong central government by concentrating powers in the presidency or the executive.

The interventionist role of the Philippine state can be illustrated by the following case. The industrial promotion policies of the 1950s based on the ISI strategy were carried out at the expense of the agricultural exporting interests. The exporters at that time represented one of the powerful political groups during that period. State intervention, at this point, resulted in elite pluralism and led to the conflict of interests among this diversified elite. Such conflict invited more state intervention and growth in the power of the executive in relation to the legislature and the judicial system, culminating in the declaration of martial law in 1972.

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[173] The Philippines is prone to calamities such as typhoons, earthquake, volcanic eruption, El Niño and El Niña phenomena. These calamities have aggravated the poor condition of the agriculture sector.

[174] Doronila, *The State, Economic Transformation and Political Change in the Philippines: 1946-1972, op. cit.*, p. 6.

[175] Rueschemeyer and Evans in their definition of the state and its role in economic transformation argued that 'the State must acquire a certain degree of relative autonomy from the dominant class in order to promote economic transformation effectively'. Cited in Doronila, *ibid.*, p. 4.

[176] Doronila, *The State, Economic Transformation and Political Change in the Philippines: 1946-1972, op. cit.*, pp. 39-40.

The period of strongest state intervention was during the martial law regime. The 'emergency Constitutional provisions' allowed those in control of the state the use of authority and military power to overthrow members of the elite opposed to the authoritarian model of development.[177] This operation was performed even to the extent of forcing some important foreign corporations out of business, replacing them with locally-owned companies headed by crony capitalists. The leadership was able to assert national, executive-branch control over the local factions led by the landowning elite. The state interfered aggressively in the private sector domain by creating public corporations and state monopolies. However, the ruling government did not use its coercive power to bring about positive economic development in the Philippines. Surpluses extracted from public and private monopolies were not utilised to create new industries but were used for individual political goals of the dictator and his allies.[178] Dictatorial power was not exercised to bring about agrarian transformation.

During the post-martial law years, the state's autonomy has been Constitutionally restricted. The 1987 Constitution has reduced the power of the presidency in relation to Congress. For example, during the immediate post-martial law period up to 1992, there were at least three areas of policy in which the state demonstrated weakness, namely on insurgency problems, on agrarian reform, and on the restructuring the economy towards export promotion.[179] The State was caught in the tensions between the communist insurgents and the military rebels and the factions within the armed forces. These tensions resulted in seven coup attempts and the dominance of military thinking in the insurgency policy.

The progress of the land reform program—CARP—during this period, illustrates the failure of the state to achieve relative autonomy over the landed elite. In terms of economic reform legislation, it took two years before the Aquino government could get Congress to approve the gradual elimination of tariff protection and liberalise foreign investment rules.[180] The only time that the Philippine state during the period 1986 to 1992 was able to make effective use of state intervention was when it quickly abolished public and private monopolies created during the martial law regime.

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[177] Hawes, *op. cit.*, p. 43.

[178] *Ibid.*, pp. 82, 128.

[179] Amando Doronila, 'The state, economic transformation, and political change in the Philippines', in Tapales and Pilar (eds), *Public Administration by the Year 2000: Looking Back into the Future*, *op. cit.*, pp. 12-17.

[180] Doronila, *ibid.*, p. 15.

The Philippine government for the period 1992 to 1997 aspired to free the state from the dominance of the oligarchy through a 'minimalist state strategy'. The assumption here was that greater reliance on the market would remove the political source of oligarchic power. However, there were some policy contradictions in this strategy and other reform programs. The reform programs involved painful measures that cut across income classes and social sectors. The government's industrialisation scheme was in conflict with the land reform program. Regional industrial centres, such as the EAGA, economic zones, and development projects, had already displaced thousands of peasant families and indigenous people.[181] The same industrialisation program promised more jobs yet contained some anti-labour policies. For example, the government had set a low minimum wage in order to attract foreign investors even if it did not meet the high cost of living. The government also promoted 19 regional industrial centres (RICs) to foreign investors as being 'strike-free' as a result of its open support for 'labour-only' contracting.[182] Also, there was conflict between 'devolution' and the need to enhance the capacity of central government in pushing its industrialisation agenda. The Local Government Code has increased the share of LGUs in taxation income. It has expanded the power of LGUs to impose new taxes. These provisions in the Code considerably reduced the central government's resources at a time when what was needed was a more cohesive plan for maximising distribution of resources for development.

It is in the issue of land distribution or reform that the Philippine state has miserably failed to free itself from the interests of big landlords. Various attempts at land reform have failed because they contained provisions that allowed powerful landowners to circumvent the law or even use the law to strengthen their positions in power. Land redistribution based on the agrarian reform laws has always been slow because the Philippine governments have not allocated enough funds to implement the agrarian reform programs.

In terms of policy issues related to foreign debt and international trade, the sovereignty of Philippine state has often been constrained. The Philippine state has been

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[181] IBON Philippines, 'Regional agro-industrial growth center—growth at the expense of development: The final blow', *IBON Facts and Figures*, vol. 17, no. 17, 1994, p. 7.

[182] With 'labour-only' contracting and subcontracting scheme, the formation of union is discouraged because workers are hired on temporary basis as specified in the job contract. When job contract is finished, new set of workers may be hired. With this arrangement, workers will not be able to enjoy economic benefits accorded the regular employees like 13th month pay/bonus. Cited in IBON Philippines, *ibid.*, p. 3; IBON Philippines, 'Of labor relations and policies: Legislation of interests', *IBON Facts and Figures,* vol. 17, no. 9, 1994, p 4.

trapped in continued indebtedness to both local and international financial institutions to support its development projects. The country's foreign debt began to accumulate during the authoritarian regime. The amount of foreign debt soared from US$2 billion in 1970 to US$24.3 billion in 1983.[183] It was claimed that a large portion of the Philippine debt went to unproductive investments[184] and 'crony' capital abroad.[185] The huge debt servicing has drained the country's foreign reserves and has, in part, contributed to the dependency relationship of the Philippine governments with IMF and WB for foreign loans. It has limited the state's capacity to deliver basic services that were poverty-alleviation related. The government was forced to adopt austerity measures, which meant less government spending for social services, infrastructure such as irrigation facilities, education, agricultural research and development, and extension service.[186]

Some of the foreign loans and grants or what is called Official Development Assistance (ODA)[187] have been in the form of tied aid. Tied aid is assistance provided on the condition that part of it will be utilised by the recipient country to buy goods and services for the development projects from the donor country.[188] This condition has been viewed as benefiting the donor countries' companies or MNCs. Case 3 (under chapter 9) is an example of a rural development project funded through foreign aid. **Appendix 9.2** explains the nature and workings of aid with focus on Japan's Official Development Assistance.

The commitment of the Philippine government to WTA implies adherence to the Multilateral Agreement on Investment (MAI).[189] If the MAI commitments become binding on WTO members, the Philippine government will be forced to amend the 1987

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[183] de Dios and Rocamora, *op. cit.*, p. 71.

[184] An example is the US$2.2 billion nuclear plant built by Westinghouse and then mothballed.

[185] de Dios and Rocamora, *op. cit.*, pp. 3-4.

[186] SAP requires cost-cutting measures on practically all aspects of government expenditures excluding debt servicing.

[187] Official Development Assistance refers to the flow of resources through official channels which could be in the form of financial or technical assistance. Financial assistance could be either loans or grants. Loans are transfer of funds from one economic entity to another (e.g. government to government, multilateral agency to government) which must be repaid with interest over a prescribed period of time. Hard loans refer to those given at market rates of interest. Soft loans are given at concessionary or low interest rates. Grants are financial aid which will not be repaid but will be spent based on the agreement with the foreign donors. Cited in IBON Philippines, 'Official development assistance, anyone?', *IBON Facts and Figures*, vol. 17, no. 18, September 1994.

[188] IBON Philippines, 'Official development assistance, anyone?', *IBON Facts and Figures*, vol. 17, no. 18, September 1994.

[189] Negotiations on the components of MAI such as national treatment of foreign investors are suspended in the WTO at the time of writing. National treatment means that foreign investors will be given the same rights and privileges accorded to their local counterparts.

Constitution. The Constitution is now seen as an impediment to the globalisation policies of the government and WTA.[190] In particular, there are at least nine provisions under Article XII of the Constitution on National Economy and Patrimony that are in conflict with the trends to globalisation. The possibility of foreigners owning land in the Philippines and the provision on national treatment of foreign investors are being reviewed.

The Magna Carta for Small Farmers has been regarded as one of the foundations of political and social stability in the country. However, it has been eyed for revision. Some of its provisions are seen as inconsistent with the objectives of agricultural modernisation and limited government's intervention.[191] There are other laws to be amended and repealed in response to WTA. This topic is discussed in section 3.6.3.3.

In summary, the Philippine state has been caught in the tensions between interest groups, resulting in delays in implementation or stifling of reforms. In trying to negotiate order *vis-a-vis* these competing interests, the government has often undermined the agriculture sector. The relative autonomy of the Philippine state has been increasingly affected by major changes in the international level— from aid relationship between the Philippines and the US during the colonial period, to new forms of intervention by international and regional organisations. However, within the limitations of the dependency relationship of the Philippine state with these foreign entities, it had some opportunities to exercise control over its own policy-making process. This autonomy was greater during the ISI period, which led to major changes in the economic structure of the country, and elite pluralism. It was strongest during martial law except that dictatorial powers were misused and abused by the ruling elite. On the other hand, the new Constitution has allowed the exercise of influence by all interest groups. While this has improved the legitimacy of the post-martial law governments, the policy-making process has become much more difficult and slow. In recent years, the power of the state has been increasingly reduced as decision-making has been influenced by changes in the global economic order.

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[190] IBON Philippines, 'Globalising the Constitution: The economic basis of charter change', *IBON People's Policy and Advocacy Studies Special Release*, no. 40, IBON Foundation, Inc., Metro Manila, December 1998, pp. 9-10.

[191] Congress of the Philippines, *Modernising Agriculture*, Report and recommendations of the Congressional Commission on agricultural modernisation, Philippines, 1997, p. 125.

3.6 Global and Regional Trade Agreements: Implications for Philippine Agriculture

In a more liberalised environment, where competitiveness in terms of product quality and production efficiency is the rule of the game, the demand for technologies is expected to increase. However, it is difficult to predict whether an increase in the need for technologies will strengthen local technological capability or encourage the transfer of foreign or local technologies. Proponents of trade liberalisation claim that reduced trade barriers will stimulate technology transfer because commercial relationships in the form of foreign direct investment, joint ventures, licensing, and importation of capital goods will expand. Technologies are assumed to flow in nearly all these transactions. On the other hand, trade liberalisation can also be viewed negatively in the sense that it will reduce the protection against influx of inappropriate technologies and undermine efforts to maintain environmental protection measures.

In this section, I examine regional and global trade agreements and their implications for the agriculture sector. Emphasis is given on the agreements directly affecting the agriculture sector and technology transfer, namely the Trade Related Intellectual Property Rights (TRIPS), and the agricultural agreements of the WTA. These two sets of agreement have been the cause of serious concern for the agribusiness sector, farmer groups, scientists, environmentalists and legislators in the Philippines.

3.6.1 The Concept of Protectionism

At this point, it may be necessary to describe briefly the principle of 'protectionism' as this topic will appear quite often in the following discussions. The rationale behind protectionism is to discourage imports. The system of protection can be in the form of tariff barrier or non-tariff barrier. There are two classes of non-tariff barriers, namely those that bypass GATT's rule of law, and those that capture the 'fair trade' provisions of GATT.[192] The former can include some of the following measures: voluntary export restrictions; and other export-restraining arrangements such as import quotas, non-automatic licensing, state-subsidies, and state monopolies. On the latter, countervailing-duty and anti-dumping provisions in GATT can be used to harass foreign rivals to force their governments into negotiating voluntary export restrictions. For example, the US has

[192] Jagdish Bhagwati, *Protectionism*, The MIT Press, Cambridge, Massachusetts, 1988, pp. 43-53.

applied the super 301 provision of the US Tariff and Customs Code[193] on countries whose markets are seen as inadequately open to American goods and investments.[194] Sometimes environmental and labour standards (such as claiming that products from the South are produced through exploited labour) are used as excuses for protectionism. There was substantial reduction of tariffs after the GATT-Tokyo Round in the 1980s. However the use of non-tariff barriers as a means of restricting trade has grown in varying degrees across the world.[195]

3.6.2 Regional Trade Agreements

In recent years, there have been moves toward regionalisation. This regionalisation trend is thought to be a response to the 'breakdown in the world trade system'[196] as evidenced by many breaches of the trading rules.[197] The United States, Canada and Mexico organised the North American Free Trade Agreements (NAFTA) in the 1990s. Europe pursued its own free trade agreement in 1992.[198] In the Asia-Pacific region, there are two regionalisation efforts. The Association of Southeast Asian Nations (ASEAN) formalised in 1992 its ASEAN Free Trade Area (AFTA). AFTA is a program for freeing trade among ASEAN countries—Philippines, Thailand, Malaysia, Singapore, Brunei, and Indonesia—within fifteen years, subsequently accelerated for completion within 10 years.[199] The ultimate goal of AFTA is to create a regional market to stimulate regional industrialisation.[200] The initial success of emerging Growth Triangles, such as the Brunei-Indonesia-Malaysia-Philippines-East Asian Growth Area (EAGA), is an indication of increasing economic integration in the ASEAN region. The Asia Pacific Economic Cooperation (APEC) with membership from 18 economies in the Asia-Pacific[201] started in

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[193] The super 301 is a kind of black ball which the Americans arbitrarily and unilaterally impose to stop the entry of goods from trade-unfriendly developing countries.

[194] Constantino, *The Invisible Enemy-Globalisation and Maldevelopment*, *op. cit.*, pp. 13-15.

[195] Alburo, *op. cit.*, p. 6.

[196] See section on protectionism for examples of violations of international trading rules in the form of various kinds of protectionist practices.

[197] Florian Alburo, 'An overview of the emerging world economic environment', in Cayetano Paderanga, Jr. (ed.), *The Philippines in the Emerging World Environment: Globalisation at a Glance*, The University of the Philippines Center for Integrative and Development Studies and The University of the Philippines Press, Diliman, Quezon City, Philippines, 1996, p. 8.

[198] For detailed discussion of the political economy of NAFTA and EEC, see for example Chapters 20 and 21 in Richard Stubbs and Geoffrey Underhill (eds), *Political Economy and the Changing Global Order*, The MacMillan Press Ltd., Houndmills, Basingstoke, Hampshire, 1994.

[199] Constantino, *The Invisible Enemy-Globalisation and Maldevelopment*, *op. cit.*, p. 13.

[200] *Ibid.*

[201] Members include the six ASEAN countries; five East Asian economies: Japan, China, South Korea, Taiwan, Hongkong; three from Australasia: Australia, New Zealand, and Papua New Guinea; and four from the Americas: Canada, United States, Mexico and Chile.

1989 as a loose forum for discussing trade liberalisation in the region. It soon launched a bold program for free trade within 25 years.[202]

AFTA has been affected by other international trade developments such as WTA and APEC. WTA has further liberalised trade on a global scale, thus superseding the tariff arrangements within AFTA.[203] APEC, on the other hand, has the potential for subordinating the economies of Asia, although at this stage, it is just a forum whose pronouncements are non-binding on its members. APEC which includes non-Asian countries is becoming viewed as a vehicle to serve the interests of the US and Japan.

All the trade blocs and agreements outlined above imply that Philippine agricultural farms and firms must be more technologically and financially equipped to be able to compete head-on with their foreign counterparts.

3.6.3 World Trade Agreement

3.6.3.1 Overview

GATT is a multilateral agreement on the rules governing the conduct of international trade. It convened a series of multilateral negotiations in 1947, 1949, 1951, 1956, 1962, 1967, and 1979.[204] The earlier rounds focused on reducing tariffs while the latter rounds covered rules on anti-dumping, import licensing, customs valuation, technical standards and subsidies. The latest and most ambitious round was the GATT-UR. Negotiations for it started in 1986 and were concluded on 15 December 1993.[205]

Starting 01 January 1995, the GATT-UR has been replaced by the WTA. The WTA requires all Contracting Parties to eliminate trade barriers and harmonise their domestic policies with the international agreement to liberalise world trade. It adheres to the principle of the most favoured nations (MFN) or trade without discrimination. This means that concessions given by one country to another member must also be granted to all other members.[206] A summary of the New World Trading Pact under WTA is shown in **Appendix 3.3**.

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[202] Alburo, *op. cit.*

[203] Constantino, *The Invisible Enemy-Globalisation and Maldevelopment, op. cit.*, pp. 13-14.

[204] The GATT-UR Interagency Committee, 'The Philippines in WTO: Moving the Filipino to win', The GATT-UR Interagency Committee Report, Philippines, 1995, p. iii.

[205] *Ibid.*

[206] *Ibid.*

The WTA includes new areas such as agriculture, services, textiles and clothing, intellectual property rights and investment measures.[207] As agriculture comprises the bulk of economic activity in the Philippines, the WTA's agricultural provisions have generated much controversy among different sectors of the Philippine society. It is for this purpose that this section is focused on, but not limited to, the implications of trade liberalisation in Philippine agriculture.

The WTO oversees the implementation of the WTA and the agreed rules of trade and economic relations between Contracting Parties. The scope of its attention extends beyond international trade—also covering intellectual property, the environment, occupational health and safety, consumers' welfare, the foreign investment regime, industrialisation strategy, food security, agricultural technology and national security.[208]

As the Philippines' participation in the WTO has not yet fully materialised and the liberalisation conditions are still being worked out, some of the discussion and arguments here are speculative in nature. However, this section hopes to contribute to the increased understanding of possible consequences of the different governments' responses to WTA.

3.6.3.2 Trade Related Intellectual Property Rights

The WTA intends to reduce impediments to international trade through the Agreement on Trade Related Intellectual Property Rights (TRIPS). The main objective of TRIPS is to promote technological innovation and the transfer and dissemination of technology. The Agreement requires all member-countries to align their laws with existing international agreements and protocols on international protection. The principles of national treatment and most-favoured nation treatment shall be used in the resolution of IPR disputes. This would mean that member-countries would provide the same treatment to other member-countries' nationals as they would their own citizens. Members shall also give any advantage, favour, privilege or immunity granted to the nationals of one country immediately and unconditionally to the nationals of all other member countries.

There are many apprehensions regarding the tighter controls on intellectual property rights under TRIPS. For instance, it is well known that advanced countries, through their MNCs, own most of the world's patents. It is felt that with TRIPS requiring governments

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[207] Jose Antonio Buencamino, 'GATT realities and trade alliances: Implications and prospects for the Philippines', *Kasarinlan: GATT Defining the Discourse*, vol. 9, no. 4, Third World Studies Center, UP Diliman, Quezon City, Q2 1994, p. 86.

[208] Walden Bello, 'The case against GATT: Drastic surrender of sovereignty', *Philippine Daily Inquirer*, December 1994, p. 6.

of the South to extend patent protection for a minimum period of 15 years, royalty payments to MNCs and the cost of imported technology will substantially increase. Another area of great concern among the farmer groups and scientists is the plant variety protection. TRIPS obliges member states to provide protection for plant varieties, either by patents or locally developed regulation. The anti-plant variety protection lobbyists are concerned that the MNCs would legitimise their rights over the traditional seed varieties and medicinal plants of the developing countries. For instance, ninety percent of the vegetable varieties recommended by the Philippine Seed Board have come from the farmers.[209] By patenting seed varieties, the farmers are expected to pay royalties to make commercial use of these seeds. The supporters of TRIPS argue that granting protection to plant variety developers will stimulate creativity and innovation among agricultural scientists.

The indigenous and traditional community knowledge and practices are also endangered because these are not acknowledged in TRIPS. However, policy makers in the Philippines have started to design a system for protecting indigenous community knowledge and practices.[210]

While there are indeed some costs to IPR protection, it is hoped that these costs will be outweighed by the benefits of having access to critical information or technology at the time of value. Other commonly cited benefits from TRIPS are as follows: R&D will be encouraged because it will be protected from illegal use; with assurance of IPR protection, foreign companies will be more confident not only in generating but also in sharing technologies; and there will be better utilisation and employment of scientific manpower.

3.6.3.3 WTA: Implications for Domestic Policies and Policy-Making Process

Policy Adjustment Measures

There are two ways by which the Philippine government will respond to the requirements of WTA, namely amending existing laws to conform to the Agreements; and where there are no existing laws, enactment of appropriate legislation.[211] On agriculture, the Magna Carta for Small Farmers[212] needs to be amended to reflect the conversion of

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[209] Oscar Zamora, University of the Philippines Los Banos, cited in Cajiuat and Regalado, *op. cit.*, p. 184.

[210] Janes Innes and Tim Turpin, *Intellectual Property Legislation and Innovation in Asia-Pacific Economies*, Law Crest, a publishing imprint of Hybrid Publishers, Ormond, 1999, pp. 90-93.

[211] GATT-UR Interagency Committee, *op. cit.*, pp. viii-ix.

[212] Specifically Section 23 (10) Magna Carta for Small Farmers, stipulating that 'importations shall not be allowed on agricultural products that are produced locally in sufficient quantity' including corn, meat

quantitative restrictions (QRs) into tariff equivalents.[213] According to the GATT-UR Interagency Committee,[214] this amendment will only tariffy the QRs and will create little change in the importation of agricultural products. Rice, which is covered by the Special Treatment[215] provision of WTA, is excluded from tariff reduction for ten years. Restrictions contained in other existing laws[216] shall likewise be repealed to incorporate the tariffication of all agricultural products except rice in the Tariff and Customs Code.[217] An executive order or law on the introduction of foreign plants and animal pests in the country that is consistent with the international plant and animal protection agreement needs to be created. The Seed Industry Development Act (R.A. 7308)—prohibiting the 'importation in commercial quantities of species of seeds that are being produced locally....'—shall also be amended, and provision on sanitary and phytosanitary measures will be added. [218] The National Food Authority (NFA)[219] charter will be revised to allow import and export of rice and corn.[220] Its mandate will be changed from price support to buffer stock management for food security objectives. There are pending bills in the Senate or Congress[221] that the GATT-UR Interagency Committee recommends to be immediately acted upon to improve the competitive position of the Philippines relative to WTA.

The WTA antagonists are concerned with the socio-political implications of policy changes in connection with the Agreement. For one, by amending the Magna Carta for Small Farmers, Bello[222] argues that the government is in effect breaking a social contract which was carefully negotiated among different social and political sectors of the country.

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products, coffee, potatoes, garlic, cabbage, onions and seeds.

[213] Congressional Planning and Budget Office, 'Legislative measures required by GATT-UR of Agreements', House of Representatives-Philippines, April 1994.

[214] GATT-UR Interagency Committee, *op. cit.*

[215] Stipulates that a GATT Contracting Party has the privilege to postpone for ten years the required conversion of a politically sensitive non-tariff measure on a food staple. However, this is accompanied by the guarantee of minimum import access from one percent in the first year of implementation to 4 % at the end of ten years.

[216] Including Republic Act (R.A.) 1296 QRs on onions, potatoes, garlic, and cabbages; R.A. 2712 QRs on coffee; and Presidential Decree 1297 and 1593 QRs on beef and beef products.

[217] GATT-UR Interagency Committee, *op. cit.*, Annex D.

[218] Congressional Planning and Budget Office, *op. cit.*

[219] NFA is a government marketing agency responsible for the attainment of the rice price policy objectives of government. It influences the domestic price levels by monopolising the importation and exportation of rice and through domestic procurement and disbursement operations. It is mandated to be the buyer and the seller of the last resort.

[220] Congressional Planning and Budget Office, *op. cit.*

[221] For example, House Bill (HB) 9288 - Encouraging farmers to shift from low value marginal to high value crops; HB 1173 - Urging Pres. Ramos and the legislature to sustain and maximise the budget for irrigation; HB9943 - Amending import duties and tariff rates of agricultural packaging materials.

[222] Bello, The case against GATT: Drastic surrender of sovereignty', *op. cit.*

Another social issue raised involves the agrarian reform law. By acceding to WTA, oppositionists maintain that land utilisation will be affected, further undermining the Comprehensive Agrarian Reform Law (CARL).[223] For example, smaller, contiguous plots of land may be reconcentrated to form big plantations, a condition necessary to survive the demands of large, fast, and export-quality production of crops.

Impact on Domestic Policy-Making Process

The concern of some local WTA observers over the effect of the WTO on the law-making power of the Philippine state deserves mention in this section. Bello[224] foresees conflict between the 'sovereign law-making power' of the Philippine Congress and the 'supersovereign power' of the WTO. According to Bello, the WTO—a body vested with enormous trade-related authority—is not a democratic association such as the UN General Assembly.[225] The WTO dispute settlement mechanism will operate on the principle of 'consensus' controlled by the 'Quad'[226] instead of 'one-country one vote' procedure.[227] As Bello points out,[228] the decision-making process in the WTO will be conducted by closed-door, secret tribunals 'from whose decisions there is no effective right of appeal'.

The legislative authorities of the Philippine Senate and Congress have already been compromised upon joining the WTO. Congress is obligated to repeal at least 22 laws that are incompatible with GATT, including the Magna Carta for Small Farmers.[229] Congress is obligated to pass or amend certain laws to firm up WTO authority over trade-related areas.[230] Congress is prevented from passing future laws involving any dimension of national life if they are considered 'unduly trade restrictive' by the standards set forth in the UR.[231]

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[223] CARL as it is has been besieged with loopholes and amendments, thus slowing down its implementation and effectively diminishing its coverage. The liberalisation of land ownership or the Investors' Lease Act was passed to encourage foreign and big investors to invest in agribusiness. It allows investors, including foreigners to lease land up to 50 years, renewable for another 25 years. This violates the Constitution which specifically disallows foreign entities to own land. (Kasarinlan Canlas p. 41).

[224] Bello, The case against GATT: Drastic surrender of sovereignty', *op. cit.*, pp. 1, 6.

[225] *Ibid.*

[226] An American GATT expert, Dr. Fred Bergsten, said that this consensus is controlled by the 'Quad'—the United States, European Union, Japan, and Canada. Cited in *ibid.*

[227] Bello, The case against GATT: Drastic surrender of sovereignty', *op. cit.*, pp. 1, 6.

[228] *Ibid.*

[229] *Ibid.*

[230] *Ibid.*

[231] To illustrate his point, Bello gave the following example---'Suppose the Philippine Congress decides to enact a bill banning all imports of DDT (agricultural input which is highly carcinogenic) to protect the health of the farmers and the general public. But the US pesticides' producers protest and gets the US government to bring this to the attention of the WTO Disputes Settlement Unit on the grounds that the Philippine law has 'no scientific basis' and is 'unduly trade restrictive'. Suppose the panel of three trade

The WTA, on the other hand, appears to legitimise and reinforce the industrialisation program of the Philippine governments starting 1992 up to the present. The export-industrialisation development objective of the Philippine government is well served by the WTA Agreement. Under the Agreement, Philippine agricultural exports will not be discriminated against in the world markets and their competitiveness enhanced by the removal of developed countries' subsidies to their agricultural exports.

At this point, the decentralisation policy of the Philippine government through the Local Government Code[232] shall be examined *vis-a-vis* the WTA. Although decentralisation has drained the resources of government especially during the transition period, it can serve the needs of the agriculture sector under WTA. Increasing competitiveness of the agriculture sector requires the delivery of fast and reliable support services in the rural areas. This implies the need for greater participation of local government units (LGUs) in the provision of agricultural support services. For instance, the LGUs will be partly responsible for overseeing the construction of farm to market roads, community irrigation projects, and port and cold storage facilities needed to improve agricultural competitiveness. Even the delivery of agricultural extension services has been devolved from the DA to the LGUs. This extension role is viewed as crucial in ensuring that agricultural producers are provided technologies that will increase farm productivity. However, the LGUs are not fully equipped and ready for this role. At this stage, it also needs the active support from the S&T community, the NGOs and the central government.

3.6.3.4 Impact of WTA on Agriculture

The benefits and disadvantages of WTA on agriculture have already been the subject of many debates in the Philippines. A closer examination of these issues provides insights on the policy responses to WTA of the Philippine government.

On the benefit side, local economists[233] estimate an increase in global access for agricultural products, resulting in a P3.4 billion (US $146.7 million) net gain yearly, with 500,000 jobs expected to be generated annually, and agricultural gross value added to

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experts examining the case rules against the Philippines. The decision of this panel is final and the last recourse for the Philippines is to get not simply a majority of 125 members of WTO but all to agree to reverse the verdict.'

[232] The Local Government Code provides for greater local autonomy through the devolution of responsibilities, authorities and powers from national to local government units. It increases the share of local governments in taxation income and expands their power to impose new taxes.

[233] From, among others, the Agricultural Policy Research and Advocacy Assistance Program of the University of the Philippines Los Banos, the Department of Agriculture, and the GATT secretariat.

increase by P60 billion (US $2.5 billion). More specifically, the benefits of agriculture from global trade liberalisation through WTA can be summarised as follows:

a) World prices of selected agricultural commodities will increase due to the reduction of subsidies. Domestic prices of tradeable agricultural commodities and net foreign earnings or savings will consequently increase.

b) Reductions in import barriers of trading partners will create new market access for traditional and non-traditional exports.

c) The degree of overvaluation of the domestic currency will be reduced and will raise the relative prices of agriculture compared with other goods and services because most agricultural commodities are tradeable.

d) Lowering the excessive protection on a number of agricultural commodities will lead to a more efficient allocation of resources within agriculture and across sectors. Lower prices of these commodities and processed food products using sugar and corn as major inputs will improve the consumers' welfare.

e) The WTA will divert the government's attention from counter-productive trade regulations toward addressing the problem of declining competitiveness of Philippine agriculture.[234]

On the other hand, the main argument against WTA is that it may legitimise further the dominance of industrial powers over developing and underdeveloped countries. **Appendix 3.4** summarises the perceived negative impact of the Agreement on agriculture and the corresponding actions by the Philippine government. As indicated in **Appendix 3.4**, the Philippine government chooses to provide safety nets[235] to allay the fears of affected commodities or industries and to counter the negative effects of the WTA on agriculture. The soundness of this approach shall be discussed later in section 3.6.3.6.

3.6.3.5 WTA: Impact on the Environment

There are a number of WTA provisions that appear to be safeguards against adverse environmental consequences **(Appendix 3.5)**.[236] The Department of Trade and Industry (DTI)[237] for its part released public statements about the subject, as follows:

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[234] Cristina David, GATT and Philippine agriculture: Facts and fallacies, paper presented at the symposium in honour of Dr. Gelia Castillo, Philippine Social Center Commonwealth Ave., Diliman, Quezon City, 27-28 September 1994, pp. 9-10.

[235] Safety nets are in principle short-run measures that can reduce shocks for the affected sectors of society and not in themselves contributions to long-term solutions.

[236] Ricardo Umali, Brief on GATT-UR in relation to environment, paper presented during the DENR National Management Conference, Davao Insular Hotel, Davao City, Philippines, 25 August 1994, pp. 3-

- Environmental degradation has resulted not because of trade itself but because prices fail to reflect costs to the environment;[238] there is an absence of well-defined property rights which allows open access to resources; government has failed to invest on environmental protection control infrastructure; and poverty, population pressure and high demand for Philippine exports have led to excessive scale of extractive resource use.
- GATT members are free to adopt and enforce environmental measures as long as they apply to all and there is no discrimination.
- The WTO Committee on Trade and Environment will give the needed attention to link trade with environmental policy.

While the direct impact of WTA on communities and resources worldwide are largely unknown, there are reasons to be concerned because of the following observations:

- GATT rules often treat environmental measures as trade-restrictive;
- Investment rules in GATT do not require investors to meet certain environmental standards. The same rules create strong temptation for multinational corporations (MNCs) to invest in nations with weaker environmental laws; and
- There are no guidelines on natural resource extraction or harvest rates nor on the promotion of sustainable practices.

Concerns about the first issue are justified on the basis of previous cases in which certain trade principles conflict with measures to protect the environment. To illustrate this point, it is worthwhile looking at the specific cases cited by Gutierrez.[239] In 1990, a GATT panel ruled against Thailand's act of banning imported cigarettes for reasons of protecting human health, because it did not impose a similar ban on domestic production and sales of cigarettes. Similarly, the GATT panel ruled against the US 'Superfund'[240] on the grounds that a tax on imported petroleum violated the principle of national treatment.

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[237] Eric Gutierrez, 'History A.G. (After GATT): The Philippines when the GATT spills over', *Political Brief*, Institute for Popular Democracy, Philippines, November 1994, p. 12.

[238] According to M. de los Angeles (in 'Philippine trade and the environment: Exploring the implications of GATT), pricing failures is the most direct cause of environment degradation where environmental costs and/or consumption are not internalised by the concerned producers and consumers. As a consequence, the scale of production and the techniques employed in using environmental and natural resources tend to be wasteful and/or generate pollution. The government has also failed to capture the economic rents (e.g. environmental taxation) from the exploitation of the country's resources.

[239] Gutierrez, *op. cit.*, pp. 11-12.

[240] Collected from higher taxes imposed on petroleum and certain imported substances, and supposed to be used to clean up toxic wastes.

Bello[241] provides a clear illustration of the adverse effect on the Philippine environment of export-oriented production. He correlates this with the impact of the debt crisis and structural adjustment. He claims that prawn farming in the Philippines, intended for the foreign markets, not only destroyed mangroves but also affected traditional agriculture because of its extensive use of a mix of salt and fresh water. He explains that the inflow of salt water threatened to lower the productivity of adjacent rice fields. Indeed, the tales of environmental damage associated with free trade and industrialisation in the Philippines are many. Environmental problems are common in logging, mining and agri-business industries that are developed around the needs of Japan, United States, and other industrialised countries. Some of these stories are summarised in **Appendix 3.6.**

While trade liberalisation may force inefficient and pollutive local industries to modernise more quickly by adopting state-of-the-art technologies—which may include pollution control equipment due to lower importation costs—there are accompanying ecological costs as well. Some of these modern technologies will be resource and energy intensive. In their bid for competitiveness, production sectors are expected to shift to highly productive although uniform one-dimensional systems. For example, monoculture in agriculture might be used. This system of production is vulnerable to outbreak of diseases and insects and requires higher inputs in terms of fertilisers and pesticides.

With freer trade due to WTA, the intensity of industrial processes is expected to increase. As a consequence, pollution will most likely escalate until such time that local industries will shift to cleaner and environment-friendly technologies. Statistics show that at the present level of industrialisation in the Philippines, the extent of pollution is already alarming. According to a United Nations report cited by Bello,[242] some 20-30% of water pollution in the whole country and 30-40% of air pollution in Metro Manila originate in industry. The Environmental and Natural Resource Accounting Project (ENRAP)[243] examined the Philippine trade in terms of factor content and pollution intensity, 'based on the DENR-Environment Management Bureau 1983 classification of commodities'. The

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[241] Walden Bello, 'Global economic counterrevolution: The dynamics of impoverishment and marginalisation', in Richard Hofrichter (ed.), *Toxic Struggles: The Theory and Practice of Environmental Justice*, New Society Publishers, Philadelphia, 1993, pp. 203-204.

[242] The United Nations Economic and Social Commission for Asia and the Pacific report, 'Environmental Aspects of TNCs Activities in Pollution-Intensive Industries in Selected Asian and Pacific Countries'. Cited in Bello, 'Revisioning Philippine industrialisation', *op. cit.*, p. 15.

[243] ENRAP c/o Project leader M.S. delos Angeles, Philippine trade and the environment: Exploring the implications of GATT, discussion paper presented during the Third ENRAP Network meeting, NEDA, 4 November 1994. pp. 1-6.

project indicates that during the period 1975-1990, there was a trend towards less pollution intensity of Philippine exports. Examples are exports with unskilled labour and human resource-intensive components (except in the semiconductor industry). However, during the same period, there was an observable increase in the importation of more hazardous commodities. It is uncertain, though, whether this trend will prevail in the context of freer trade. The same project concludes that at the national level, while industry as a group is the major source of air pollutants, government and household sectors are also responsible for significant pollution.

The foregoing discussions indicate that there is uncertainty as to the impact of greater trade liberalisation on the environment. A comprehensive environmental impact assessment (EIA) to reduce this uncertainty and prepare government and all sectors for the consequences of WTA is deemed necessary. The idea of adopting resource accounting systems, as advanced by the scientific community, makes much sense. With this system, the costs incurred on the environment as a result of expanded trade will be reflected in the balance sheets. The ongoing research of the Philippine Institute for Development Studies (PIDS) for the formulation of standards for a resource accounting system is a step in this direction. For the long term, ways by which government can capture economic rents (such as environmental taxation) from the exploitation of the country's resources should be developed. This way, firms will be forced to abate pollution to avoid payment of taxes. The revenues from this activity, in turn, can be used to improve the government's resources monitoring, enforcement of rules and regulations, conservation, and public investments. These revenues can be used to provide the necessary infrastructure that will enhance the capability and competitiveness of the rural communities.

3.6.3.6 Safety Nets as Response to WTA

The preceding discussions indicate that with the WTA, there will be winners and losers in the agriculture sector. To counter the perceived negative effects of WTA and to increase agricultural competitiveness, safeguard or 'safety net' measures will be provided by government. Some of these safety net measures, as outlined in the report prepared by the Congressional Planning and Budget Office,[244] are as follows:

a) More vigorous construction of farm to market roads, irrigation facilities, port and cold storage facilities;

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[244] Congressional Planning and Budget Office, *op. cit.*

b) Accelerated technology transfer to farmers and their co-operatives;

c) Improvement in the genetic quality of Philippine agricultural products;

d) More credit opportunities for farmers and their co-operatives;

e) Reduction in tariffs to a maximum of 10% for agricultural and food packaging materials, refrigeration equipment; and

f) Decartelisation of shipping and demonopolisation of arrastre and other port services to reduce cargo transport and handling cost.

David[245] observes that the other proposed safety net measures are counterproductive and may create more distortions in agriculture. The case of corn is an example. To allay the fears that with a 100% tariff on corn the livestock producers will substitute wheat for corn, tariff rates for wheat, when used as feeds, are proposed to be increased to the level for corn. This move will be detrimental to the livestock and poultry industry, whose most important feed ingredients (such as corn and wheat feeds) will be taxed at a much higher tariff rate. The DA also proposes that tariff proceeds from imports of agricultural products under the minimum access requirements be earmarked to fund support services. David[246] finds this in violation of good public finance management because it will be a highly unstable source of funding for agricultural support services. She explains that a committee composed of representatives from government and the affected sectors is being proposed to manage the collected funds. David[247] argues that this committee cannot be expected to allocate resources in favour of commodities with the highest technological and market potential.

In conclusion, the major problem of Philippine agriculture is its declining competitive advantage **(see Table 3.1)**. With or without WTA this must be addressed. I take the same position as David,[248] namely that the provision of agricultural support services must be considered in the light of improving the competitiveness of Philippine agriculture and not as safety nets. The issue is not how to provide safety nets because of WTA but rather how to take advantage of the opportunities for improving the competitive advantage of agriculture. This position finds strength in the argument that as a safety net, there is a tendency to choose short-term rather than more effective long-term policies such as a genuine agrarian reform program.

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[245] David, *op. cit.*, pp. 12-20.

[246] *Ibid.*, p. 16.

[247] *Ibid.*

[248] *Ibid.*, p. 13.

Table 3.1 Average growth rates of gross domestic product (GDP), agricultural value added (GVA), and agricultural exports in selected Asian countries, 1980-1992 (%).

Country	GDP	Agriculture GVA	Agriculture Export
China[a]	8.5	5.6	9.1
Indonesia	5.6	2.9	2.6
Malaysia	6.2	3.4	1.8
Thailand	9.9	5.8	5.2
Philippines	1.5	1.1	-3.2
India	5.6[b]	3.8[c]	5.1
Pakistan	13.1	11.3	1.6
Nepal	4.5	4.6	-1.0
Bangladesh	4.0	2.9	-1.5
Sri Lanka	4.1	1.8	-0.4

[a] *Refers to China and Taiwan*

[b] *Data up to 1990 only*

[c] *Data up to 1991 only*

Source: David, 'GATT and Philippine agriculture: Facts and fallacies', p. 27, citing FAO Production and Trade Yearbooks.

This section demonstrates the diversity of interests, interactions, concerns and political processes involving the various stakeholders of the international and regional trade agreements. This complexity suggests the importance of looking at the technology transfer process in the context of the socio-political interests of many groups apart from those directly involved in the application of technologies.

3.7 Conclusion

Viewed from the global economy perspective, the Philippine state has for a long period been tied to or associated with US capitalism. The structure of the Philippine agricultural sector has been influenced, in large part, by the US market during the American colonial rule, by the Free Trade Act between the Philippines and the US during the immediate post-independence era, and by the interventions of the US-dominated IMF and WB in recent decades. The Philippines has been one of the most heavily indebted developing countries with debt servicing severely affecting its foreign exchange reserves. This situation has made it more vulnerable to the dictates of foreign donors. The Philippine state has relied heavily on foreign investments to finance its industrialisation and rural development programs. It has been home to many MNCs that operate in all areas of the economy including the agribusiness sector.

The development strategies of the Philippine state have been dominated by export-oriented, foreign investment-reliant, and import-dependent industrialisation policies, except during the ISI period in the 1950s and 1960s. Therefore, economic policies have been directed towards attracting foreign capital, often at the expense of small farmers and workers. Philippine governments have introduced a number of economic and political reforms. However, these reforms have been mainly biased against the rural or agriculture sector. For example, CARP has been compromised on several occasions because it has been implemented within the context of the export-oriented development policy of the government. In the first instance, there is already a contradiction between the objectives of CARP and the requirements of the Key Production Area program that promoted the production of export crops, the development of growth centres, and the WTA. The slowness by which the past and present land reform programs in the Philippines have been implemented has also created an atmosphere of uncertainty. This has encouraged premature conversion of lands to non-agricultural uses and has given time to big landowners to find ways to avoid the land reform laws.

Public investments in agricultural productivity-enhancing projects, such as land reform, irrigation facilities, rural roads, research and development, extension and technology transfer, have been grossly insufficient. As a result of this policy bias, the agriculture sector has not developed into a competitive, productive and efficient sector. With the agriculture sector now opened for global competition, it finds itself ill-prepared for the competition. There is also a danger in the tendency of government institutions in the Philippines to focus on the most affected areas of the WTA and short-term policies at the expense of more effective long-term agricultural policies. With or without the WTA, it is important that the Philippine government rehabilitate the agriculture sector and provide the necessary competitive-enhancing support measures, which will continue to be allowed under the WTA.

The Philippine state has been generally captured by conflicting domestic and foreign interests, except in a few cases when particular Philippine governments displayed a strong activist role in the economy.[249] These local and global pressures resulted in delays in the implementation of meaningful economic reforms, constrained the state's ability to make decisions for the interest of the majority of the Filipinos, and led to an overemphasis on short-term policies at the expense of long-term planning. Partly due to the frustration over the inability of the Philippine governments to alleviate poverty in the country, the NGO movement has developed in the Philippines. During the martial law regime, there were many underground NGOs involved not only in initiating livelihood projects but also doing advocacy work such as organising the peasants against the dictatorial rule. The 1987 Constitution and post-martial law policies have allowed NGOs to freely operate and have provided them greater opportunities to participate in the decision-making process of the government. An active NGO community can stimulate a strong civil society that will serve as a check and balance on the powers of the state and the elite.

Agricultural subsidies and trade barriers which are rampant in industrialised countries are expected to decrease progressively with the WTA. Taking this positively, new opportunities are opened to net agricultural exporters such as the Philippines. There is no assurance, however, that these countries will not continue to practice other means of protectionism. As in the past, they may find loopholes in the WTA and use this to agitate their competitors. There is also a perceived increase in opportunities for technology

[249] For example, during the ISI period that resulted in elite pluralism, and martial law regime that resulted in major economic distortions such as monopolies, rent-seeking activities and corruption.

transfer with WTA. However, the Philippine government must learn how to manage this technology transfer well to ensure that the benefits from technology transfer are maximised and the cost of negative consequences minimised. It has to ensure that the local capability to absorb the technologies from abroad is in place.

The smallness of a country such as the Philippines may inhibit it from confidently advancing its rights *vis-a-vis* the industrialised countries. It is thus important that the developing countries join forces and continue their vigilance for fair trade. For instance, there is a move among the Asian countries to create its IMF counterpart, the Asian Fund.

It is within the political economy environment outlined in this chapter that agricultural development and technology transfer in the Philippines should be understood. It is important for technology transfer managers and interveners in the rural sector to understand and discern the contradictions, opportunities, socio-political processes and constraints within the political economy of the Philippines. This awareness can help the agricultural technology transfer managers and interveners design innovative strategies that will overcome such constraints and use opportunities as they arise. This sensitivity could increase the chances for their strategies to bring about meaningful change in the rural sector.

The complex setting in which the agriculture sector and technology transfer is located suggest the importance of adopting technology transfer models and theories that incorporate a social, economic and political view of agricultural development. The traditional models of innovation and technology transfer do not provide a satisfactory framework for these observations; the dynamic and evolutionary models of innovation and technology transfer are more appropriate.

While this contextual analysis offers considerable insights into the broader issues that the agriculture sector and the technology transfer process need to consider, this approach needs to be supplemented by an understanding of the more immediate environment. The analysis of the agricultural research and extension system—the direct setting of technology transfer—offers such an opportunity. This is examined in the following chapter.

CHAPTER 4

NATIONAL SYSTEM FOR AGRICULTURAL INNOVATION AND TECHNOLOGY TRANSFER

4.1 Introduction

The previous chapter provides a macro view of the socioeconomic and political environment of the Philippines highlighting the aspects that have relevance to the agriculture sector. The macro view brings into focus a complex array of interests, structures and political processes that have implications for agricultural technology transfer. This chapter shifts the focus of discussion and explores the inner sphere of technology transfer in the agriculture sector, which is the national agricultural research and extension (R&E) system.

This chapter begins with background information on Philippine agriculture and an organisational sketch of the agricultural R&E system. It examines the interrelationships among the various entities within the system that are directly or indirectly involved in the technology transfer process. The technology transfer approaches and strategies of these institutions are analysed in terms of their features, commonalities and differences. These approaches vary from simple rural extension projects to more sophisticated approaches such as science parks, business incubators and joint ventures. Differences in strategies depend on which segment of the agricultural sector the agencies involved are targeting (such as small farmers and private agribusiness companies), the technology transfer objectives, the type of technology being promoted (such as product, process and service), and/or the technology transfer models the agencies involved are following. This chapter also examines the impact of the international research and donor agencies on the R&E system in the Philippines. It ends with the identification of some complementarities among various technology transfer approaches.

The technology transfer or extension system of the Philippine agriculture sector has always been associated with government services. As mentioned in chapter 1, the existence of numerous widely dispersed farmers and small enterprises, not capable of undertaking their own research, has impelled government to assume the major responsibility of

technology transfer. The private sector, non-government agencies, and universities also have their own technology transfer initiatives, although limited in scope.

Analysis of the state of technological change in the sector points to the wide gap between potential commodity yields based on research and actual farm outputs. To narrow this gap, I underscore the importance of an effective technology transfer strategy together with other agricultural productivity enhancing services. I acknowledge that the policy bias against the agriculture sector in the Philippines, as outlined in chapter 3, has constrained the delivery of these services to the rural areas and has resulted in less competitive and productive agriculture sector. Ironically, competitiveness and productivity are qualities necessary to be able to survive this period of greater liberalisation and globalisation.

The bureaucratic structure of the agricultural R&E system is at the core of the problem. It is a major obstacle to an effective technology transfer system and is conducive to the implementation of top-down approaches to agricultural development. With this structure, the identification of national and regional R&D and extension plans and programs is generally done by the research and academic institutions. This practice often results in technologies that do not match the needs and resources of the farmers.

This organisational problem has intensified the weak linkages at various levels within the agricultural R&E system. The 1992-decentralisation policy of the Philippine government is an attempt to reduce bureaucracy in extending agricultural services to the rural areas. However, the potentials of this policy have not been fully explored because of some budgetary, political and human resource management issues. The weak linkage between research and extension groups is also associated with the incentive system for agricultural R&D and extension. For instance, extension workers have relatively low morale compared to researchers because they get much lower salaries and fewer skill development opportunities than the researchers. The award system for researchers is usually based on scientific publications instead of putting emphasis on technology transfer.

The analysis of the agricultural R&E system in relation to foreign intervention shows that the technology transfer approaches and policies of agencies concerned described in section 4.6 are in part influenced by the international donor agencies. Because of limited local funds, these donor agencies will continue to play a major role in agricultural R&E. However, I argue that arrangements with these foreign institutions must

be regulated and carefully assessed so that benefits that will go to the farmers will be maximised.

This chapter also observes the tendency of some agencies in the agricultural R&E system to introduce a new development program to correct another failed program. The big rural development programs are usually funded by international agencies. I argue that this practice will be more effective if the deep-rooted problems within the system, such as the issue of bureaucracy, are acknowledged and dealt with. Also, a more careful review of past and existing strategies/programs is necessary to draw useful lessons and identify areas in which different programs can complement each other. Comparative analysis of some of these strategies reveals areas of complementarity and provides indications of what changes are appropriate to improve the national system for agricultural R&E. These elements tend to converge towards the following bottom-up strategies: development of techno-based rural enterprises; engagement of the services of team of expert facilitators, mentors and communicators that can provide management support to the clientele; incorporation of sustainability measures in the programs; and conscious effort to involve the clientele in all aspects of the technology transfer process.

4.2 Background on the Philippine Agriculture Sector

The structure of the Philippine agriculture sector can be deduced from **Figure 4.1**. Rice, corn and coconut jointly represent 78 percent of the total area harvested to crops. Export crops (other than coconut), such as sugarcane, banana, pineapple, mango, abaca and rubber, constitute about 10 percent, while the rest are harvested to a wide range of high value and minor crops.[1] In terms of the main occupation of families in the rural areas, sixty percent (60%) are engaged in the production of rice, corn, coconut or a combination thereof, three percent (3%) in sugarcane, and the rest are involved in the production of other agricultural commodities **(Table 4.1)**.

The Philippine agriculture sector consists of a large number of small farm owner-cultivators, landless rural farmers, upland farmers (farming on marginal and rolling hills and steep mountain slopes) and fisherfolks. It also involves a significant number of commercial farms and agribusiness corporations (such as those growing bananas and

[1] Philippine Council for Agriculture, Forestry, and Natural Resources (PCARRD)-Policy Advocacy Group (PAG), 'International trade policy agenda for Philippine agriculture', PCARRD, Los Banos, Laguna, Philippines, September 1993, pp. 3-4.

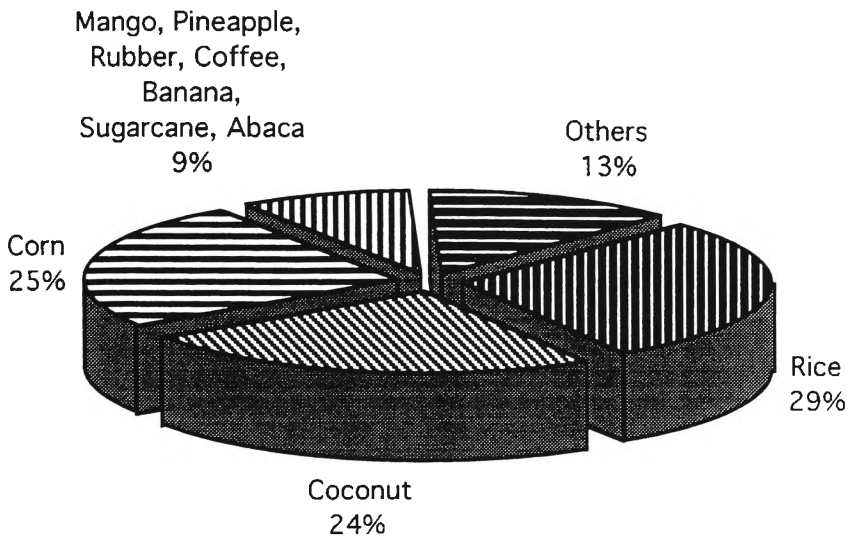

Figure 4.1 Area harvested to agricultural crops in the Philippines, 1994

Source: Bureau of Agricultural Statistics, Department of Agriculture, Philippines

Table 4.1 Main occupation of farm households.

Main Occupation of Household Head	Total No. of Families	Share of Group in Total Families (%)	Poverty Gap (%)
All agricultural families	3962.3	100	100
Rice farmers	1103.9	27.86	24.04
Corn farmers	596.4	15.05	20.48
Sugarcane farmers	19.4	0.49	0.29
Other crop farmers	203.4	5.13	6.13
Coconut farmers	360.9	9.11	9.37
Fruit tree farmers	17.6	0.44	0.22
Livestock and poultry raisers	23.4	0.59	0.41
Other livestock farmers	9.2	0.23	0.22
Rice & corn workers	215.2	5.43	6.49
Sugarcane workers	88.5	2.23	3.04
Other crop farm workers	16.4	0.41	0.49
Coconut farm workers	61.6	1.55	1.81
Livestock & poultry workers	13.8	0.35	0.24
Other crop & animal husbandry workers	80.1	2.02	1.21
Forestry workers	46.6	1.18	1.29
Fishermen	515.4	13.01	13.38
Other occupation	590.5	14.9	10.88

Source: Balisacan, 1991, quoted in PCARRD-PAG, 1993.

pineapples for export), which according to Quisumbing[2] can be considered as capitalist enterprises because of their large-scale operations and use of wage labour. There are non-capitalist plantations, such as those in sugar and coconut, in which the common arrangement is the hacienda system[3] or tenancy.[4] A few agricultural processing companies, such as food and feed processors, are mostly urban-based, capital intensive and basically import dependent. To give an idea of the size of these groups in the rural areas, the following selected research findings indicated in Callanta's[5] book are worth revisiting. Aguilar's study[6] of 1981 indicated that the proportion of landless households in rice growing areas of the Philippines could be anywhere between 20-50 percent. Various studies revealed that bulk of landless farm workers could be found in the rice and corn subsectors.[7] With regard to upland farmers population, the Bureau of Forest Development,[8] gave an estimate of 7.5 million[9] in 1981, 4.5 million of which are national cultural minorities.[10] The Luzon Secretariat for South Action (LUSSA) Research staff found out that in 1982, about 13 percent of rice farmers are small farm owner-cultivators.[11]

The agriculture sector can also be classified according to the type of farming activity. Gorrez[12] describes this typology in the following manner. *Subsistence agriculture* involves poor soil conditions, use of low levels of inputs, lack of access by farmers to technologies and capital, and very low productivity. *Self-sufficient farming* has capabilities for providing the household food need, hence resulting to improved nutrition, but with limited access to technologies, capital and market. *Diversified farming* is a production level

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[2] Ma. Agnes Quisumbing, 'Agrarian reform and rural poverty in the Philippines', *Countryside Development: The Journal for the CD Professional*, vol. 1, no. 1, January 1990, p. 42.

[3] Hacienda system refers to farm estates where large number of hired wage labourers, organised under a central management, are employed.

[4] Quisumbing, *loc. cit.*

[5] Ruth Callanta, *Poverty: The Philippine Scenario*, Bookmark, Inc., Makati, 1988.

[6] *Ibid.*, p. 42.

[7] *Ibid.*, pp. 41-42.

[8] *Ibid.*, p. 59.

[9] About 12.5 % of total Philippine population.

[10] National cultural minorities are indigenous peoples of the Philippines. As of 1986, there were 60 groups with a total population of about 7 million people (14% of national population). They are mostly concentrated in the northern and central part of Luzon (25 groups) and southern Philippines (35 groups). They are the descendants of peoples who refused to surrender to colonisation by the Spaniards and Americans. Their cultures are rooted in their lands. Cited in IBON Facts and Figures, vol. 16, no. 22, 30 November 1993, pp. 2-3.

[11] Callanta *op. cit.*, p. 43.

[12] David Gorrez, 'Review and assessment of rural development programs and projects in the Philippines: A countryside agro-industrialisation development strategy (CAIDS)', National Economic Development Authority (NEDA), Manila, March 1994, pp. 119-121.

in which agricultural activities are diversified and multi-purpose. Crops and livestock are common combinations. Here, there is improved access to technologies, capital and market. *Specialised farming* is self-contained and fully integrated. Typical of this type are large plantation-scale crops intended for a specific market. This makes full use of prime resources in land and infrastructure and employs a variety of technical or managerial expertise. The majority of rural households fall under types 1 and 2.

A closer look at Philippine agriculture will give a general picture of the level and state of technological change and innovations, and the nature of support services in the sector. Sections 4.2.1 to 4.2.5 provide a snapshot of agricultural innovations on a commodity or industry basis, namely rice and corn; coconut and sugar; banana, pineapple and mango; livestock; and timber and furniture. Section 4.2.6 describes the agricultural inputs industry including seeds, fertilisers, and agricultural machineries. Section 4.2.7 considers the role of research and extension and other support services (intellectual property right protection, credit, irrigation, rural roads and transport, postharvest facilities and information access) in the development of the agriculture sector.

4.2.1 Rice and Corn

The annual production rates of *rice and corn* in the Philippines have grown at 1.9 and 2.03 percent, respectively for the past 10 years while the population is growing at 2.7 percent per year.[13] At these rates, the World Bank estimates rice shortage in the Philippines of 0.5 to 1.1 million MT by year 2000.[14] Total rice production area is 3.2 million hectares, half of which is irrigated.[15] The entire rice industry was valued at around US$458 million in 1992.[16]

Rice production in the country has, since the 1970s, been characterised by the use of high yielding varieties (HYVs). Rice HYVs have been developed primarily by the International Rice Research Institute (IRRI) based in the Philippines and later by the Philippine Rice Research Institute (PhilRice). De Leon[17] reports that in 1967, only 2.62 percent of total rice area in the Philippines was planted to HYVs. This figure rose to 50

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[13] PCARRD-PAG, 'International trade policy agenda for Philippine agriculture', *op. cit.*, p. 4.

[14] *Ibid.*

[15] PCARRD, 'The rice industry', PCARRD, Los Banos, Laguna, Philippines, October 1996 (reprinted).

[16] PCARRD, 'The rice industry', PCARRD, Los Banos, Laguna, Philippines, May 1995. Conversion rate: US$1.00 = 24.00 pesos

[17] Normando de Leon, 'Technology transfer in rice and corn in the Philippines', *A Survey of Technology Transfer in Agriculture in Asia and the Pacific*, Asian Productivity Organisation, Tokyo, 1990, p. 233.

percent by 1971 and 87 percent by 1986.[18] Based on Kikuchi and Hayami's[19] account, 'it took only five years for 50 percent of Philippine ricelands to be covered by HYVs'. The phenomenal increase in adoption rate of HYVs during the 1970s-1980s can be explained by the following factors: it is a major 'breakthrough'; it was launched as a package of technology (HYV, irrigation, fertiliser, and pest and disease control technologies) through a massive government program called 'Masagana 99';[20] and the program was accompanied by an aggressive information campaign, the use of trained extension workers and supervised credit program. In recent years, the integrated pest management (IPM)[21] technology for pest control in rice production has increasingly been promoted and adopted nationwide.

While modern rice technology has resulted in increased yields and reduced unit costs, there are indications that the technology has led to a less equitable distribution of income and wealth.[22] This has been more evident in countries where the distribution of land ownership is very skewed such as in the Philippines. In 1995, the country suffered from a rice crisis, necessitating a huge importation of rice from Thailand and Vietnam. This rice crisis has been attributed to a combination of natural calamity such as drought (el Niño) and the more serious problem of decreasing productivity and post-harvest inefficiencies. Citing Herculano Co, Head of Grains Confederation-Philippines, Tiglao[23] compares the extent of irrigation service in the Philippines with those of other countries. Only 800,000 of 3.5 million hectares of ricelands in the Philippines are irrigated compared to 5 million in Vietnam and 10 million in Thailand. What aggravates the situation in both rice and corn industries is the inefficient post-harvest operations, resulting in about 10 to 37 percent postharvest losses and wastage.[24] For instance, the usual types of rice mills have

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[18] *Ibid.*

[19] Quoted in *Ibid.*

[20] 'Masagana' means bountiful and '99' as the target production goal---99 sacks (44 kg each) of palay per hectare per crop.

[21] IPM is a 'pest management system that, in the context of the associated environment and population dynamics of the pest species, utilises all suitable techniques and methods in as compatible a manner as possible and maintains pest populations at levels below those causing economic injury', as defined by the Entomological Society of America Publication 75-2. IPM uses pest control judiciously to ensure favourable economic, ecological and social consequences.

[22] Aida Librero, 'A survey of technology transfer in rice, corn, and wheat in Asia and the Pacific', *A Survey of Technology Transfer in Agriculture in Asia and the Pacific*, Asian Productivity Organisation, Tokyo, 1990, p. 1.

[23] Rigoberto Tiglao, 'Myopia in Manila', *Far Eastern Economic Review*, September 28, 1995, p. 87.

[24] PCARRD-PAG, 'International trade policy agenda for Philippine agriculture', *op. cit.*

an average milling recovery of only 65%.[25] Drying facilities and warehouses are inadequate in many rural communities.

Corn is grown in 3.3 million hectares with grain production valued at US$875 million in 1992.[26] Domestic production has, since the 1960s, been unable to meet local demand for food and the requirements of the growing livestock and poultry industry for feeds. As a consequence, the country has become a net importer of corn with an average importation of 200,000 MT per year from 1980 to 1992.[27] Corn research from 1980s to 1990s focused on intensive development of high-yielding open-pollinated varieties and hybrids. Corn farmers have been using either hybrids, improved varieties developed by local research institutions, or local traditional varieties. De Leon[28] referred to various studies in corn growing areas of Mindanao, the southern island of the Philippines. These studies showed that the majority of farmers in Mindanao preferred a local variety called *Tinigib* over hybrids. In a study conducted in 1986, the combined area of local and improved varieties in South Cotabato, the biggest corn producing area in the country,[29] accounted for 86 percent of the total area planted to corn. The rest of corn areas was planted with hybrids. A later study (1992) by Pamplona and Garcia[30] revealed that 88 percent of total area planted to corn in the Philippines in 1989 was still planted to varieties which were neither hybrid nor high-yielding open pollinated ones. Average yield of corn for the period 1987 to 1991 was about 1.4 tons per hectare compared to the yield potential of hybrid corn which is 6 tons per hectare. Bias in favour of local and improved varieties can be explained by the fact that seeds of these varieties are less expensive and they have greater resistance to drought, pests and diseases. Supply of corn is crucial to the feed and livestock industries because it accounts for about 40 to 50 percent of total feed mixture by weight basis and 30 percent of total feed cost.[31] Therefore, these industries cannot tolerate

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[25] PCARRD, 'Highlights of the roundtable discussion on rice policies', PCARRD, Los Banos, Laguna, Philippines, 23 August 1995, p. 9.

[26] PCARRD, 'The corn industry', PCARRD, Los Banos, Laguna, Philippines, May 1995. Conversion rate: US$1.00 = 24.00 Pesos

[27] PCARRD, 'Highlights of the national consultative meeting on corn production, utilisation and policies', PCARRD, Los Banos, Laguna, Philippines, 9-10 October 1995, p. 2.

[28] De Leon, *op. cit.*, pp. 237-238.

[29] Producing 80% of the national corn output.

[30] A. Costales, Integrating the Philippine corn and livestock markets: A derived demand model, PhD dissertation, University of the Philippines Los Banos, Laguna, Philippines, 1990.

[31] PCARRD, 'Highlights of the national consultative meeting on corn production, utilisation and policies', *op. cit.*, p. 5.

deficits in corn and are the first ones to press government for importation if shortage in local corn production occurs.

4.2.2 Coconut and Sugarcane

Coconut and sugarcane are traditional export crops of the country. The coconut industry consists of about 1.6 million farmers, 1.9 million farm workers, 100 oil mills,[32] 72 oil refineries,[33] 11 desiccated coconut processors,[34] 6 activated carbon manufacturers and 6 oleo-chemical plants.[35] *Coconut* occupies 3.1 million hectares and has an average annual earnings of US$700 million.[36] Coconut is the Philippines' leading agricultural export and the country is the world's leading supplier of traditional coconut products. The coconut industry's comparative advantage is in the diversity of the by-products such as copra, coconut oil, desiccated coconut, coir fibre, copra meal, coco chemicals, activated carbon, timber and many others. However, the industry has been in serious trouble because of problems in both international and domestic scenes. For example, Philippine coconut oil has been confronted with unstable world prices. The demand and prices of coconut oil is highly elastic owing to the high substitutability by other oils particularly soybean and palm oil. In the domestic front, coconut production has been declining because of lack of improved technology utilisation, an increasing number of senile unproductive trees, and lumber cutting for low cost housing. A massive replanting or rehabilitation program has been implemented by the government, but it will take several more years before the industry can recover. With about 20 million Filipinos directly or indirectly involved in this industry, it will remain an important foreign exchange earner of the Philippines.

The Philippine *sugar* industry has been unstable and in a sorry state since 1982 when the world price of sugar started to decline. This price decline is partly due to the emergence of substitute sweeteners in developed countries. This has led to a steady decline in the production of and area planted to sugarcane. There have been major disinvestments in sugarcane research since then. Consequently, the industry has become more inefficient and technologically inadequate. The sugar industry has been depending on the US quota for its market with almost 97 percent export going to the US. However, the World Trade

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[32] With capacity of 3 to 950 tons copra/day
[33] With capacity of 1.0 to 700 tons oil
[34] With capacity of 127,854 tons DCN/annum
[35] PCARRD, 'The coconut industry', PCARRD Los Banos, Laguna, Philippines May 1995.
[36] *Ibid.*

Agreement (WTA) calls for the lifting of such quota. This means further reduction in the country's sugar market. The association of sugar plantation owners and millers has been lobbying the Department of Agriculture (DA) to negotiate for the repeal of the Philippines' commitment for sugar under the WTA. The DA in turn has asked the association to come up with a feasibility study for such action because this could mean trading-off other commitments in more vital commodities such as rice and corn. As demonstrated in chapter 3, sugar is a highly political commodity.

4.2.3 Banana, Pineapple and Mango

Banana, pineapple and mango are the leading fruit exports of the country. Banana and mango are exported either in fresh or processed form while pineapple is exported mainly as syrup. Banana and pineapple are produced largely by multinational corporations (MNCs) in Mindanao accounting for 40 percent and 37 percent of total area harvested to these crops, respectively.[37]

Banana is planted in 325,000 hectares with total production valued at US$444 million in 1993.[38] The banana export industry has its beginnings in 1963 with the introduction of Cavendish banana. During the early years of the industry, it was purely controlled by the MNCs who either leased the lands through local subsidiaries or entered into growers' contracts with local corporations where the MNCs provided technology for a price and a ready market.[39] Large banana corporations, producing mainly the Cavendish variety, generate the production and handling technologies of the fresh banana export industry with minimal support from government S&T agencies. Many of these technologies are used as baseline information for the development of local technologies for other banana cultivars and are applied by smaller plantation farms and packinghouse systems.

The banana industry has a distinct advantage of high production efficiency because of its rich experience in production and handling technologies, and highly integrated production and marketing operations.[40] To sustain this position under the threat of the

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[37] PCARRD-PAG, 'International trade policy agenda for Philippine agriculture', *op. cit.*, p. 7.

[38] PCARRD, 'The banana industry', May 1995, PCARRD Los Banos, Laguna, Philippines. Conversion rate: US$1.00 = 24 pesos

[39] Gorrez, *op. cit.*, p. 94.

[40] Concepcion Lizada, 'Assessment of the fruits industry', *Achieving International Competitiveness Through Technology Development and Transfer, Assessment Reports: Module 1: Export Winners*, Department of Science and Technology and United Nations Development Programme, Philippines, 1995, p. 55.

Comprehensive Agrarian Reform Program (CARP), the agribusiness firms involved have started to enter into joint ventures with agrarian reform beneficiaries. An example is the joint venture between the Tagdangua CARP Beneficiaries Co-operative and the Landasan Timber Corporation.[41] The joint venture is called Tagdangua Development Corporation (Tagdecor). The Tagdecor has developed CARP-distributed lands in the community into a banana plantation and has entered into a marketing agreement with Davao Fruits Corporation (DFC). The Tagdecor is responsible for plantation development and production costs following the cultural management and handling technologies of the DFC. The DFC provides pest control services and banana packaging materials.

Pineapple is grown in 66,925 hectares with total production valued at US$218 million in 1993.[42] MNCs used to operate this as a closed system with only employment and taxes benefiting the country. However, the agrarian reform program has changed the MNCs production system. They now include co-operative growouts instead of mainly in-house corporate farming.[43] Through this system, local growers are able to learn the MNC technology.

Mango occupies 57,669 hectares with production valued at US$193 million in 1993.[44] Mango production in the country is concentrated in a large number of small non-contiguous farms each having few trees. The usual production arrangement is for farm owners to contract-out mango trees to traders who in turn induce the trees to flower. With this method, mango trees are seldom given proper care and nutrition. Since growers are rarely involved in the marketing of fruits and have pre-arranged sharing agreement with the traders, they see no benefit in adopting cultural management technologies.[45] Large plantations exist but their combined area is still relatively small. The mango industry involves many marketing intermediaries resulting in mango quality problems. Some agribusiness corporations are engaged in procuring the fruits from traders and exporting these to Japan, Hong Kong, Singapore and other markets.

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[41] *Ibid.*

[42] PCARRD, 'The pineapple industry', PCARRD Los Banos, Laguna, Philippines, May 1995. Conversion rate: US$1.00 = 24 pesos

[43] Gorrez, *op. cit.*, pp. 89-90.

[44] PCARRD, 'The mango industry', PCARRD Los Banos, Laguna, Philippines, May 1995. Conversion rate: US$1.00 = 24 pesos

[45] Lizada, *op. cit.*, p. 34.

Production of banana and mango has been declining in the last decade because land areas have lost their productive potential due to excessive chemical applications. The banana industry is highly dependent on chemicals, using pesticides during the production phase and chemical treatments during the postharvest stage. With the growing concern of the world market for safety and wholesomeness of imported food, the banana industry has been considering integrated pest management technology. The local research and development (R&D) community has been packaging technologies for the production of organic and reduced-pesticide bananas to support the industry.

In mango, there has been indiscriminate use of flower induction chemicals[46] without corresponding fertilisation. A comprehensive mango commercialisation program to address production and post-production technological problems of the industry has been launched since 1993 by the Department of Science and Technology.

The political economy of the fruits industry in the Philippines, with emphasis on the operations of the MNCs, is covered in chapter 3.

4.2.4 Livestock Sector

Livestock production in the country is classified into backyard and commercial operations. Livestock industry is one of the growth leaders in the domestic market, contributing about 22 percent of gross value added in agriculture. So developed are the poultry and hog industries, that either in small or large-scale operations, producers can efficiently operate. Integrated production is the dominant mode in commercial hog and poultry farms. One of the major problems of the commercial poultry and hog industries is the continued reliance on imported breeding stock, feed ingredients and feed additives. The *poultry* industry requires the importation of grand parent stocks from the United States and Europe that produce day-old chicks for broiler production. The industry is at present controlled by five large integrators, who have the means to import the breeding stocks. In the *hog* industry, 83 percent are backyard farms and 17 percent commercial farms. In 1992, pork valued at US$1.71 billion was produced.[47] The *poultry* industry consists of 72 percent

[46] In early 1970s, a chemical---Potassium nitrate or KNO_3 was discovered to induce flowering of mango trees.

[47] PCARRD, 'The swine industry', PCARRD Los Banos, Laguna, Philippines, May 1995. Conversion rate: US$1.00 = 24 pesos

backyard farms and 28 percent commercial farms. A total of US$1.42 billion worth of chicken was produced in 1992.[48]

The beef industry consists of 85 percent backyard and 15 percent commercial farms. It relies largely on importation (mostly from Australia) of feeder stocks for fattening. Local stocks are very few in number and not capable of meeting local demand for beef. Low production level of cattle in the country is a consequence of problems including widespread incidence of diseases, indiscriminate slaughtering of stocks to meet local demand for beef, and inability of cattle ranchers to undertake normal operations due to land tenure uncertainties.[49] Cabanilla[50] explains the predicament of cattle ranchers with the implementation of the Comprehensive Agrarian Reform Program (CARP). CARP covers all public and private agricultural lands regardless of tenurial arrangements and crops produced. It limits the size of landholdings for non-rice and non-corn lands to five hectares. Cattle ranchers, which serve as domestic source of feeder stock, are among the first to be affected by CARP. Since cattle ranching requires large areas for grazing, many operators have either stopped operations or shifted to feedlot or confined fattening. While CARP can explain the closure of some large-scale cattle farms, Costales argues that it cannot directly account for the declining cattle population in smallholder-backyard farms.[51] A more detailed discussion about CARP is presented in chapter 3.

With low cattle population and high level of technological requirements of dairy operations, the dairy industry is highly import dependent. Industrial dairy processing plants in the country are occupied with reprocessing and repacking of imported ingredients into a variety of products. Backyard dairy operators can only supply as much as 10 percent of the domestic demand.

4.2.5 Timber and Furniture Industry

The Philippine timber industry, with its indiscriminate logging operations (using sophisticated resource utilisation technologies) to serve the needs of the export market,

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[48] PCARRD, 'The poultry industry', PCARRD Los Banos, Laguna, Philippines, May 1995. Conversion rate: US$1.00 = 24 pesos

[49] PCARRD-PAG, 'International trade policy agenda for Philippine agriculture', *op. cit.*, p. 13.

[50] L. S. Cabanilla, 'Ruminant sector deserves more support' and 'Cattle importations are still unavoidable', *Economic Notes: Collected Articles on Agricultural and Economic Policy*, The Research and Training Program on Agricultural Policy, College, Laguna, Phils., 1990, pp. 16-17, 22-23.

[51] Achilles Costales, 'Small-scale cattle raising must be encouraged', *Economic Notes: Collected Articles on Agricultural and Economic Policy*, The Research and Training Program on Agricultural Policy, College, Laguna, Phils., 1990, pp. 32-33.

particularly Japan, has caused serious damage to the country's environment. Lately, the Philippine government has banned logging in the remaining virgin forests of the country, and the exportation of lumber and logs. This policy has displaced many upland dwellers who depend on the industry for their livelihood. The objective of present resource management programs and technology development is to provide livelihood opportunities or interim business to uplanders as immediate source of income while at the same time conserving and expanding the forest base through participative reforestation program. An example of a short-term source of income is the production of fast-growing-softwood tree species (*vis-a-vis* reforestation trees) for firewood, charcoal making, furniture and fashion accessories industry.

4.2.6 Agricultural Inputs and Mechanisation

Agricultural inputs, such as seeds, fertilisers, pesticides, agricultural machineries and agricultural product-processing machines, are mostly imported or controlled by transnational corporations.

The seed industry is dominated by foreign seed corporations such as Pioneer and Cargill and big local companies such as San Miguel Corporation and Ayala Corporation.[52] These companies control the breeding of hybrid seeds.

Fertiliser and pesticides usage in agricultural farms has increased considerably since the introduction of HYVs in the 1960s. However, local production of such inputs has been very low. Foronda[53] indicates that in 1990 about 70 percent of domestic fertiliser was imported **(Table 4.2)**. Fertiliser policies of the Philippine government appear to have conflicting objectives—provision of low-priced fertiliser through importation on one hand and granting adequate incentives to local fertiliser manufacturers on the other.[54] However, any increase in protection or incentives given to fertiliser importers or local producers would increase the farmers' buying price of fertiliser. Recognising the environmental hazards of chemicals, recent research by the local S&T community has focused on the generation of technologies that will produce fertiliser and pesticide substitutes. Most of

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[52] IBON Databank and Research Center Peasant Desk, *Contract Growing: Intensifying TNC Control in Philippine Agriculture*, IBON Books, Metro Manila, Philippines with the assistance of World Council of Churches, p. 119.

[53] Cristeta Foronda, 'Policy issues on productivity and input use', in A. Librero and A. Rola (eds), *Agricultural Policy in the Philippines: An Analysis of Issues in the Eighties*, University of the Philippines and PCARRD, 1991, pp. 59-60.

[54] *Ibid.*, p. 60.

Table 4.2 Fertiliser and pesticide imports and consumption in the Philippines.

Year	Fertiliser Imports[1]	Consumption[2]	Pesticides Imports[3]	
	In thousand tons	MT/KL	MT	CFI Value in US$000
1980	745.23	819.6	7088	26222
1981	426.89	785.4	11166	33978
1982	765.45	845.9	10771	42468
1983	613.38	878.3	11960	36296
1984	626.35	665.2	11098	35397
1985	557.47	-	10959	30840
1986	876.64	-	12908	40443
1987	974.40[4]	1.2M[5]	15901	52464

Source: Taken by Foronda, 1991 from:

1 Balisacan, 1990
2 Rola, 1990
3 Rola, *et al.*, 1990
4 Agriscope, vol. 2, No. 8
5 Agribusiness Weekly, 22 April 1988

these researchers are in the areas of biotechnology (such as fertilisers from nitrogen-fixing organisms and mycorrhiza, and pesticides from isolates of the bacterium and *Bacillus thuringiensis*), organic-inorganic fertiliser combination technologies, integrated pest management studies and others.

Agricultural machineries in the Philippines have been mostly imported. During the 1960s and early 1970s, importation of farm machineries, specifically for rice production, was prevalent. This was made possible through a combination of macro policies of government (such as devaluation of currency making it cheaper to import equipment) and specific mechanisation credit programs (through World Bank agricultural mechanisation loan programs). But these policies have discouraged the growth of local agricultural equipment manufacturing. During the 1980s, however, a small farm equipment manufacturing industry began to emerge in response to the need by rice farmers for smaller equipment more suitable to local conditions. Small-scale manufacturing has gained popularity because of the following: big market demand for such types of equipment; its low capital and its high labour requirements; and entry into the industry was relatively easy with IRRI providing most of the technologies. Through the joint industrial extension program of the Department of Agriculture (DA) and IRRI, about 484 cooperating manufacturers produced 39,358 pieces of rice farming equipment during the period 1975 to 1984.[55] IRRI has worked closely with selected local manufacturers providing them with blueprints of their designs as part of their technology promotion activities.

The national research institutions and farmers themselves have developed small-scale or village-type farm equipment for major agricultural crops and small-to-medium scale food processing industry. However, the local mechanisation industry needs adequate supply of steel materials, and effective rate of protection from importation to be able to manufacture equipment more affordable by farmers and small-scale food processors.

4.2.7 Agricultural Support Services

Support services determine the level of technology utilisation, commercialisation and efficiency at which agricultural production and processing, and output distribution can be carried out. The discussions in this section are limited to the state of agricultural support

[55] Felisa Cruz, 'Agricultural mechanisation policy issues', in A. Librero and A. Rola (eds), *Agricultural Policy in the Philippines: An Analysis of Issues in the Eighties*, University of the Philippines and PCARRD, 1991, pp. 131, 134.

services in the Philippines. The nature of support institutions, their policies and their interactions with other agencies are dealt with under sections 4.4 and 4.5. Agricultural R&D and extension are discussed in general terms in this section, and more extensively in the remaining sections of the chapter.

Agricultural Research and Development and Extension

Despite empirical studies that show high returns on investments in research **(Table 4.3)**, the Philippines has underinvested in R&D.[56] The proportion of R&D expenditures to gross value added (GVA) is widely used as a measure of adequacy of agricultural research investment. Librero[57] reports that the Philippine annual expenditures for R&D in agriculture for the years 1989 to 1996 averaged only 0.3% of the GVA. This is the lowest in Asia for the same period and much less than what the World Bank recommends, that is 1 percent of agricultural GVA.

R&D development in the Philippines has also been hindered by the relatively small R&D workforce pushed away to other sectors and even abroad because of inadequate salaries of scientists, researchers and technicians. There were only 155 scientists and engineers per one million population in the Philippines during the period 1987 to 1994 compared to 6042 in Japan, 2038 in Korea, 364 in Indonesia and 326 in Malaysia. Guerrero[58] noted that compared to R&D workers of most other Asian countries, the country's R&D personnel are paid poorly and the salary rates are not competitive with those of the private sector.

Some recent developments that provide a more favourable environment for research include: a) the issuance in 1991 of the Accounting and Auditing Manual for Research Operations (AAMRO), which is more responsive to the exigencies of R&D activities of government researchers and research institutions compared to the stifling rules contained in the old law; b) the 'Scientific Career System'[59] which aims to provide rewards and recognition to attract and retain outstanding scientists; and c) more S&T scholarships

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[56] Aida Librero, Research investment in agriculture and natural resources, paper presented to Hon. Richard Gordon and the PCARRD Technical Advisory Committee, Subic Bay Metropolitan Authority, Zambales, 13 September 1997, p. 5.

[57] *Ibid.*

[58] Jose Guerrero, 'Science and technology in the Philippines: Before, today and tomorrow', *S&T Post*, vol. 12, no. 7, 1994, p. 8.

[59] Under the Scientific Career System, a scientist is ranked based on his or her educational qualification and training, scientific productivity, significant contributions, practical application of their research findings, discoveries and inventions in commerce, published works, and professional standing in the community. It is a way of promoting scientists without burdening them with administrative tasks.

Table 4.3 Rates of return on investment in agricultural research for selected countries and commodities.

Country	Commodity	Annual Rate of Return (%)
Malaysia	Rubber	25
Indonesia	Rice	133
Japan	Rice	25-27
USA	Corn	35-40
Mexico	Corn	35
Australia	Sugarcane	40-50
India	Sugarcane	63
South Africa	Sugarcane	40-50
Philippines	Rice	11-20
	Corn	29-48
	Sugarcane	51-71
	Mango	85-107
	Poultry	154-163
	Coconut	12-48

Source: Aida Librero, Research investment in agriculture and natural resources, paper presented to Hon. Richard Gordon and the PCARRD Technical Advisory Committee, Subic Bay Metropolitan Authority, Zambales, 13 September 1997.

awarded by the Department of Science and Technology in 1996 to students from various municipalities and barangays in the country.

The agricultural R&D community has produced technologies that have vast potential to increase agricultural outputs. However, wide gaps between actual farm and experimental yields exist for most crop commodities.[60] This situation suggests that the technology being generated is not relevant to farmers' conditions or that the agricultural extension programs and other supports services are not effective. However, there are some exceptions. In mango, the yield gap is small, perhaps because most mango producers in the Philippines use high yielding technologies such as the flower inducer. Similarly, there is a small gap between the experimental and actual farm technical efficiency in poultry and swine farms. This condition could be related to the fact that the poultry and swine industries are highly commercialised in the Philippines. Livestock operations can still be improved by using technologies that reduce the cost of production per unit of input.[61]

Appropriate agricultural extension and technology transfer activities are important to narrow the yield gaps discussed here. However, the system for agricultural research and extension in the Philippines is confronted with various linkage problems. This issue is covered at greater length in later sections of this chapter.

The condition of the extension service in the Philippines is affected by the lack of human resource development program for agricultural extension agents. The extension workers are the most poorly paid of the professional agricultural workers in the Philippines. They lack training opportunities to upgrade their skills so that they will be able to perform their functions more effectively. They also get inadequate allowance for transportation and equipment.

Intellectual Property Right Protection

The intellectual property right (IPR) law in the Philippines covers patents (invention, industrial design and utility model), trademarks and copyrights. Some of the issues related to the IPR system in the Philippines include the following: slow processing of applications; slow and less certain legal process for settling infringement complaints/cases; uncertainties on the rules regarding inventions generated by the public sector; and the absence of plant variety protection (PVP). The Philippine Congress has

[60] Librero, *op. cit.*, pp. 1-3.
[61] *Ibid.*

recently enacted a new IPR Code to improve the patenting system in the country. However, this new law does not include plant varieties.

As discussed in chapter 3, the WTO-Trade Related Intellectual Property Rights (TRIPS) provides for member countries to develop IPR protection to plant variety developers in the form of patent or breeder's right. The TRIPS Agreements require developing countries to observe the provisions of plant variety and biotechnology processes protection starting 1 January 2000. In compliance with TRIPS, the Philippine Congress has been scrutinising (as of the second quarter of 1999) draft legislation that will provide protection to new plant varieties.[62] The controversial nature of the Act has resulted in a long ongoing deliberation within the House of Representatives. There are two opposing views about patenting plant varieties. Supporters of the patent policy for life forms argue that IPR protection will encourage increased private sector investment on agricultural R&D. They also claim that IPR protection will motivate the researchers from both the public and private sectors to be more creative and productive. Those who are against patenting of life forms argue that such policy will deliver the agricultural sector's future into the hands of the multinational corporations (MNCs).[63] They claim that MNCs would eventually own most of the patents on seeds, monopolise trade and increase prices of seeds to the detriment of the farmers.

A separate draft law on community knowledge and ownership, namely House Bill No. 38, was proposed in 1996 before the Philippine Congress. This House Bill provides for the mechanism in which the traditional knowledge of indigenous communities and local farmers can be protected.[64] The implication for technology transfer of this proposal can be inferred from the following arguments. The proponents of the Bill allege that many international companies have exploited the country's traditional knowledge such as traditional medicines, engineering approaches to irrigation and crop improvement practices.[65] With the traditional knowledge protection law, the local communities reserve the right to prohibit companies from using their traditional innovations. When the

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[62] House Bill No. 1070 or the Philippine Plant Variety Protection Act of 1998 introduced before the House of Representatives, Quezon City, Republic of the Philippines.

[63] Dave Llorito and Fermin Adriano, 'True lies: Myths and facts about the GATT-UR agreement', *Policy Update*, Agricultural Policy Research and Advocacy Assistance Program, vol. 2 no. 10, October 1994, p. 8.

[64] Janes Innes and Tim Turpin, *Intellectual Property Legislation and Innovation in Asia-Pacific Economies: Case studies of intellectual property law in Australia, China, Indonesia, Korea, the Philippines and Thailand*, Law Crest, a publishing imprint of Hybrid Publishers, Ormond, 1999, pp. 90-92.

[65] *Ibid.*, p. 91.

communities concerned agree to the use of their knowledge, the law ensures that the commercial benefits from products of companies based on this knowledge will accrue to the communities.[66]

Credit

The access to cheap, timely and adequate credit has always been expressed by farmers as an important input to production. However, credit flowing to the rural areas has been inadequate and has steadily declined since the 1980s.[67] For instance, of the total agricultural loans extended by the banks in 1992, only 11 percent went to small farmers.[68] There are few banking institutions that cater to rural development in the Philippines. Banks that participate in the lending program of the government for the rural sector tend to choose clients from the agriculture sector who are of lesser credit risk such as agribusiness firms. Furthermore, the loan borrowing procedures of banks are highly complicated compared to those of informal lenders (such as usurers and traders). Interest rates in the country are also among the highest in Asia, ranging from 27 percent to 35 percent. Therefore, the small farmers normally rely on informal lenders for their credit requirements.

The Philippine government has generally failed in its various subsidised credit schemes through the formal financial institutions. The main reasons for this failure are poor repayment by farmers and the complex nature of the formal lending system. The government agencies concerned have only recently considered integrating some of the features of the informal lending system with the official lending scheme.

Irrigation

Irrigation increases farm productivity because it allows farmers to plant a second or third crop in a year. While the Philippine government has always had irrigation as one of its priority programs for rural development, the emphasis in the past—especially during the 1970s and 1980s—was on large irrigation projects such as multipurpose dams.[69] This type of irrigation system has proven to be costly to develop, operate and maintain. Furthermore,

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[66] *Ibid.*, p. 92.

[67] PCARRD Policy Advocacy Group (PAG), International trade policy agenda for Philippine agriculture, Draft report, PCARRD, Philippines, 1993, pp. 15-17.

[68] L. Rola, Credit and cooperatives: Issues, problems and prospects to strengthen global competitiveness of Philippine agriculture, Report submitted to the Congressional Commission on Agricultural Modernization, manuscript, 1997, quoted in Congressional Commission on Agricultural Modernization, *Modernizing Agriculture*, Congress of the Philippines, n.d., p. 62.

[69] Congressional Commission on Agricultural Modernization, *Modernizing Agriculture*, Congress of the Philippines, n.d., pp. 56-57.

many studies have shown that the construction of large dams has caused social and environmental damages to the displaced communities and surrounding areas.

The recent policies on irrigation have shifted to the development of irrigation systems that are cheaper to install, that farmers can easily manage and maintain, and that are amenable to the participation of the private sector in its construction and sustainability.[70] Examples of these irrigation systems include shallow tubewells, low-lift pumps, and similar low-cost farmer controlled and sustainable irrigation facilities.

Rural Roads and Transport

The poor quality of road network in the Philippines, especially in the rural areas, has resulted in marketing problems such as the cost of transporting agricultural products being high, and traders dictating the farmgate prices. The government expenditures for road repairs and maintenance have largely been skewed in favour of the urban areas. The Philippine shipping industry is far from efficient because monopolies exist in most of the country's major ports. To illustrate, shipping corn from the US west coast to Manila in 1985 cost P0.26 per kilo, from Bangkok to Manila, it cost P0.16 per kilo, but ferrying one kilo of corn from South of the Philippines to Manila cost P0.60.[71]

Postharvest Facilities

Inefficiencies in postharvest operations have resulted in losses and wastage of up to 37 percent of rice paddy, 30 percent of corn, and 40 percent of fruits and vegetables.[72] The adoption or use of postharvest facilities (such as mills, threshers, corn shellers, mechanical dryers, storage facilities and transportation units) by farmers has been low. Some of the constraints in the adoption of these facilities include the following: inappropriate technology considering the users needs and their environment; inadequate knowledge of the users on proper operation of the facility; unsuitable location of postharvest facility considering the farm and consumption centres; inadequate supply of agricultural products to run the facility at capacity; and labour displacement as a result of using capital-intensive facility.[73]

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[70] *Ibid.*

[71] PCARRD-PAG, 'International trade policy agenda for Philippine agriculture', *loc. cit.*

[72] PCARRD, Agricultural mechanisation R&D program, PCARRD, Los Banos, Laguna, Philippines, 1996.

[73] University of the Philippines Los Banos (UPLB) Rural Development Study Team, *Philippine Rural Development: Problems, Issues and Directions*, UPLB, Philippines, January 1991, pp. 121-123.

Information Access

Farmers in the Philippines have limited access to vital information that will enhance their production and marketing activities. Timely information on available technologies, and market outlets and prices will improve the farmers' ability to make technological decisions and deal effectively with market traders.

Other support services

Crop and livestock insurance policy minimises the risks involved in primary agriculture production. However, the coverage of this program is limited to very few commodities.

4.3 Types of Innovation in Philippine Agriculture

The foregoing discussion gives a glimpse into what kinds of technologies are being utilised in Philippine agriculture. The type of technology determines the nature of activities and linkages required to be successful in its dissemination or transfer. Technologies or innovations in Philippine agriculture can be categorised as product, process, service and information.[74]

4.3.1 Product

This type of technology takes the form of physical goods. Examples of product technologies include farm equipment and machinery; new crop varieties and hybrids; feed formulations; biocontrol products such as *Trichogramma* for corn borer control and *Nematicide* in banana and citrus industries; and fertiliser substitutes such as *Mycorrhiza Ecto* for the reforestation program, *Rhizobium* as soil inoculant in food legumes, *Nitrogen-fixing bacteria* in rice and corn, and *Trichoderma* for rapid composting. These technologies are normally directed toward a specific market demand.

4.3.2 Process

Technologies of this nature are not tangible and may refer to systems for doing things or systems for improved production and postproduction. These may also involve models or strategies for efficient utilisation, conservation, and management of resources; marketing and distribution system; seed production system; and others. In general, they are

[74] Maripaz Perez & Bessie Burgos, 'Technology transfer and commercialisation framework' *Staff Paper Series no. 17/92*, PCARRD-DOST, Los Banos, Laguna, Philippines, 1992.

aimed at increasing productivity and efficiency but cannot by themselves create a market for their use. Examples of these technologies include biological method of coconut oil extraction, improved agroforestry methods, farming systems for smallhold upland farmers, and village-level coconut processing.

4.3.3 Service

This type of technology generally provides the complementary activities or services to enhance existing government programs and policies. For instance, the technology on 'upgrading of Philippine carabao through estrus synchronisation and artificial insemination' may not have a high utilitarian value as in 'product technology' but it has high impact in terms of complementing the government's program to improve Philippine carabao stocks. Technologies under this category may necessitate government support especially in the early stages where market structure may not yet provide adequate premium to encourage payoff to private investments.

4.3.4 Information

Other technologies are simply information or research findings that may indicate valuable socioeconomic and technical databases for policy formulation and follow-up R&D activities. These may also refer to computer aided information systems in support of agricultural production such as Decision Support System for Agrotechnology Transfer (DSSAT), Agrotechnology Suitability Evaluation System (ASES), and Agriculture and Resources Regional Technology Information System (ARRTIS).

In agricultural language, technologies can also be classified into *component technology* or *package of technology (POT). Component technology* refers to a specific cultural technique in the management and production of crops, livestock or forestry. In crops, this may include choice of variety; tillage and method of crop establishment; management of water, pests and weeds; and harvesting and processing techniques. Examples in the case of animals include choice of breed, management of herd, feeding and nutrition techniques, and specific breeding practices. In forestry, this may involve the choice of forest species; management of fertilisation, water and pest; nursery and plantation techniques; and harvesting methods.

A *package of technology (POT)* refers to the combination of all necessary component technologies for production or postproduction activities. These technologies are

proven to be individually outstanding and when utilised together will result in improved performance and greater productivity in the farm or firm. For instance, the POT for improved mungbean production includes the improved variety called Taiwan Green, inoculation of seeds using rhizobia at the rate of 100 g per 20 kg of seeds, and drill method of planting.

The importance of distinguishing the two categories is basically in the amount and nature of commercialisation activities required for each. Although efforts are more specific and directed for component technologies, the probability of attaining development objectives is improved if technology transfer activities carefully consider other components that may prohibit or induce technology adoption.

There are some issues associated with POTs that deserve mention here. The POT concept can be an important vehicle for some agribusiness firms to create and maintain continuous demand for their products. The green revolution POT is a case in point. It involves the use of HYVs which require heavy application of fertiliser, irrigation and pest control, without which the full potential of HYVs will not be achieved. It thus creates continued dependency of farmers on agrochemical products. However, small farmers find it difficult to adopt the different components of POT at one time. One of the major reasons for this difficulty is the limited access to irrigation and credit necessary to buy seeds, fertilisers and pesticides. This case demonstrates the importance of promoting technologies whose requirements match with the farmers' resource capabilities. Greater importance must be given to local options, something that may not be consistent with the generalised recommendations of POTs. In recent years, there has been a growing interest among international and local research-extension agencies to promote organic fertiliser and integrated pest management (IPM). This is with the intention of complementing and reducing but not completely eliminating the use of agrochemicals.

4.4 The Structure for Agricultural Research and Extension in the Philippines

The agricultural research and extension system in the Philippines consists of the following groups of institutions: coordinating agencies; R&D institutions; extension service units; the clientele group or agricultural producers; support institutions; and international research and donor agencies. Agricultural research and extension in the

Philippines are mainly the responsibilities of the government. Therefore, the R&E system is in general bureaucratic.

The R&D component of the system operates on a network basis or the 'Research Council Model' in which R&D activities are dispersed across several line departments and universities, and coordination is undertaken by a council.[75] In this set-up, 127 institutions with R&D mandates are members of the National Agriculture and Resources Research and Development Network (NARRDN) or what is internationally known as the Philippine National Agricultural Research System (NARS). Coordination of the network's activities is undertaken by the Philippine Council for Agriculture, Forestry and Natural Resources Research and Development (PCARRD). At the regional level, an *ad hoc* arrangement for R&D management exists through the regional R&D consortia in agriculture, forestry and natural resources. The following sections describe the various groupings within the R&D system and the nature of their interrelationships.

4.4.1 Coordinating Bodies

The Philippine Council for Agriculture, Forestry and Natural Resources Research and Development (PCARRD) is one of the five planning councils of the Department of Science and Technology (DOST). Originally called Philippine Council for Agricultural Research (PCAR) when it was created in 1972, the major reason for its existence was to provide order in the national agriculture research system. The NARRDN then was characterised by duplication and fragmentation of research efforts, lack of central planning and coordination, inadequate research facilities and trained manpower, and ineffective dissemination of research results. Now referred to as PCARRD (after 2 major reorganisations since 1972), it coordinates, monitors and evaluates the R&D activities—in crops, livestock, forestry and environment, agricultural resources and systems, and socioeconomics—of the NARRDN member agencies. Although accountable to PCARRD on matters outlined above, the network member agencies are administratively independent from PCARRD.

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[75] E. Javier, 'Organizational design issues in agricultural research in the Philippines: Structure at the national level', *Research Management in Agriculture and Natural Resources in the Philippines*, PCARRD, Los Banos, Laguna, Philippines, 1989, quoted in Congressional Commission on Agricultural Modernization - Standing Committee on Technology, 'Committee Report: First Draft', Congress of the Philippines, Metro Manila, 1996, p. 16.

As part of PCARRD's 'development' mandate, it promotes technology transfer and commercialisation activities in coordination with the NARRDN and other entities concerned.

PCARRD is the overall R&D coordinating agency at the national level. On a sectoral basis, the Department of Agriculture (DA) and the Department of Environment and Natural Resources (DENR) have their own units responsible for R&D and extension planning and coordination. The DA Undersecretary for Research, Training and Extension, through the Bureau of Agricultural Research (BAR) and the Agricultural Training Institute (ATI), oversees the implementation of the R&D and extension functions of the department. The DA-BAR plans, coordinates and monitors the research activities performed by the DA field stations, staff bureaus, and other attached institutions and corporations.[76] Before the devolution of extension service to the local government units, the DA-ATI was mandated to communicate research results to the farmers through appropriate training and extension activities.[77] Since the decentralisation, the role of DA-ATI has been limited to the coordination of the provision of technical assistance to the LGUs. On the part of DENR, the Ecosystems Research and Development Bureau (ERDB) coordinates the R&D and technology transfer activities of the Department's field units.

4.4.2 The R&D Network: NARRDN

PCARRD has established the NARRDN consisting of agencies that conduct basic and applied research on one or more commodities across a broad range of disciplines. The NARRDN operates using the 'commodity assignment' principle. This means that an agency is encouraged to work only on commodities in which it has research capability and which are important to the area where it is located. NARRDN is classified into national and regional centres, and cooperating stations. National research centres act as the main research stations which conduct basic and applied research in one or more commodities. They are either single commodity centres (such as Philippine Coconut Authority, Philippine Rice Research Institute) or multi-commodity national research centres represented by leading state colleges and universities which have broad based disciplines needed in fundamental research, and have strong applied communications units. Regional

[76] Section 14, Executive Order No. 116, Republic of the Philippines, 1987.

[77] Congressional Commission on Agricultural Modernization - Standing Committee on Technology, *op. cit.*, p. 19.

research centres conduct applied research for commodities of major importance in the region where the centre is located. They conduct studies to verify findings from national research centres. Cooperating field stations provide facilities and sites for adaptive trials or location specific testing.

The NARRDN is composed of 70 stations of the DA, 12 stations of the DENR, 39 state colleges and universities (SCUs), 3 research institutes of DOST, and 3 specialised agencies.[78] While member agencies of the NARRDN are autonomous from each other, PCARRD coordinates, monitors and evaluates their R&D activities to avoid duplication of efforts.

The DA has the primary responsibility over agricultural development in the Philippines. Its constituent agencies, such as the DA-regional offices and field units, staff bureaus, and attached agencies and corporations, perform both regulatory (i.e. regulating product quality and supply) and R&D functions.

Likewise, the DENR agencies have regulatory function and undertake R&D activities as well. R&D and technology transfer are carried out through the ERDB and the Ecosystems R&D Service Units of the DENR field offices.

State colleges and universities (SCUs) have 3 major functions, namely teaching, research and extension. They engage in both basic and applied research and provide the human resource development needs of the agricultural R&D community.

4.4.3 Regional R&D Coordinating Mechanism: Regional Consortia for Agriculture and Natural Resources

To facilitate and decentralise R&D management, PCARRD encouraged and supported the NARRDN to form themselves into regional consortia. There are 14 regional consortia in the country today **(Appendix 4.1)**. **Figure 4.2** shows the specific locations of the regional consortia in the Philippine map. A consortium serves as mechanism for R&D priority setting, planning, monitoring and evaluation; applied communication and technology transfer; and sharing of R&D resources among member-agencies at the regional level. The consortium system aims at balancing the national, regional and local R&D agenda. Membership in the consortium is not limited to the NARRDN. Regional offices of the National Economic and Development Authority (NEDA) are members in all

[78] PCARRD, 'The road to agro-industrialization: Agricultural technology in the Philippines', paper submitted to the Standing Committee on Technology of the AGRICOM, 23 May 1996.

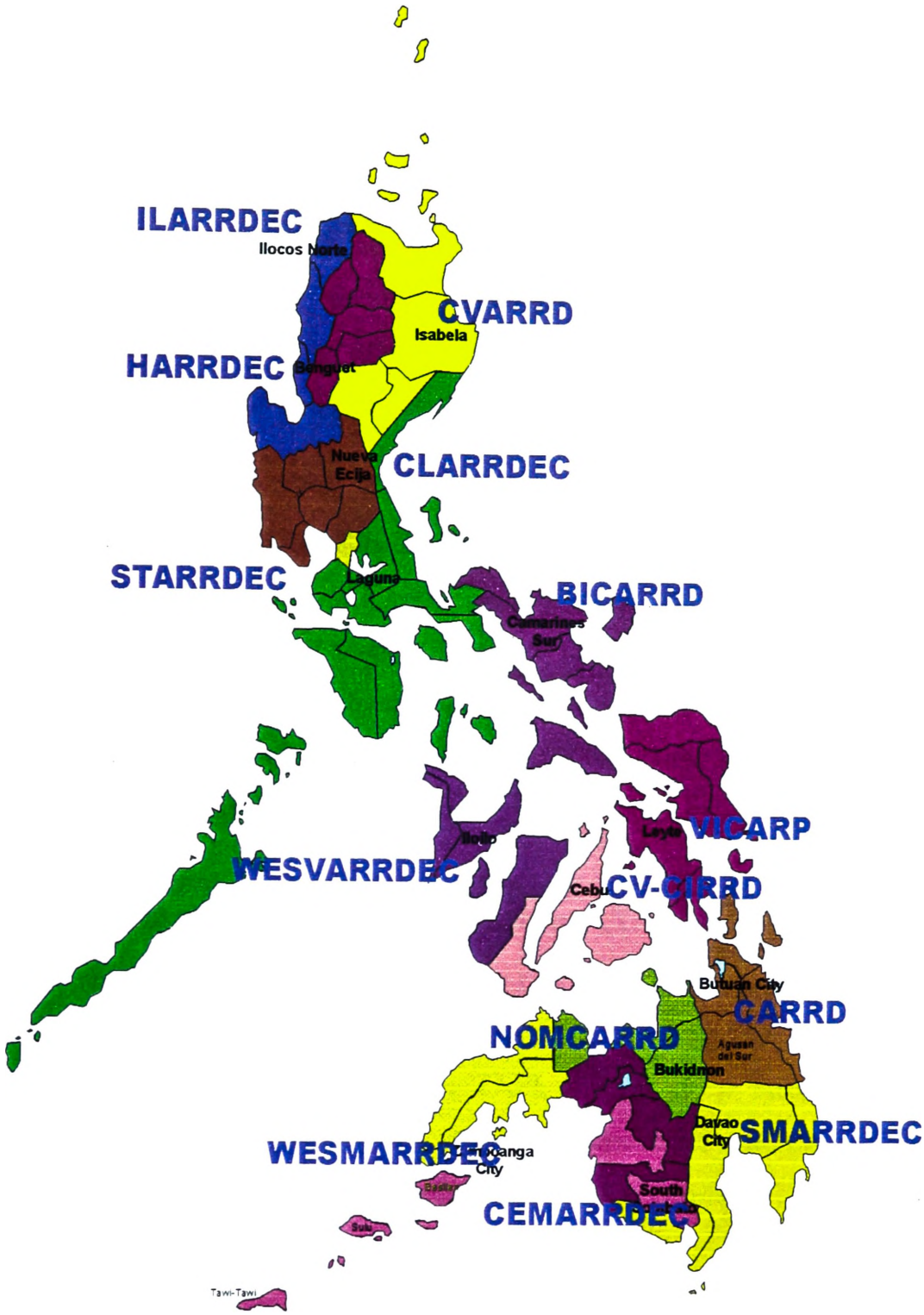

Figure 4.2 The Regional Research and Development Consortia

consortia. Some consortia have members coming from the private sector, non-government organisations (NGOs) and lately, representatives from local government units (LGUs). The problem of regional R&D consortia is that they exist on the basis of interagency 'memorandum of agreement' and not by some legal basis. Lacking legal status, the regional consortia are in a difficult situation because they do not have specific budget allocations from government for their operation. Funding for regional consortia activities is sourced from the regular contributions of member-agencies either in kind or cash. The biggest contribution comes from the base agency[79] and PCARRD.

4.4.4 Extension Service: The Local Government Units

The DA had the major responsibility for agricultural extension and on-site research services until 1992 when this function has been devolved to LGUs. With the devolution, agricultural development became the responsibility of local executives. The rationale behind this move is to facilitate the delivery of extension services to the farmers. The previously single extension agency has been replaced by 75 provincial extension units and some 1,300 municipal extension services.

4.4.5 The DOST's Provincial Centres for Science and Technology and Technology Application and Promotion Institute (TAPI)

The DOST created 73 Provincial S&T Offices to identify technology needs in the provinces, localise the implementation of DOST programs, and link DOST with other agencies working on or supporting S&T. The TAPI, on the other hand, promotes technology transfer and commercialisation of technologies, markets the services of other DOST units, and encourages the formation of technology-based enterprises.

4.4.6 The Private Sector and Non-Government Organisations

The private sector, particularly agribusiness companies and some NGOs, have their own R&D and technology transfer agenda and activities. The agribusiness sector, although technology beneficiaries of the R&E system themselves, conduct their own R&D work. Their R&D investments in the Philippines are mostly concentrated in the agricultural chemical, corn seed, livestock, banana and pineapple industries. High commercial and market incentives exist in these industries, hence the agribusiness companies concerned are

[79] A base agency is the seat of the consortium secretariat.

motivated to conduct R&D. Furthermore, since most of the agribusiness firms engaged in these industries are multinational corporations, they have access to more diverse germplasm and outside technologies that can be tested for local adaptation.

Pray and Echeverria[80] describe 6 types of private institutions conducting agricultural research and extension in the developing countries including the Philippines. These are production input and supply companies, large farms and plantations, processing companies, consulting firms and agricultural publishing companies, co-operatives and commodity groups, and research foundations. According to Pray and Echeverria,[81] most private sector research in the developing countries is applied in nature and undertaken by large companies engaged in seed, pesticide and livestock feed production. Both multinational corporations (MNCs) and local companies are involved in seed and feedstuff research. Seed production research is focused on breeding hybrid cultivars while most livestock feed research is focused on discovery of new materials to reduce production cost of high-quality-feed. Private sector research on pesticides is mostly conducted by MNCs. Initial research is undertaken in Europe, the USA and Japan; field trials of new pesticides are carried out at their experiment stations in various agro-climatic zones; and final trials are conducted by local subsidiaries. Large companies especially those involved in agricultural chemicals employ their own technical or extension staff.[82]

Pray and Echeverria[83] explained the roles of other groups within the private sector. Research conducted by large farms and plantations focuses on improving production management techniques. Processing companies rely on their extension staff for contact with farmers. The extension force acts as buyers of raw materials and gives feedback to researchers on the needs of farmers. Most consulting firms in Asia serve the needs of large farms or plantations. Publishing companies of agricultural magazines can serve as an important medium for transferring technical information from the public and private sectors to farmers. Commodity groups are associations of large commercial farmers, such as the Davao banana plantations in the Philippines, that hire experts to provide technical advice on farm management and commercialisation issues. There are also non-profit, non-

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[80] Carl Pray & Ruben Echeverria, 'Private sector agricultural research and technology transfer links in developing countries', in David Kaimowitz (ed.), *Making the Link: Agricultural Research and Technology Transfer in Developing Countries*, Westview Press, Boulder, San Francisco, 1990, p. 199.

[81] *Ibid.*

[82] *Ibid.*, pp. 199-200.

[83] *Ibid.*, pp. 200-201, 208.

stock foundations that conduct or fund research and provide technical assistance to farmers.

Overall, the private sector's investments in agricultural R&D in the Philippines are very low. According to Guerrero,[84] it amounts to only 9.8 percent of the total R&D expenditures in the country.

The NGOs involved in agricultural R&D and extension are service type agencies that assist in the implementation of socio-economic projects in the rural areas. Their strengths are in providing extension support and education programs for value orientation, and in community organising.

4.4.7 Agricultural Producers

The beneficiaries or clientele of the R&E system include the farmers, upland dwellers, fisherfolks, rural enterprises and agribusiness companies. They are either served by the system individually, through contact farmers or leaders, or through co-operatives or farmers organisations. In recent years, major agricultural programs (such as lending programs) and other government support services have been provided to the farmers through co-operatives. A more detailed description of the agricultural producers in the Philippines is given in section 4.2. The discussion about agricultural co-operatives is covered in chapter 5.

4.4.8 Support Institutions

The support service institutions play an important role in mobilising resources—such as credit, technical inputs, and market linkages—in the rural areas. In the forefront of agricultural credit delivery is the Land Bank of the Philippines (LandBank). But the LandBank lending program is far from sufficient in meeting the needs for rural credit. The LandBank, in 1990, changed its policies to undertake non-agricultural banking. This shift in policy resulted in a situation in which loans extended to non-agriculture enterprises were greater than those granted to small farmers.

The bulk of credit resources of the Philippine commercial banks are captured by large corporations. As IBON[85] notes, not even the Agri-Aqua Law which requires banks to 'allocate 10 percent of their loanable funds for agriculture, 15 percent for agrarian reform,

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[84] Guerrero, *loc. cit.*

[85] IBON, 'Liberalisation of banking system', *IBON Peoples Policy and Advocacy Studies Special Release*, no. 5, June 1994, p. 3.

and 10 percent for small-medium scale enterprises', has improved the rural credit situation. This problem has been partly due to the perception among banks that farmers are non-bankable and are credit risks.

Recently, there has been a move by the Department of Finance and the DA to review and rationalise the charters of the LandBank, the Philippine Crop Insurance Corporation, Guarantee Fund for Small and Medium Enterprises, Quedan and Rural Credit Guarantee Corporation, and Agricultural Credit Policy Council. The objective of the review is to develop policy changes and measures to induce the private sector's participation in lending to agriculture, to improve credit access by farmers, and to plan a special financing program for long-gestation agricultural projects.

The National Irrigation Administration (NIA), an attached agency of the DA, is responsible for the development and rehabilitation of irrigation systems in the rural areas. It collaborates with the DENR and the Bureau of Soils and Water Management for watershed protection. Recent irrigation policies provide for the gradual transfer of communal irrigation systems and the budget for their construction, operation and maintenance to the LGUs. The government has only recently started to consider the construction of irrigation facilities through other innovative schemes such as build-operate transfer.

There are some NGOs or private sector groups that provide enterprise management assistance to co-operatives (such as assistance in the preparation of feasibility studies required by credit institutions, enterprise planning and operation). While farmers are production experts in their own right, the majority of them are lacking in 'business orientation' and not yet ready to take on the responsibilities of entrepreneurship. Hence, support agencies are needed to augment the production know-how of farmers with management intervention in the immediate interim period. NGOs may also serve as conduits between the farmers, and government development programs and financing institutions. Tolentino observes[86] that in many instances, the NGOs are seen as a preferred mechanism for the distribution of government resources since they have better access to the grassroots level.

[86] Bruce Tolentino, 'Imperatives for sustainable industrialisation', *State of the Nation Reports*, no. 9, University of the Philippines Press and the Center for Integrative and Development Studies, 1993, p. 8.

The Technology Livelihood and Resource Center (TLRC), a government corporation, is also involved in agricultural technology transfer and commercialisation. It provides technology information packages, training courses, financing, and consultancy service or feasibility study assistance for technology commercialisation. It obtains technology information from PCARRD and the NARRDN and package them into multi-media promotion materials.

Access to land is one of the preconditions to rural development. Therefore, policies of the Department of Agrarian Reform (DAR) have a strong influence over the technology generation and transfer system. For instance, with the Comprehensive Agrarian Reform Program (CARP), ownership of agricultural land is in smaller parcels with new owners. Smaller land sizes dictate the need for technologies which will intensify production or a production scheme that will group small landowners into more productive units.

The Co-operative Development Authority (CDA) is the agency in charge of the registration and regulation of co-operatives. CDA is responsible for conducting management and training programs in entrepreneurial capabilities, management expertise and technical skills for efficient co-operative operation.[87]

Other agencies providing support to the agriculture sector in terms of infrastructure facilities include the Department of Public Works and Highways, Department of Transportation and Communication, and Philippine Ports Authority.

The Department of Trade and Industry supports agricultural R&D through the Bureau of Patents, Trademarks and Technology Transfer (BPTTT) and the Bureau of Export Promotion. They are represented in the PCARRD Technology Transfer Advisory Committee and Technical Advisory Committee (TAC). The BPTTT is responsible for the review of patent applications. The DOST-TAPI provides IPR-related services to researchers and technologists of private and government R&D institutions, inventors and student-researchers. These services include guidance in the preparation of patent application documents, assistance in filing the patent request to the express lane service of BPTTT, and techno-legal advisory services in infringement cases.[88]

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[87] Ephraim Romero and Virgilio Esguerra, *Agrarian Reform Taxation and Co-operatives: A Social Science Perspective*, National Bookstore Inc., Metro Manila, Philippines, 1991, p. 172.

[88] Republic Act no. 7459, the Republic of the Philippines.

4.4.9 International Development Donor Institutions and Research Agencies

Merill-Sands and Kaimowitz[89] describe foreign donors as including multilateral and bilateral aid and technical assistance agencies, externally funded NGO, and international agricultural research centres (IARCs). The major donor agencies for agricultural development in the Philippines include the World Bank, Food and Agriculture Organisations (FAO) of the United Nations, United States Agency for International Development (USAID), Asian Development Bank (ADB), and Japan International Cooperation Agency (JICA). They extend loans and grants to the Philippine government to augment the national budget for rural development projects. Examples of these projects include those in the areas of integrated area development, irrigation and watershed protection, agricultural R&D and extension, and other rural infrastructure improvement projects.

The following discussions focus on linkages with international organisations in terms of agricultural research. The NARRDN through PCARRD collaborates with its counterpart national agricultural research systems (NARS) in other countries. NARS are organisations that are responsible for national program planning and coordinating, monitoring, evaluation, budget programming, and capability building for agricultural R&D.[90] Inter-NARS linkages provide opportunities to share experiences of parallel systems and to find solutions jointly to common problems in managing agricultural R&D.[91] Most of PCARRD's commitments with other NARS include exchange of scientists and training, and joint R&D projects. Specifically, PCARRD and the NARRDN have linkages with the Indian Council for Agricultural Research, Bangladesh Agricultural Research Council, International Technical Cooperation Center-Rural Development Administration of Korea, Malaysian Agricultural Research and Development Institute, Pakistan Agricultural Research Council, Agency for Agricultural Research and Development on Indonesia, and Japan International Research Center for Agricultural Research.[92]

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[89] Deborah Merill-Sands and David Kaimowitz, *The Technology Triangle: Linking Farmers, Technology Transfer Agents, and Agricultural Researchers*, The Hague: International Service for National Agricultural Research (ISNAR), 1990, p. 24.

[90] William Dar, *State of Affairs of PCARRD Partnerships with National and International R&D Institutions*, PCARRD-DOST, Los Banos, Laguna, Philippines, 1997, p. 25.

[91] *Ibid.*

[92] *Ibid.*

The NARRDN through PCARRD is also a member of the Consultative Group on International Agricultural Research (CGIAR). CGIAR is a network of 16 international agricultural research centres (IARCs) supported by 42 public and private sector donors.[93] Its goal is to support the agricultural development concerns of 40 developing countries through R&D, training and information exchange. The Philippines is the seat of two important IARCs, namely the International Rice Research Institute, and the International Center for Living Aquatic Resources Management (ICLARM). PCARRD has forged collaborative agreements with 13 CGIAR centres, including IRRI, ICLARM, International Maize and Wheat Improvement Centre (CIMMYT), International Potato Center (CIP), International Service for National Agricultural Research (ISNAR), International Irrigation Management Institute (IIMI), International Network for the Improvement of Banana and Plantain (INIBAP), International Crops Research Institute for the Semi-Arid Tropics (ICRISAT), International Centre for Research in Agroforestry (ICRA), International Livestock Research Institute (ILRI), Centro International de Agricultura Tropical (CIAT), International Institute of Tropical Agriculture (IITA), and International Plant Genetic Resources Institute (IPGRI).[94]

The R&D network of the Philippines has also collaborated with some advanced research institutes that have no formal affiliation with the CGIAR. These include the Asian Vegetable Research and Development Centre (AVRDC), Australian Centre for International Agricultural Research (ACIAR), Commonwealth Scientific and Industrial Research Organization (CSIRO), International Development Research Centre (IDRC), International Board for Soil Research and Management (IBSRAM), and the Southeast Asian Regional Center for Graduate Study and Research in Agriculture (SEARCA). The NARRDN enters into collaborative arrangement with these organisations on research areas of their mutual interest. Collaboration comes in the form of germplasm exchange, joint research and development work, scientists exchange, technical assistance, training, and R&D equipment support.

The extent to which these international agencies have influenced the structure and activities of the agricultural R&E system in the Philippines is discussed in section 4.7.

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[93] Dar, *op. cit.*, p. 32.

[94] *Ibid.*, pp. 33-34.

4.5 Interrelationships Among Agencies

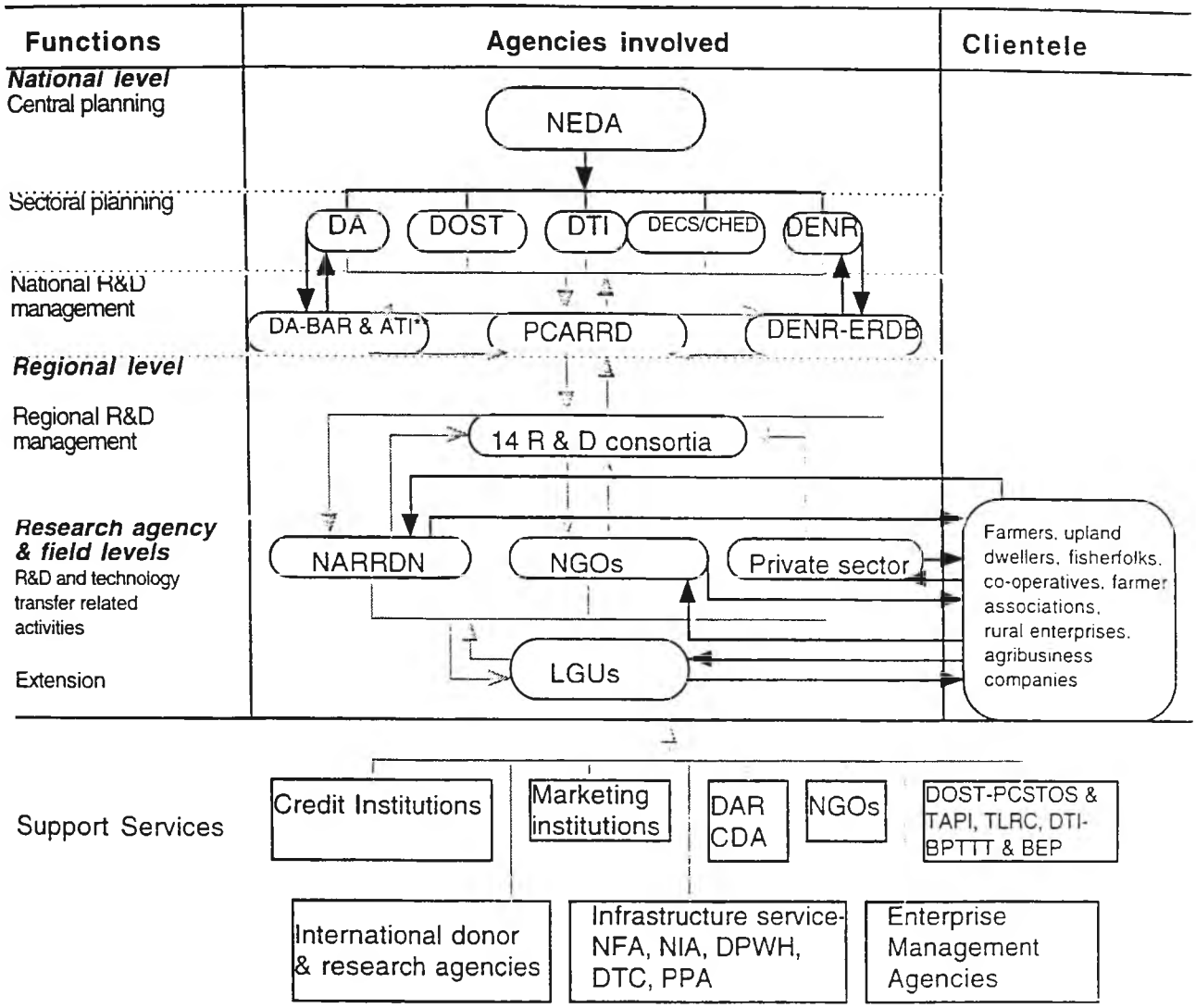
The preceding discussions illustrate the complexity of the research and technology transfer system of the Philippine agriculture sector. It involves many agencies or entities, the majority of which are not administratively and organically related.

This section examines the system in terms of the interrelationships among the various agencies and groups involved. **Figure 4.3** shows the relationships of these agencies at the national, regional and field levels. There are weak linkages at various points in the system: between researchers and extension agents; between researchers and the clientele; between extension agents and the clientele; between the LGUs and researchers; and between SCUs and the private sector. For instance, research and extension units are highly interdependent but their relationships have always been problematic. The R&D community relies on the extension group for the promotion and dissemination of their research outputs. The success of the extension and technology transfer service is contingent on its access to technologies generated by the R&D community.

4.5.1 National and Regional Targeting

National targeting and planning for agriculture development is led by the National Economic and Development Authority (NEDA) with sectoral departments concerned, namely DA, DENR, DOST, Department of Trade and Industry (DTI), Department of Education, Culture and Sports (DECS), Commission on Higher Education (CHED), and representatives from the private sector and NGOs. The overall national development plan for the period 1994-1998 is embodied in the Medium Term Philippine Development Plan (MTPDP). The Sustainable Agro-Industry Development section of the MTPDP specifically addresses agricultural concerns. The different sectoral departments translate the MTPDP into action agenda and flagship programs. In the case of agro-industry related departments, these include the Key Production Areas (KPA) Development Program of the DA, the Science and Technology Agenda for National Development (STAND) of the DOST, the Integrated Social Forestry Development of the DENR, the Countryside Agro-industrialisation Development Strategy (CAIDS) and others. One of the most recent statements of policies and programs on agricultural development was issued by the DA in

Figure 4.3 Organisational Structure: Research-Technology Transfer System of the Philippine Agriculture Sector



Legend:

———	Has legal basis for direct relationship	NEDA -	National Economic and Development Authority
———	Has informal linkage		
ATI -	Agricultural Training Institute	NFA -	National Food Authority
BAR -	Bureau of Agricultural Research		
BEP -	Bureau of Export Promotion	NGOs -	Non government organisations
BPTTT -	Bureau of Patents, Trademarks and Technology Transfer	NIA -	National Irrigation Administration
CDA -	Co-operative Development Authority	PCSTOs	Provincial Centres for S&T Offices
CHED -	Commission on Higher Education		
DA -	Department of Agriculture	PPA -	Philippine Ports Authority
DAR -	Department of Agrarian Reform	TAPI -	Technology Application and Promotion Institute
DENR -	Department of Environment and Natural Resources		
DOST -	Department of Science and Technology	TLRC -	Technology and :Livelihood Resource Centre
DPWH -	Department of Public Works and Highways		
DTC -	Department of Transportation and Telecommunication	** DA-BAR for R&D coordination & DA-ATI for extension management	
DTI -	Department of Trade and Industry		
ERDB -	Environment and Resources Research and Development Bureau		
LGUs -	Local Government Units		
NARRDN	National Agriculture and Resources R&D Network		

1998 through its Framework for Agricultural Development and the implementing rules and regulations pursuant to the 'Agriculture and Fisheries Modernization Act of 1997'.[95]

While the various programs mentioned above have complementary ideas and parallel goals, they are independently pursued. Mechanisms for linkages at the policy level have been established, but these are generally limited to *ad hoc* interagency committees or representation in the planning board of a particular department or national agency. There is no built-in mechanism as of yet that will link the national programs together. The DA 1998 rules and regulations identify how linkages for R&D complementation with other government agencies, NGOs, LGUs and the private sector will be implemented.[96] Other departments and agencies concerned have also started to be more specific about their plans to unify their activities with other entities concerned. However, it is too early to judge if these mechanisms are feasible and effective.

The programs outlined here are further translated into the national agricultural R&D agenda for agriculture, forestry and natural resources, with PCARRD largely coordinating the process. At the subsector level, the DA develops the R&D and extension program for agriculture and fisheries, while the DENR develops those for the environment and natural resources. The DA, in 1998, changed its National Agriculture Research and Extension Agenda (NAREA) into the National R&D System in Agriculture and Fisheries (NaRDSAF) and the National Extension System for Agriculture and Fisheries. The NaRDSAF aims to integrate the agriculture and fishery components of the DA-NAREA and the DOST-STAND. It intends to consolidate the overall management of, and responsibility for R&E system in agriculture and fisheries under the DA at the national level and under the LGUs at the local level.[97]

The R&D consortia pursue the same 'focusing exercise' at the regional level through what is called an 'Integrated Research and Development Program (IRDP)'. Through IRDP, consortium member-agencies agree to direct most of their efforts to one or two commodities of greatest importance to the regions. The IRDP has the following integrative components: research; technology transfer and commercialisation; applied

[95] Department of Agriculture Administrative Order no. 06 Series of 1998, pursuant to Republic Act 8435: The Agriculture and Fisheries Modernization Act of 1997, 10 July 1998.

[96] *Ibid.*

[97] *Ibid.*, p. 41.

communication and development; information management; resource management and institution development; and linkages, cooperation, and complementation.

In general, the national and regional R&D and extension plans are developed with little participation of the clientele. The identification and prioritisation of R&D areas and technologies for extension are mainly carried out by the research and academic institutions.[98] This exercise often results in R&D outputs or technologies that do not fit the needs, resources and environment of the farmers.

4.5.2 R&D and Extension Implementation

The NARRDN implements the R&D activities based on the national and regional R&D agenda. The DA-BAR and DENR-ERDB monitor and evaluate the R&D activities within their respective subsectors. On the other hand, PCARRD provides the overall coordination of both subsectors (except fisheries) and the R&D activities of the rest of the NARRDN member-agencies. The regional consortia perform the overall coordination task at the regional level. The regional consortium's position in the research and technology transfer system is strategic. The consortium could serve as conduit between the national and regional or field components of the system. It could provide the venue where research-extension linkages at various levels can be established and operationalised. However, its coordination work is constrained by limited resources and other reasons explained in section 4.4.3.

Some NGOs carry out independent R&D and have their own technology transfer or extension initiatives that address the needs of their specific service areas. Their direct involvement with the clientele makes them suitable technology transfer agents and a reliable source of information about farmers' feedback on rural needs and problems. Although lacking in scientific and technical capabilities, the NGOs are generally competent in participatory development planning and community organising. These are social preparation techniques that provide a favourable environment for technology interventions.

The private sector's R&D work is generally demand-driven, geared toward product development, in answer to specific technical needs of companies, and aimed at strengthening their market positions. Some private agribusiness companies have their own

[98] Congressional Commission on Agricultural Modernization - Standing Committee on Technology, Committee Report: First Draft, *op. cit.*, p. 16.

extension staff. However, as discussed in section 4.4.6, this is part of their promotion and selling strategies.

Other members of the NARRDN, such as agencies under the DENR, SCUs and DOST, maintain their own technology transfer activities that are directed towards the needs of both small farmers and private companies.

With agricultural extension decentralised to the LGUs, the DA has redefined its role in extension through the National Extension System for Agriculture and Fisheries (NESAF). NESAF is composed of three subsystems: the national government through DA-ATI; LGUs; and the private sector.[99] With NESAF, the role of DA-ATI is now limited to the provision of technical assistance to the LGUs through its national, regional and provincial training centres. The municipal governments are responsible for direct agriculture and fisheries extension services. The provincial governments are tasked to integrate the operations of the municipal extension services. Under the NESAF, the DA can commission and provide funding to farmer associations and co-operatives, NGOs and other private entities for training assistance and other related extension services.[100] The SCUs are expected to support the LGU extension personnel by providing degree and non-degree training programs, technical assistance, extension cum research projects and information support services.

A survey conducted by PCARRD[101] in 1995 about 'research and extension linkages under the local government units' highlights the strengths and weaknesses of the extension system under the LGUs. With this system, the problems and needs of farmers are expected to be immediately addressed and the 'bottom-up approach' in agriculture program planning becomes more realisable. The major weakness of the agricultural extension system under LGUs can be political in nature. The Local Government Code lacks the standard on how discretion by local executives should be exercised. The attention given to agriculture depends on the orientation of local government leaders. Some officials give more priority to other concerns such as infrastructure projects in which results are more tangible. Studies cited by Cabanilla[102] indicate that poor municipalities tend to have poorer extension

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[99] *Ibid.*, p. 48.

[100] Such as community organising, use of participatory approaches, popularisation of training materials, and agribusiness, marketing and management skills.

[101] PCARRD-PAG, 'A survey of the research and extension linkage under the local government code', unpublished paper by PCARRD, 1995, pp. 45-47.

[102] Liborio Cabanilla, 'Devolution of agricultural extension to LGUs: A socio-economic analysis', Local Government Academy, Department of the Interior and Local Government, Philippines, 1995, p. iii.

service. They have few resources to provide the necessary incentive system to extension workers, resulting in a less productive extension workforce. Ironically, it is in these poor municipalities where agricultural land areas are bigger. Overall, the LGUs lack the technical, infrastructure and financial assistance to carry out their extension mandate.

Under the previous set-up, research and extension activities of the DA were administratively under one roof. But, studies reveal the weak linkage between research and extension functions within the department and within the whole research-extension system in general. This problem is not unique to the Philippines. Kaimowitz[103] cites the common findings of the World Bank, United States Agency for International Development, and Food and Agriculture Organisation. Accordingly, the weak linkages between research and technology transfer are the most serious constraints of the research-extension systems in developing countries.[104] With the present agricultural extension function under the LGU, the linkage between research and extension may be further jeopardised because research is completely separated from extension. This is where the role of the DA regional offices and the regional R&D consortia becomes even more important. The DA regional offices, in the absence of extension linkage between the national agencies and LGUs, are expected to serve as feedback and monitoring centres for the national agencies, and provide the research and resource support to the LGUs.[105] The R&D consortium with its basic interagency coordinating functions at the regional level could serve the technology and information needs of the LGUs. It could provide the venue for active participation of the LGUs in regional R&D planning for agriculture.

The farmers and their organisations have limited participation in agricultural R&D and extension despite the adoption of location-specific and small farm-centred R&D strategies such as the farming systems research approach. In the few cases where farmer participation was strong, farmers and co-operatives have been observed to excel in farmer-to-farmer type of technology transfer approach. The government agencies concerned have only recently experimented on farmer-scientist partnerships in agricultural R&D such as the MASIPAG and Farmer-Scientist Bureau approaches discussed under section 4.6.

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[103] David Kaimowitz (ed.), *Making the Link: Agricultural Research and Technology Transfer in Developing Countries*, Westview Press, Boulder, San Francisco, published for the International Service for National Agricultural Research (ISNAR), 1990, p. xi.

[104] *Ibid.*

[105] Congressional Commission on Agricultural Modernization - Standing Committee on Technology, *op. cit.*, pp. 34-35.

The R&D system receives support services from a wide variety of government, non-government and private agencies/entities as indicated in section 4.4.8. However, the delivery of such services are oftentimes independently undertaken, and uncoordinated. As illustrated in section 4.4.9, the linkages of the NARRDN with the international agricultural research institutions have been well established.

There are many points in the research-technology transfer system where linkage mechanisms have been established, such as the consortium arrangement, interagency committees, joint planning and reviews, on-farm research and others. However, the necessary linkages—which are generally lacking—must be those at the grassroots level. The research-extension system has undergone major reorganisations over the past years with the decentralisation of agricultural extension as the more recent major change. But in general, linkages in the research and technology transfer system are weak. While the devolution of extension service to the local government units have aggravated the R&E linkage problem, there are indications that it has facilitated the linkage between the extension group and the farmers.

4.6 Technology Transfer Approaches and Strategies

4.6.1 Government Initiatives

Technology transfer strategies in Philippine agriculture vary according to the proponent (government, NGO, SCUs and the private sector), the development objectives and concepts that they advocate, specific development programs they promote, their target clientele, and the type of technologies involved. These strategies are generally 'top-down' in approach, in which technologies generated by national or regional or international research centres flow downstream to the target clientele in a linear process.

There are various ways in which the different technology transfer mechanisms for agricultural development could be examined. There are the more sophisticated mechanisms that are focused on the industrial sector (agribusiness), those that are more grassroots-oriented, and those in between. The 'industry or private sector focus' approach is best exemplified by the technology promotion and transfer programs of the DOST-TAPI, some of which are listed below. The small farmer oriented mechanisms are discussed later in this section.

Agribusiness and Small and Medium Enterprises Focused

a) Technology-Based Enterprise Development

This program includes the DOST Technology Training Center (DTTC), the DOST-Academe technology-based enterprise development (DATBED), Special Technology Financing (STF) Program and Technology Business Incubators.[106] The DTTC provides technology training courses for aspiring entrepreneurs and continuing professional development courses for scientists, academicians and technologists. It extends technical expertise through actual demonstrations and pilot plant visits. DATBED trains students for enterprise development, taps available expertise and facilities of selected state colleges and universities (SCUs), and assists these SCUs in developing a strong entrepreneurial course. Through the STF, the DOST makes arrangements with financing institutions, such as the LandBank, TLRC and Development Bank of the Philippines (DBP), to provide technology-based enterprises access to financing assistance. With endorsement from DOST through TAPI, firms can borrow funds from any of the participating institutions at interest rate ranging from 6 percent for R&D loans to 18 percent for establishing technology-based enterprises.

DOST -TAPI also provides venture/equity financing to small associations or co-operatives for the application of emerging technologies with high commercial potential. With no interest required, DOST shares the risks of putting up a technology-based enterprise whose viability is not yet proven. Funding is limited, however, to only $10,000 per venture. DOST-TAPI intends to continue this financing program until the Philippine Technology Development Corporation (PTDC), a newly established private venture company, is fully operationalised.

The technology business incubator (TBI) encourages and nurtures new technology business ventures by providing common service facilities, access to DOST laboratories and technical services, business spaces, access to various DOST programs and promotion activities. Housed in several DOST institutes and regional offices, the TBIs not only showcase some of the DOST-generated technologies but also help identify gaps for further R&D. The TBI concept is however difficult to apply in the case of agricultural technologies that do not operate well within a controlled environment set-up.

[106] Republic Act no. 7459, the Republic of the Philippines.

b)Technology Promotion and Commercialisation

Pilot plant assistance is included in this component.[107] Pilot plant assistance mechanism allows for a technology to be tested on a pilot scale before being launched into commercial operation. Through this scheme, improvements and adjustments are made to address technical problems encountered at the pilot stage. Funds to purchase the technology, initial working capital of at most three months, training expenses for cooperators, and technical assistance during the start-up period of the demonstration plant are provided through this program.

Other programs included under this technology commercialisation component are the following:

- *Technology Packaging Program.* This involves the production of feasibility or prefeasibility studies, investment packages and flyers for selected technologies.
- *Investors Forum and S&T Fairs.* Annual technology fairs and investors fora at national and regional levels are sponsored to feature various technologies and inventions developed by DOST and other agencies in the R&D network (such as the NARRDN). The fair attracts potential investors and provides opportunities for technology marketing and business negotiations between the technologists and entrepreneurs.

c) Consultancy Services[108]

This component includes the following programs:

- *S&T Experts Volunteer Pool* . This program links technology generators directly with the users. It taps the skills and expertise of both active and retired S&T experts affiliated with the SCUs, private industries and research institutions.
- *Municipal S&T Advisory Program.* The program enlists the active involvement of selected SCUs in technology assistance to the rural sector. Each participating university forms a core team that set directions for project implementation at the provincial/municipal level. It serves as a link between municipal/LGU government planners and the S&T community.
- *Manufacturing Productivity Extension for Export Promotion (MPEX) Program.* This assists small and medium enterprises in the manufacturing sector to achieve productivity by about 20 to 30%. Through this program, study teams composed of

[107] *Ibid.*
[108] *Ibid.*

industrial engineers and educators are sent to the requesting firm or co-operative's plant site. The teams recommend productivity-enhancement measures for immediate implementation by the firm or co-operative. The most common areas of consultancy include plant layout, production planning and control, quality control and materials handling. The co-operative in Case 2 of this thesis (chapter 8) was a beneficiary of MPEX program.

- *Consultancy for Agricultural Productivity Enhancement (CAPE) Program.* CAPE promotes effective farm management strategies to improve agricultural productivity. It provides consultancy teams to conduct productivity studies of qualified small- and medium-scale agricultural enterprises.

As can be observed, the above mentioned strategies are (in the case of agriculture) generally directed toward the agribusiness industry. These strategies promote and encourage collaboration or partnership between the S&T sector and the private sector in technology commercialisation. The S&T sector is acknowledged as the technology generators for enterprises while the job of technology packaging is best accomplished by the private sector. This private sector bias is understandable considering the modernisation and industrialisation objectives of the DOST. The department leaves the downstream technology transfer activities to the NARRDN under the coordination of its planning council for agriculture which is PCARRD, LGUs, DA-ATI, DOST regional and provincial offices, and NGOs.

Small Farmers and Rural Enterprises Focused

Agricultural extension is associated with the more rural or farmer-oriented type of technology transfer. The extension service system in the Philippines has undergone many changes throughout the years—from the central government control to regional and later to local level of management.[109] **Appendix 4.2** summarises the evolution of the agricultural extension in the Philippines.

The early history of agricultural extension in the Philippines was characterised by the conventional *'training and visit (T&V) approach'* to extension. The T&V system was hierarchical and highly structured, in which extension staff were tasked to deliver technical

[109] Santiago Obien, 'Some observations on the acquisition and transfer of agricultural technology', Paper presented during the 6th Philippine Productivity Movement Conference on 'Quality through appropriate technology', DOST, Bicutan, Metro Manila, 02 September 1987. p. 2.

information only. There was clear delineation of responsibilities among the different components of the system. The subject matter specialists (SMSs) were responsible for the content of technical 'messages' and training of extension workers on such technologies. Village extension workers (VEW) were responsible for communicating these information or technologies to the farmers. Extension workers visited selected 'contact farmers/leaders' on a regular basis.

While the system had intended to improve efficiency in the extension service, the lack of proper incentives and conditions for extension workers (such as low salaries and lack of logistic support) to enable them to operate effectively in their assigned areas had rendered the extension system weak. There were other failures in the T&V system. For instance, information extended to farmers were not often relevant to their problems. The T&V structure was not flexible enough to address the complex and varied nature of farming systems and resources. Feedback system was made difficult by the very hierarchical nature of the system. The 'contact-leader' focus of the T&V system appeared to be biased against resource-poor farmers. What was not realised then was that the 'contact leader' concept had a lot of political implications affecting the existing power base among the farmers. According to Kaimowitz,[110] the T&V system failed in the aspects of relevance and responsiveness.

What followed after the T&V approach were various attempts to improve research-extension linkage. Prior to 1992, the Department of Agriculture (DA) used the following research-extension linkage mechanisms: *in-house reviews on research, extension, training and communication programs*, conducted every semester and involving the DA agencies, SCUs, NGOs, Regional Applied Communication Offices, and the Agricultural and Fishery Council; *annual reviews of the NARRDN*, where the field offices of the DA participate; and *training of extension workers.*

The DA adopted the concept of 'technology continuum' in its technology generation and diffusion activities. The 'technology continuum' model views technology as a progression from technology generation, through to technology adaptation, technology verification, and finally technology dissemination.

Technology generation (TG) involves fundamental research that focuses on the development of component technologies, improvement of plant varieties and animal

[110] Kaimowitz, *op. cit.*, pp. 61-63.

breeds, and production systems toward enhancing the efficiency and economic viability of agriculture and natural resources. TG is generally conducted by SCUs in research stations.

Technology Adaptation (TA) is designed to evaluate the stability and replicability of the performance of component technologies over space and time. TA is replicated in more locations and uses far fewer treatments than TG. It is research-managed and conducted by DA and DENR.

Technology Verification (TV) is the testing of TG and TA research results under actual field conditions using farmers' resources. It involves research on comparative performance of improved POTs versus farmers' practices. TV is conducted with farmers as research partners in their own farms under the supervision of NARRDN member-agencies and extension workers.

Technology Dissemination (TD) involves pilot-testing programs, information packaging, and extension of technologies that give consistent outstanding performance in TG, TA, or TV.

This 'technology flow continuum' is further illustrated by Bernardo in his 'research-extension process' model **(Figure 2.13).**[111] The model explains the stages which most agriculture and natural resources R&D undergo and the interface between research and extension activities. As the technology moves downstream into the early stage of piloting and dissemination, research activities diminish while extension activities increase. The whole process is not necessarily sequential with some technologies finding their way directly from technology generation to utilisation. [112] The Bernardo model captures the general trend for most research and extension activities in agriculture although actual tracing of technologies along the continuum is easier for crop technologies. As pointed out in chapter 2, while this technology continuum model is useful in defining interfaces between research and extension, its linear flow concept does not capture the complexities in the R&E system.

The 'TG-TA-TV-TD' continuum has found expression in the policy framework of DA, the *farming systems approach.* The *farming systems research approach* (FSR) involves a system for multidisciplinary and location-specific field research, the intermediary (extension) system, and the user (farmers) system. The location-specific

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[111] Fernando Bernardo, Report of the consultation meeting of agricultural research and extension experts, SEARCA, Los Banos, Laguna, Philippines, 1986.

[112] *Ibid.*

system with emphasis on farm management (such as rice-based farming system, upland crop-based farming system and animal-based farming system) is the basic research-extension strategy rather than the commodity approach.

FSR gained wide prominence in the Philippines through the implementation of the World Bank funded project in 1983, entitled 'Agricultural Support Services Project'. More specific discussion of FSR is found in chapter 2 and its basic principles shown in **Appendix 4.3.**

In 1983, the DA, then referred to as the Ministry of Agriculture and Food (MAF) established a nationwide network for the conduct of on-farm trials.[113] The network consisted of the regional integrated agricultural research systems (RIARS) for each political regions and provincial technology verification teams (PTVTs). The RIARS was responsible for providing on-farm specific technologies while the PTVTs involved extension workers trained on the FSR methodology. The PTVT was assisted by a core staff of an agronomist, soil technologist, livestock specialist, economist and extension specialist.[114] The FSR model used by MAF is based on the TG-TA-TV-TD continuum concept.

In 1991, a further re-structuring of DA's research stations and facilities took place in anticipation of the Local Government Code and in consideration of the farming systems development framework. Four levels of research stations were set-up: national research centres (NRCs); regional integrated agricultural research centres (RIARCs); research outreach stations (ROS) to represent the major development zones or sectors of the region; and provincial service stations (PSS) for crops, livestock and fisheries.[115]

With agricultural extension function devolved from the DA to LGUs since 1992, changes in the extension service are expected. However, based on PCARRD-PAG survey, there is little difference between the technology sourcing and dissemination practices before and after the devolution.[116] This can be explained by the fact that most extension workers under LGUs are devolved personnel from the DA. However, changes are noted in the manner by which technologies for dissemination are selected.

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[113] Virginia Cardenas, E. Rosario and A. Gomez, 'Farming systems research-extension in the Philippines', *Proceedings: Regional Consultative Seminar-Workshop on Farming Systems Research*, SEARCA, Los Banos, Laguna, Philippines, June 30 - July 2, 1986, p. 36.

[114] Obien, *op. cit.*, p. 7.

[115] DA-BAR, *On-farm Research Manual: Overview and Directions of Agricultural Research*, Bureau of Agricultural Research (BAR), 1991, pp. 4-5.

[116] PCARRD-PAG, 'A survey of the research and extension linkage....*op. cit.*, pp. 15, 52-53.

Under the DA system, the general practice was that the majority of technologies for extension come from the DA offices either from central, regional, or provincial levels and research stations. Accordingly, these technologies were provided to the extension workers through memoranda and directives.[117] This 'top-down' orientation was observable despite the farming systems or participatory research and extension framework of the DA in the past.

Under the LGU system, there is an observed increase in the participation of farmers and NGOs in the choice of technologies for extension in particular and setting the rural development plan in general. Therefore, there is a good chance that a real 'bottom-up approach' to agricultural development planning and implementation can be operationalised. However, there are areas of serious concern, if not properly addressed. While extension-farmer linkage has improved under the new system, research-extension linkage is minimal if not absent because of the institutional separation of extension from research. Also, there are indications that the technical expertise of extension workers may weaken because of lack of training and promotion opportunities under the new system. These concerns are however not without solutions. Given proper attention, they will complement the strength of the new extension system—its potential for more participative approach to rural development.

By way of ending the discussion on agricultural extension, 'Masagana 99', claimed to be one of the most successful technology transfer programs in the Philippines, will be examined. 'Masagana 99' was the Philippine version of the green revolution in the 1970s. It was considered to be the most massive integrated rice production program in terms of government and private sector participation, farmer participation, area of coverage, use of trained extension workers, mass communication of information by the broadcast and print media, and diffusion of HYV technology developed by IRRI and local counterparts.[118]

Specifically, Masagana 99 had the following major elements:

- A package of modern rice production technology[119] with fertiliser subsidy;

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[117] *Ibid.*, p. 9.

[118] Joseph Madamba, 'Masagana 99: A success story in food production in the Philippines', Paper prepared for Technical Advisory Committee Meeting of the Food and Fertiliser Technology Center, Taipei, Taiwan, 6-7 March 1978, p. 4.

[119] 16-Step Package Of Modern Rice Production Technology—choosing the rice variety and securing certified seeds; raising seedlings; plowing or rotavating; harrowing operations; basal fertilisation and leveling; treating seedlings; transplanting; rat control; water management; replanting and weed control; protection from insect pests and diseases; nitrogen topdressing; sustained irrigation and rat baiting; intensive insect pest monitoring and control; harvesting and threshing; and cleaning and drying.

- Non-collateral, supervised production credit (however farmers who availed of loans were organised into 'seldas' or groups, and each member guaranteed for his fellow members);
- Extension supervision by rice technologists;
- Incentives to extension workers (such as provision of motorcycles under vehicle loan fund);
- Price support to farmers and ceiling price to consumers;
- Support of public and private mass-media through free promotion of the program as a public service contribution;
- Organised national leadership from the President to village leaders; and
- Linkage with SCUs and research institution vital in the training of extensionists.[120]

The extension delivery component was basically a T&V system characterised by the following features: technicians observed the Masagana 99 systems and procedures and followed a pre-packaged technology—technical recommendations emanated from a national committee and technicians were trained on them and were supposed to follow a set of instructions; technical training of government extension workers in rice production at IRRI and through mobile training teams; and motor vehicle loan fund as incentive for extension worker.[121]

The program was successful in terms of increasing the rice production level in the Philippines. However, studies have shown that the Masagana 99 program and the T&V approach that promoted it failed to meet the needs of the majority of the farmer population in the Philippines.[122] Instead of farmers acquiring and gaining control over the introduced technologies, they became dependent on imported inputs such as fertilisers and pesticides.[123] This dependence on chemicals increased the farmers' cost of production, hence only the richer farmers could afford the recommended package of technology. The program also contributed to the damage of agricultural and forestry resources because of the excessive use of chemicals. It was laden with subsidies that eventually could not be sustained by the government.

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[120] *Ibid.*, pp. 5-9.

[121] Rogelio Cuyno, 'The extension delivery system of the Masagana 99 program', p. 3.

[122] Zamora and Villareal, 1995 and MODE, 1995 quoted in Virginia Cardenas, Extension paradigm shift for sustainable development, Professional Chair Lecture, UPLB Alumni Association, University of the Philippines Los Banos, Philippines, 1995, p. 7.

[123] IBON Databank and Research Center Peasant Desk, *op. cit.*, pp. 17-18.

The NARRDN and PCARRD, in exercising their development and/or extension mandates, implement various mechanisms to facilitate technology transfer and commercialisation. These are as follows:

Action or Development Projects

Through action or development projects, PCARRD coordinates the pilot-testing of improved technologies (component or POT) to demonstrate their technical feasibility and viability in farmers' fields. Technologies are verified and fine-tuned on a semi-commercial scale. With action projects, farmers are provided with relevant support services such as credit, market, extension and training. In recent years, the concept of action or development projects in agriculture have been expanded to emphasise the business nature of technology application. This change in orientation is in response to the national development goals of global competitiveness and people empowerment. Such principles are embodied in the Medium Term Plan for National Development (MTPDP) and further translated into the Science and Technology Agenda for National Development (STAND).

Comprehensive Commercialisation Programs

Comprehensive commercialisation programs are designed and directed to fewer but very strategic commodities such as mango, pineapple, banana, coconut and ornamental crops. Comprehensive commercialisation is an approach that integrates the aspects of production, processing, financing and marketing for each priority commodity. It necessarily involves strong linkages and collaborative work between the R&D community and private sector in the generation, identification, selection and utilisation of improved technologies.

Bottom-up Technology Transfer Approaches

The new initiatives of PCARRD to promote technology transfer are more bottom-up in orientation and are sensitive to local knowledge. These include the following: *Development Support Communication (DSC); Rural-based Enterprise Development (RED); Farmers' Information and Technology Service (FITS); and Farmer-Scientist Bureau (FSB).*

The concept of *DSC* originated from the programs of the UN and Food and Agriculture Organisation (FAO-UNDP) starting in the late 1960s and was first introduced

in the Philippines in 1989. As indicated in the PCARRD-FAO/UNDP DSC documents,[124] the DSC Philippines aims to promote active participation of the community in development projects through the systematic use of need-based technologies packaged through appropriate communication techniques and channels.

FAO[125] identifies four essential stages of the DSC process: needs assessment or information gathering; decision making or strategy development; implementation; and evaluation. In *the needs assessment stage*, key development priorities are determined through field surveys such as rapid rural appraisal (RRA), community consensus, and interviews with field specialists and subject matter specialists. Media channels available to potential target groups are assessed and technology transfer inputs are checked if available. The *decision making or strategy development* phase leads to the identification of target groups and conduct of baseline knowledge, attitudes, practices survey and focus group sessions. During this phase, specific communication campaign objectives are set and multi-media mix and message design determined. The *implementation stage* is when an action plan is drawn up; prototype media materials are field tested, revised according to results and finalised; and training of field staff is conducted on the use and distribution of media materials and monitoring of the DSC process. During the *evaluation stage*, field evaluation at strategic points and impact evaluation surveys are carried out.

Appendix 4.4 gives a more detailed illustration of the DSC process featuring the specific case of DSC in Barangay Tacunan, Davao, Philippines. The DSC Philippines pilot projects use the community audio-tower system (CATS) as the lead medium in a multi-media communication campaign. CATS is a community-based communication facility managed and controlled by local broadcasters organised in each barangay.[126]

The *RED* process has been introduced and pilot tested by PCARRD in selected regional R&D consortia since 1992. RED aims to provide sustained developmental interventions in the countryside and facilitate the delivery of techno-based, market-led, environment-friendly and 'not dependent on dole-out' enterprises.

Based on the old concept of rural enterprise development and incorporating the experiences of the private sector, PCARRD, through a technical assistance project in 1991-

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[124] DSC, 'Project Document: PHI/87/006: Development support communication for selected agricultural technology transfer project in the regions', PCARRD, Philippines.

[125] FAO, 'Communication strategies for rural development: A case study of the use of campaigns in Lesotho', *Development Communication Case Study*, FAO, Rome, 1990.

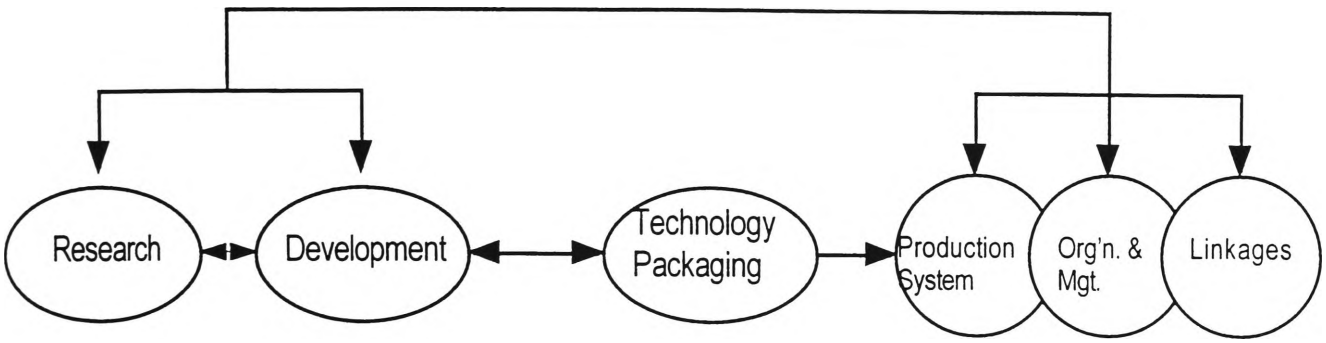
[126] Barangay is the smallest local government unit in the Philippines.

1992, developed a conceptual framework for RED strategy in the countryside **(Figure 4.4)**. In this framework, the process of putting agribusiness in rural areas is seen as involving technology development or R&D, technology packaging, and enterprise building. The RED framework emphasises that three requisites must be in place to establish a rural-based enterprise. These include the following: a production system with established input system and technology base (both indigenous and generated by R&D community) which has proven to be socially, technically, economically, environmentally and politically feasible; an organisation and management system, preferably a co-operative which can ensure the viability of the enterprise; and the necessary linkages such as credit, market, infrastructure, extension and training.

With the RED framework as guide, the RED delivery process provides three interrelated tools for enterprise planning, monitoring and evaluation. These include a gap identification tool called Quick Resource Appraisal (QRA), an intervention identification and decision-making tool called Risk Management Process (RMP), and Backward Resource Inventory System (BRIS) which is a tool for identifying basic assumptions for business plan. **Appendix 4.5** describes in more detail these RED tools.

The conduct of QRA, RMP and BRIS actively involves the target clientele and is facilitated by an interagency, interdisciplinary team organised by the regional consortia. A localised project management system is an essential component in the delivery of the RED process especially where co-operatives with limited loaning track record are involved. Through a localised project management office (LPMO), assistance is extended to target co-operatives or farmers' organisations in the packaging of business plans or feasibility studies, networking, and initial managerial start-up of the enterprises. Sustainability of the delivery systems can be assured by having LPMO mobilised and funded through a certain amount from the total enterprise cost (for example, 10% management fee if funding is from loans, or 10% administrative expense if coming from grants). The LPMO continues to provide interventions to the target co-operative until sustainability indicators jointly set by the two parties are achieved. With LPMO, co-operative members are having 'hands-on' training on enterprise management. In terms of funds coming from grants, the seed fund concept assures the return of borrowed funds by co-operatives for use in creating new enterprises.

A. Rural-Based Enterprise Development Process



Technology Generation

Technology Commercialization

Enterprise Building

B. Sectors/Institutions Participants

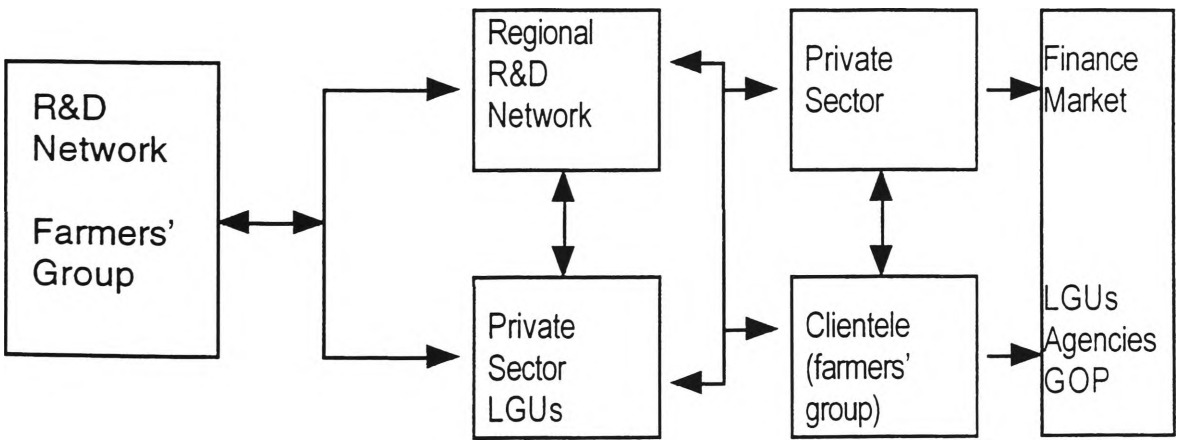


Figure 4.4 Conceptual Framework of the Rural-Based Enterprise Development

The delivery of the RED process requires the active participation of the NARRDN from where inter-agency and interdisciplinary teams of RED interveners could emerge, the private sector, co-operatives or farmers' organisations, LGUs and support institutions. An example case of RED application is discussed in **Appendix 4.6.**

The FITS and FSB were first launched by PCARRD in 1997.[127] FITS is a one-stop shop for research information and technologies, expert advice, and technology exhibits on agriculture, forestry and natural resources. It serves as a referral system for information on production inputs, credit, marketing and technical assistance. FITS caters to the information and technology needs of farmers, entrepreneurs, traders, processors and other clients in areas that are difficult to reach by extension services. FITS centres can be established at the provincial, or the municipal/city level, with the strong support of PCARRD and its regional consortia, through different modalities, namely the DOST-PSTC, the DA, the DENR, LGUS and the agricultural colleges and universities in the area. The FITS centres are provided with communication facilities, equipment, materials and experts. As of late 1997, there were 11 municipalities where FITS centres have been established.[128]

The FSB program involves the partnership between farmers, and scientists and other experts of PCARRD in research and technology development. It serves as a mechanism by which farmers are directly involved in the planning and implementation of agricultural breakthroughs. Through the FSB, demonstration farms will be established to showcase the successful experiences of model farms. These demonstration farms will be managed and operated by a group of outstanding farmer-leaders. FSBs will be established at the provincial level to manage the various model farms. They will be implemented closely with the 14 regional consortia, the Regional R&D Information Services (described under Databases in this section) and FITS.[129] During the last quarter of 1997, PCARRD was evaluating proposals for FSB from the regions.[130]

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[127] William Dar, *The Philippine National Agricultural Research System: A Catalyst for Economic Growth and Sustainable Development*, PCARRD, Los Banos, Laguna, Philippines, 1997, pp. 86-89.

[128] PCARRD, Strategy to enhance technology adoption, PCARRD, Los Banos, Laguna, Philippines, 1997, pp. 1-2, unpub.

[129] Dar, *The Philippine National Agricultural Research System, op. cit.*, p. 87.

[130] PCARRD, Strategy to enhance technology adoption, *op. cit.*, p. 2.

Applied Communication Strategy

The more traditional approach to disseminate technology transfer is the use of applied communication techniques. These include among others, technology publications, press releases, broadcasts, audio-visual production, trainings and seminars, and technical assistance. In addition, PCARRD develops instructional or 'how-to' materials to reinforce training programs for extension workers and farmers. Through PCARRD's Scientific Literature Service (SLS), it attends to the information needs of the research network, the SCUs and extension workers by providing document delivery services to 120 libraries in the network.

An innovative approach related to applied communications for technology transfer is the *Regional Applied Communications Program (RACP).* With the RACP concept introduced by PCARRD in 1979, Regional Applied Communication Offices (RACOs) have been established in the 14 regions of the country. RACO is a decentralisation strategy that allows R&D consortia to implement more localised communication activities to meet communication needs of specific regions. The RACOs produce publications and instructional materials, manage regional scientific and literature service, conduct training and establish mass media linkages to disseminate technologies generated by member-agencies. The RACOs are now institutionalised within the regional R&D consortia and as such operate through interagency sharing arrangement (in terms of manpower, skills, funds, communication facilities). PCARRD provides training and workshops to develop the communication skills and technical capability of RACO members.

Databases/Information Systems and other Support Systems

PCARRD has developed information systems that assist researchers, policymakers, planners and research managers in developing their strategies for R&D management and technology transfer. It has also introduced information systems that directly support the needs of the extension workers and agricultural producers such as the database in FITS.

The Agriculture and Resources Management Information System (ARMIS) provides the details of all the agriculture sectoral activities nationwide. The Research and Development Management Information System (RDMIS) highlights information on the new, ongoing and completed agricultural R&D programs and projects. The Research Information Storage and Retrieval System (RETRES) compiles the abstract bibliographies of all completed agricultural R&D projects. The Agriculture and Resources Regional

Technology Information System (ARRTIS) traces the levels of technologies generated by the NARRDN.

In support of the regional integrated R&D programs, PCARRD has provided and piloted a model for regional data gathering, processing, synthesis and integration. This information system, referred to as *Regional Research and Development Information Services (RRDIS) or one-stop-information-shop*, has been institutionalised, since 1995, within the 14 regional consortia to be hooked up to the national databases at PCARRD. As part of the institutionalisation process, the consortia were equipped by PCARRD with the necessary skills and equipment for the implementation of information management and data conversion strategies for sustained technology transfer activities and decision making. RRDIS involves the establishment of a Regional Information Service Office; the installation and maintenance of technology transfer related softwares and databases;[131] and the production of technology transfer materials. They complement the RACOs of the consortia. While the RRDIS are based in the regions, their counterpart units in the provincial and municipal levels are the FITS.

Other information technology (IT) programs include the Agricultural and Natural Resources Information Network (AGRINET) and the Mango Information Network (MIN). AGRINET, established in 1999, is an IT-based communication and information network nationwide. It is intended to electronically connect the NARRDN member institutions and PCARRD to facilitate information and technology exchange. MIN is a computer-based network with a central node at PCARRD Headquarters and four satellite nodes located in four provinces where mango is most abundant.[132] It is an information system specifically for the mango industry, the third most important fruit industry in the Philippines.

The DA has its own information systems and marketing support service for the agriculture sector. In 1998, the DA declared its plan to establish the National Information Network (NIN). The NIN intends to provide information and marketing services in agriculture and fisheries such as supply and demand data, price and price trends, product standards, directory of co-operatives, traders, key market centres, processors and business institutions involved, international, regional and local market forecasts and resource

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[131] May include information on R&D activities, manpower, facilities and technologies; statistical baseline databases; and information on producers, processors, market outlets, trainers and training packages.

[132] William Dar, *Building Partnerships and Capacities: A Centennial Achievement of PCARRD*, PCARRD-DOST, Los Banos, Laguna, Philippines, 1998, p. 86.

accounting data.[133] It will also include information on R&D activities and current available technologies in agriculture and fisheries.

Some other support mechanisms for technology transfer include the *Regional Symposium on Research and Development Highlights (RSRDH) and Regional Techno Forum.* The RSRDH was started in 1989 and coordinated by the regional consortia. It involves the annual review and discussion of technologies and significant information generated by the NARRDN. RSRDH serves as a venue to facilitate dissemination of technologies to farmers, and significant information to policy makers. This activity has been recently replaced by the Regional Techno Forum. The regional forum has basically the same objectives as the RSRDH but its implementing strategies are different. It is still organised by the regional consortium, but this time in collaboration with the local government units, and the regional and provincial agriculture and fishery councils. It focuses on the mature technologies generated by the consortia member-agencies. It is a mechanism for validating with the prospective clients the acceptability of the technologies presented.

Section 4.6 reveals the pervasiveness of the linear approach to agricultural research and extension in the Philippines. It points to the ways in which the government—having realised the limitations of the earlier versions of this approach (such as the T&V approach)—have gradually shifted to an R&E framework that considers farmers' participation in research and extension (such as the farming systems research approach). Despite these changes, the practice of research and extension has remained largely top-down in orientation. It seems that it is easier for these top-down approaches to fit the bureaucratic structure of agricultural R&E. It is only in recent years that the government agencies concerned have introduced approaches, such as RED, DSC and FSB, that provide clear mechanisms and a deliberate space for farmer participation, rather than just talk of participation with no mechanism. However, it is unrealistic to assume that these participatory approaches alone can meet the needs of the various clientele groups of the agricultural R&E system.

[133] Department of Agriculture Administrative Order no. 06, Series of 1998, *op. cit.*, p. 28.

4.6.2 The Private Sector and NGO Experience in Technology Generation and Transfer

The Private Sector

The private sector's involvement in agricultural development is generally profit-motivated, concentrating on activities in one or two or more aspects of the production process (such as primary production, processing and marketing). However, there are corporations that are also engaged in socially-motivated activities, where they support projects that intend to 'generate goodwill with no direct impact on corporate profitability'.[134]

Technology transfer and extension are not the deliberate intention of private agribusiness companies but often the outcome of product promotion and marketing. For instance, this can be done through the promotion of their products such as seeds and chemicals. To illustrate, San Miguel Corporation (SMC), one of the leading local agribusiness firms in the country, is engaged in the hybrid corn business. It has established a hybrid seed research centre and seed conditioning plant in Mindanao. After four years of research, it has released its first corn hybrid product line to corn growing areas in the country. As part of its promotion activities, it holds demonstration trials in farmers' fields and sponsors harvest festivals to showcase the benefits of growing hybrid corn. SMC conducts regular classes to update farmers on technological developments such as improved cultural practices.

Both local and transnational agribusiness corporations have introduced the practice of contract farming.[135] Contract farming can be considered as a form of technology transfer. As production units for agribusiness companies, farmers have access to the company's package of production technologies and are assured of a market for their produce. However, there are studies that show that little technology transfer takes place in this kind

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[134] Rolando Dy & Pacifico Chua, 'Private corporations in the Philippines: Their linkages with agricultural producers', in Aida Librero & Pablito Villegas (eds), *The Economics and Prospects of Agro-industrial Development in Southeast Asia*, Proceedings of the 7th Biennial Meeting of the Agricultural Economics Society of Southeast Asia (AESSEA), Makati Metro Manila, 25-28 May 1988, p. 129.

[135] In contract farming or growing, agribusiness corporations transfer the farm production process to independent farmers or agricultural co-operatives. Contract farming is an arrangement bound by a contact that stipulates the quantity and quality of a particular crop, the price for which the corporation will buy the harvest, and the right of the corporation to reject products that do not meet the standards. The corporation is usually in charge of marketing, financing, technical supervision, and provision of farm inputs while farmers are contracted to provide land and labour and to rent machinery. Cited in IBON Databank and Research Center Peasant Desk, pp. 3-4.

of arrangement. The corporation's technologies are usually designed for intensive, large scale production system that are not suitable for independent farming.[136]

There are some companies which have strong developmental and societal concern. For example, some companies sponsor the education in agriculture of deserving students from the rural areas. Others enter into partnership with farmer groups so that farmers will increasingly become integrated into industry. This is done by slowly involving the farmer groups into more value-added production such as semi-processing while the company engages in final product processing or moves up into higher value products. Private companies of this type are, however, very few in the Philippines.

Private marketing techniques are quite similar to those employed by public extension, namely farmers' meetings, demonstration plots and on-farm trials, field days, short courses for farmers, training of distributors and dealers, radio programs and information bulletins.[137]

Dy and Chua[138] presented illustrative examples of 'private sector-farmer linkages' in the Philippines. The following discussions focus on some of these cases.

The Ayala Agricultural Development Corporation (AADC) is one of the first companies to introduce a contract growing scheme in the Philippines. It has contract growing arrangements for hybrid corn seed production with farmers in Mindanao. AADC provides the technical know-how, supervision and inputs to its growers, who in turn render their labour and land for seed production. The basic research function is done by Pioneer Overseas Company. AADC buys all the harvest of contract growers at a pre-set price, from which advances on inputs, personal loans and interest were deducted.

Nestle Philippines Inc. is a joint venture between local investors and Nestle. As part of its Agricultural Assistance Program, coffee clonal garden and soya outgrowers scheme have been set up in Mindanao. Nestle propagates superior varieties of robusta coffee and sells them to interested farmers at cost. It provides free technical advice, training and educational/printed materials to farmers. Nestle also develops soya varieties that are adaptable to local climate and farming practices. Soya seeds, other farm inputs and technical assistance are then provided to cooperating farmers at cost.

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[136] IBON Databank and Research Center Peasant Desk, *op. cit.*, p. 119.
[137] *Ibid.*, p. 208.
[138] Dy & Chua, *op. cit.*, pp. 135-141.

RFM Corporation is one of the largest poultry integrators in the country. Starting as a flour milling company in 1957, it diversified into the feedmilling business and later expanded into breeding day-old chicks when it acquired exclusive franchise agreement with Peterson Industries, Arkansas, USA. Since then, the company has embarked on contract growing of poultry. RFM provides chicks, feeds, technical support and marketing assistance to farmer cooperators while the farmers provided land, buildings, light, water and medication.

San Miguel Corporation (SMC) is the largest food and beverage company in the Philippines. Its agricultural products include dressed chicken, animal feeds, hybrid corn seeds and shrimps for export. In the case of the shrimp farming industry, SMC trains growers and technicians in semi-intensive and intensive grow-out technology and serves as ready a market for their produce. Its extension staff and technicians provide advice to cooperators on farm design, construction and pond management.

The Paper Industries Corporation of the Philippines (PICOP) is the largest and only fully-integrated pulp and paper mill in the country. It maintains three forest concessions with a combined area of about 183,000 hectares in four provinces in Mindanao. PICOP relies on its forest concessions and independent farmers for raw materials requirements. It implements reforestation program that sustain the company's source of raw materials and maintain fertility of the forest lands. At one time, PICOP promoted the growing of fast growing tree species among its independent farmers by providing them with seedlings, technical know-how, and assistance in acquiring credit from the banks.

Pilipinas Shell Group of companies established the Pilipinas Shell Foundation in July 1982. Through the Foundation, scholarships are provided for the training of poor out-of-school youth to improve small farm productivity and management. The Foundation has established linkages with agencies involved in rural development to facilitate re-entry of graduates into their rural communities.

Much can be learned from the private sector research and promotion efforts. The strength of the private sector lies in its market-oriented research and extension. Private companies are more efficient in developing and promoting new products because of the active participation of their marketing personnel in all aspects of the business.

The private sector is credited for introducing a contract growing scheme that is claimed to be beneficial to the farmers in terms of access to market, credit and new

technologies. However, there may be problems with this kind of private sector-farmer linkage. Under contract farming, the relationship between a corporation and farmers is reportedly biased in favour of the corporation because it controls the production, technology and pricing of products.[139] Under this arrangement, corporations are said to make huge profits from the sale of prescribed farm inputs (such as feeds, chemicals and seeds) to the farmers, from cheap contract market price and from the one-sided quality control standards and procedures.[140] Other issues with the private sector-farmer linkage include bias of corporations for areas close to the markets, bias of some firms for large farmers because of the needed product volume and quality, and the perpetuation of monocropping.

The NGOs

The NGOs have their own technology transfer initiatives for countryside development. They have the ability to disseminate technologies to rural areas since they are the nearest grassroots contact. There are various umbrella organisations or federations that serve as networks of NGOs all over the country. As cited by Cacho,[141] in 1989 there were 91 members of the Association of Foundations (AF), 500 proponents of the Philippine Business for Social Progress (PBSP), and 47 members of the PhilSA (whose forte is research and training of labor organisations). Here, the cases of the Center for Rural Technology Development (CRTD) and the Foundation for Resource Linkage and Development, Inc. (FRLD) are discussed.

The CRTD was established by PBSP to promote and disseminate appropriate technologies to poverty groups. The PBSP is a non-stock, non-profit, non-governmental organisation supported and funded by Filipino corporations as their response to the social and economic problems of the country. It develops and assists private voluntary associations and rural NGOs to serve as the implementing arm of its socio-economic activities, one of which is CRTD.[142] CRTD's mandate involves technology testing and

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[139] IBON Databank and Research Center Peasant Desk, *op. cit.*, p. 123.

[140] *Ibid.*, pp. 123-128.

[141] Myrna Cacho, 'Concluding remarks', *PCARRD Book Series no. 101/1990: Technology Transfer for Sustainable Development*, Proceedings of the Dialogue among the Association of Foundations, DOST, PCARRD, and PCAMRD on Technology Transfer for Sustainable Development, PCARRD, Los Banos, Laguna, Phils., 15 November 1989, p. 73.

[142] Development Academy of the Philippines, 'An attempt at poverty alleviation: The PBSP Samar Island Program', *Countryside Development: The Journal for the CD Professional*, vol. 1, no. 1, January 1990, pp. 83-84.

verification and ensuring that poverty groups gain access to technology information, technical skills and resource institutions. It has become both a technology source and a resource, a source because of the results and experiences it has generated through technology testing and verification, and a resource because of its accessibility to poverty groups and their organisations. The various programs of CRTD include financial and technical assistance to NGOs and beneficiary organisations, training of officers and leaders of people's organisations in project organisation and technology management, provision of management consultancy to people's organisations, and publication and distribution of technical manuals.[143]

The FRLD assists small farmers, and small- and medium-scale entrepreneurs to form into economically viable producer associations. It provides management and technical assistance in business development, agro-processing, project feasibility studies and other business endeavours. It implements market promotion, market information dissemination and market linkage development programs.[144]

4.6.3 The State Colleges and Universities Experience

State Colleges and Universities (SCUs) in the Philippines perform three major functions: education, research and extension. There are two ways in which research findings or technologies generated by universities are disseminated and transferred to the end users. Technology transfer is done through extension and rural development programs, and/or technology commercialisation activities. Extension programs generally involve training, information dissemination (such as publications), action research (initiatives designed to produce both social change and research insights) and technical assistance through university experts and specialists.[145] The rural sector or small agricultural producers are the main target clientele. The technology commercialisation approach is more business-oriented and is directed towards the industrial sector—the agribusiness sector and small- and medium-scale enterprises. The technology transfer strategies of two leading agricultural universities in the country, the University of the Philippines Los Banos (UPLB) and Central Luzon State University (CLSU), are discussed in this section.

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[143] Ramon Derige, 'NGOs strategy for technology verification, packaging, and dissemination: The CRTD experience'. Keynote speech, LBSC-NSTW Celebration, PCARRD, Los Banos, Laguna, 1991.

[144] FLRD Brochure.

[145] Corazon Azucena (ed.), *Rural Development Designs and Approaches: UPLB Experiences*, Office of the Director for Extension, UPLB, College Laguna, Philippines, 1991, p. 3.

In UPLB, the Office of the Director for Extension is responsible for coordinating extension activities.[146] The different colleges and departments perform the actual extension, promotion or dissemination activities for their respective technologies. Each of these units allot a certain proportion of their annual budget for extension purposes. Through extension projects, faculty and staff-members work directly with the rural people in pilot testing and demonstrating innovations. Technologies and extension techniques that proved successful in the pilot stage are usually recommended for wider adoption by appropriate government and non-government agencies. Extension projects include among others formal and non-formal training, communication media utilisation, formation of co-operatives, marketing, integrated rural development with focus on economic and social development of selected area, specialist support services, and others.

One example of UPLB's innovative extension approach is called Farmers and Scientists for the Development of Agriculture or what is locally called MASIPAG. The MASIPAG approach links farmers and scientists in the development of improved traditional rice varieties. It was first introduced in 1986 to develop traditional-based rice varieties that required less chemicals at acceptable yield levels.[147] MASIPAG was an attempt to lessen the dependence on the high yielding rice varieties widely distributed during the Masagana 99 period. Through the MASIPAG, 100 improved traditional varieties of rice seeds have been developed. It was observed that there was better acceptance by the farmers of the technologies developed.[148] Conversely, the scientists involved gained a better understanding of the farmers' needs.[149]

UPLB promotes the commercial use of its technologies through the Business Affairs Office and the UPLB Foundation.[150] The Business Affairs Office is responsible for managing the various income generating projects of UPLB. It performs market research and pre-feasibility studies to confirm the commercial viability of technologies generated by university units. The UPLB Foundation is a non-stock, non-profit organisation that initiates, manages, finances and conducts technology commercialisation activities.

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[146] *Ibid*, pp. 2-3.

[147] Congressional Commission on Agricultural Modernization - Standing Committee on Technology, 'Committee Report: First Draft, *op. cit.*, p. 33.

[148] *Ibid.*

[149] *Ibid.*

[150] Louie Divinagracia, M. Garcia and H. Custodio, 'Commercialisation of the results of research projects at the UPLB through strategic alliances with industry', *Research Management Components*, vol. 6, nos 1 & 2, December 1992, pp. 46-73.

Technology commercialisation in UPLB is implemented through the following mechanisms: joint-venture with the private sector; tie-up with government agencies; and direct extension to small and medium-scale enterprises.[151] Most technologies commercialised through joint venture with the private sector are in the areas of agro-biotechnology. The UPLB Science and Technology Park, which is currently under construction, is a 22 to 42 hectare S&T complex that will offer spaces for companies and technology-based businesses. It is intended to facilitate the transfer of UPLB technologies to the private sector. These companies will have access to UPLB's scientific and technological expertise and laboratory equipment and facilities.

CLSU has its own technology dissemination and utilisation mechanisms, three of which will be cited in this section.[152] The Barangay Integrated Development Approach for Nutrition Improvement (BIDANI) is a social innovation implemented at the grassroots level via an organisational machinery which allows greater participation of the different sectors of the community. It utilises multi-disciplinary, bottom-up planning and an integrated development approach at the community level. It mobilises the indigenous agents of change who act as liaison of the program in their respective barangays. Through the Regional Applied Communication Office (RACO), the following technology transfer activities are being pursued: localised publications; preparation and production of instructional materials; development of audio-visual production; radio broadcast; indigenous media production; trainings; and workshops related to communication and social research projects. Through the Volunteers Experts Program, free expert advisory and consultancy services are provided by the university's scientists and technologists to municipalities within the service area of CLSU. The scientific and technological experts help identify development constraints and opportunities, and assist in the planning and implementation of livelihood projects in various municipalities.

4.7 Impact of International Research and Donor Agencies on Technology Transfer Approach

International research and donor agencies have a strong influence over the structure and activities of the national agricultural research and extension system. These institutions

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[151] *Ibid.*, pp. 47-48.

[152] Bessie Burgos & Aurora Paderes, Utilising information for extension in agriculture and natural resources: Some insights from the Philippines, *Information Dissemination: From Researchers to Users,* IBSRAM Proceedings no. 13, Bangkok, 1994, pp. 9-11.

have provided considerable resources in terms of loans and grants[153] (often with Philippine counterpart funding) to various agricultural research and extension institutions in the Philippines. For instance, approximately US$40 million worth of loans and grants were generated by the PCARRD from various foreign sources during the period 1972-1992 in support of research and development activities of the NARS.[154] The USAID provided US$6 million loan for the Agricultural Research Development Projects from 1972 to 1984.[155] These were projects that developed the capability of major research centres of the NARRDN and selected regional R&D consortia. Counterpart funds from the Philippine government for these projects amounted to US$10 million. As for more specific examples, the World Bank has assisted the Philippine government in the development of research and extension services starting in 1978 when it approved a loan for the National Extension Project (NEP). It provided another loan of US$20 million for the period 1981-1991 to the DA for smallholder agriculture development through the project entitled 'Agricultural Support Services Project (ASSP).[156] The USAID supported the integrated social forestry program of the Philippines (ISFP). In 1989, it provided US$25 million to the DENR for the implementation of the Natural Resources Management Project (NRMP).[157] **Appendix 4.7** describes other major agricultural R&E programs and projects of the NARRDN that were outcomes of the bilateral funding arrangements between the Philippine government and the foreign donors.

Funding or donor agencies have much say on the institutional structure, direction and activities of the recipient agencies in the Philippines. USAID, for example, granted another US$25 million (spaced over five years starting 1992) to the Philippine government to fund a major institutional innovation—the creation of an environmental foundation called the Foundation for the Philippine Environment.[158] In the case of the World Bank

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[153] *Loans* are funds provided by donors with a commitment by the recipients to repay while *grants* are funds that do not involve commitment to repay. Cited in S. Tisch and M. Wallace, *Dilemmas of Development Assistance: The What, Why, and Who of Foreign Aid*, Westview Press, Boulder, San Francisco, 1994, p. 43.

[154] PCARRD, 'Resource generation for agriculture, forestry and natural resources R&D', *Information Bulletin*, no. 27, Philippine Council for Agriculture, Forestry, and Natural Resources Research and Development, Los Banos, Laguna, Philippines, 1993, p. 3.

[155] PCARRD, 'Resource generation for agriculture, forestry and natural resources R&D', *Information Bulletin*, no. 11, PCARRD, 1986, p. 6.

[156] Operations Evaluation Department, WB, 'Draft performance audit report re: Philippines---Agricultural Support Services Project (Loan 2040-PH)', World Bank, October 1995, p. 5.

[157] Frances Korten, 'Questioning the call for environmental loans: A critical examination of forestry lending in the Philippines', *World Development*, vol. 22, no. 7, pp. 978.

[158] *Ibid.*, p 979; The Foundation for Philippine Environment's mandate is to make grants to environmentally oriented NGOs, communities, and training institutions.

funded ASSP project, it influenced some major structural changes in the DA and NARRDN in general. Regional Integrated Agricultural Research Centers (RIARCs) and their satellite research stations were established. Provincial research teams of research and extension personnel were organised and had been conducting on-farm research with farmers until they were dissolved during the reorganisation of the DA in 1987.

The farming systems research approach is an external concept that have been institutionalised as a result of this bilateral program funding arrangement. FSR concepts and strategies were institutionalised within the DA's policies, programs and projects. Through the same project, the Farming Systems and Soil Resources Institute (FSSRI) and National Seed Foundation were created under the UPLB. The National Seed Foundation is an income-generating unit that could finance its operations from the sale of seeds and vegetative material. During the ASSP re-design in 1985, the WB pushed for the implementation of the T&V extension methodology which was started under NEP in 1978. This was promoted by WB despite the lack of interest on the part of the DA. Consequently, this project component became unsuccessful as it did not gain local support.[159] Likewise, frequent changes in the national government officials and structure had seriously affected the progress of ASSP project. Local funding constraints also hindered attempts at sustaining some of the activities and maintaining facilities related to the project.

Merill-Sands and Kaimowitz[160] refer to Bernardo's case studies of 1989 about the impact of foreign donors on technology development and transfer in the Philippines. In the case of seed potato production, there were two foreign agencies involved in developing and funding seed production technologies. They had their own respective national partner agencies. Accordingly, the 'uncoordinated support' provided by these foreign agencies to their counterparts resulted in 'competition rather than collaboration or linkage' between institutions.[161] Another example presented was on 'soil improvement and erosion control program'. In this case, the foreign donor helped a local university to prepare a 'farming systems development project' through Cornell University. Cornell worked closely with the local university and relevant government agencies. The product of this collaboration was the creation of a Farm Resources Management Unit within the local university. This unit now serves as a venue in which linkage between agencies concerned are sustained. This

[159] Operations Evaluation Department, WB, *op. cit.*, pp. 11, 14, 39.
[160] Merill-Sands & Kaimowitz, *op. cit.*, pp. 24-26.
[161] *Ibid.*

study illustrates the need for foreign donors to carefully study the national R&E system to determine their appropriate entry points and the necessary linkage mechanisms that must be put in place. It is also important to investigate other foreign donors' projects to avoid duplication of efforts.

The NARRDN has benefited from partnerships with the national agricultural systems (NARS) of other countries through programs such as exchange of scientists and training, and joint R&D projects. However, there were experiences of lop-sided relationships where benefits accrued more to the outside NARS.[162] This was a lesson that led PCARRD to devise a more systematic procedure for prioritising the areas covered by the linkages.

Collaborations with IARCs and the CGIAR have contributed to the building up of research capabilities of R&D manpower in the Philippines through workshops, conferences, study tours and training. Other benefits derived from these linkages are the following: germplasm exchanges and improvements (such as the case in which the superior corn genetic materials collected from CIMMYT have increased the yield expectations of UPLB breeders); improvement of R&D activities; and sharing of knowledge and information through scientific journals, research papers, scientific literature service, direct scientist-to-scientist consultations and other formal and informal channels of communication.[163]

The partnerships of the Philippine NARS with the advanced research institutes (ARIs) have generally contributed to the country's agricultural development. For instance, one of the most successful linkages with ARIs is with ACIAR. It resulted in the development of technology for 'drying in bulk storage of high moisture grains' in tropical climates; transfer of new technologies in rice-based farming systems; and the development of technologies in banana, mango and other tropical fruits, and coconut-based farming system.[164] Linkages with ARIs also resulted in the development of information systems for specific commodities and technical assistance. The ARIs and their host countries have also benefited from the linkages with the Philippine NARS as would be expected of international mutual collaborations.

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[162] Dar, *State of Affairs of PCARRD Partnerships with National and International R&D Institutions, op. cit.*, p. 26.

[163] *Ibid.*, pp. 46-50.

[164] *Ibid.*, p. 52.

4.8 Major Commonalities and Differences of Technology Transfer Approaches and Strategies

As an initial attempt at comparing the different technology transfer approaches, this section focuses on three mechanisms, namely the farming systems approach, DSC and RED as strategies for agricultural research and technology transfer.

4.8.1 Commonalities

These three mechanisms adhere to common concepts and principles, namely a participatory or need-based approach to development, an interdisciplinary/interagency team approach, a holistic or systems-oriented approach, and integrated resource management. They all employ rapid appraisal methodologies for needs assessment (such as rapid resource appraisal in the case of FSR and DSC, quick resource appraisal in RED). All three mechanisms apply the strategy of providing intervention but differ in the level of intervention and manner by which this is delivered. They also consider training of interveners and beneficiaries as a major component of their respective delivery systems. Both RED and DSC acknowledge the importance of farmers' organisations or co-operatives in providing a strong base for enterprise building and community development, respectively.

4.8.2 Differences

Differences among the three approaches are noted in terms of their focus, purpose, direct beneficiaries and interventions and potential impact **(Table 4.4).**

There are also differences in terms of the sustainability of the approaches. FSR is adopted by the DA and other research institutions in their programs. But these efforts remain government initiated and funded. The 'weaning' process seemed to be inadequate if not lacking. With DSC, when people are trained and socially prepared for changes or progress, sustainability in the hands of the community may be assured. The RACOs are expected to continue giving support and technical assistance. In RED, there is a system for providing sustained intervention to co-operatives through localised project management office (LPMO). With LPMO, co-operative members could serve as 'under-studies' of the LPMO staff.

Table 4.4 Differences among FSR, RED and DSC.

Area/Approach	FSR	DSC	RED
Direct beneficiaries	Farmer and his family	Whole community or co-operative	Farmer-co-operatives/ associations Partner private sector (if any)
Direct interventions	On-farm research-extension	Need-based communication strategies	Enterprise development
Purpose	Develop and test site-specific technologies to improve efficiency of the farming systems of the whole farm	Develop social skills and values of the whole community thru appropriate and effective communication strategies	Develop and improve rural-based enterprises which are techno-based, market oriented, and not dependent on dole-outs thru the RED integration process
Potential Impact	Increase in yield, productivity and income	Create positive changes in all aspects of the rural people's lives	Create savings that will increase local capital build-up Sustained economic intervention

Source: B. del Rosario, B. Burgos, L. Oliva, and N. Llemit, Complementation between the farming systems approach and some new initiatives for rural development: The Philippine experience, paper presented during the International Symposium on 'Systems-oriented research in agriculture and rural development', Montpeller, France, 21-25 November 1995, p. 22

4.8.3 Possible Complementary Areas

The three approaches can complement each other's strengths and weaknesses. The DSC approach is a social preparation process that makes a community ready to take responsibility over livelihood projects. The success of RED or enterprise building will be enhanced in this kind of situation. Farming systems research makes available location-specific technologies that can support the technological needs of enterprise building. The farming systems approach and DSC can provide a favourable and conducive environment for rural enterprises.

There are areas of complementation among the other technology transfer approaches and strategies. The FITS, other support databases and information systems, and the marketing information service described in section 4.6.1 will facilitate the development and improvement of rural-based enterprises. The information technology-based systems installed at the provincial and municipality levels have the best potential for providing the information needs of the small farmers and rural enterprises. The experiences in the implementation of action projects, and the UPLB's MASIPAG approach have contributed to the shaping of the farmer-scientist partnership concept of FSB.

4.9 Conclusion

This chapter illustrates that innovations in agriculture have vast potential to increase agricultural outputs. However, there exists a wide gap between the potential yields based on research, and the actual farm outputs. I have argued that appropriate extension and technology transfer activities are important to narrow these gaps. This chapter shows that agricultural R&D and extension alone will not lead to agricultural development. Other imperatives to improve the rural sector include credit, irrigation systems, rural roads and transport, postharvest facilities, market information, an effective IPR system and others. However, as argued in chapter 3, the government policies in the past were biased against expenditures on these agricultural productivity enhancing services, including R&D and extension. This bias reflects the present condition of the agricultural sector and support services discussed in section 4.2.

The history of the Philippine agricultural R&E system has been dominated by the top-down approaches to research and extension, where technologies and information were assumed to flow from the R&D community to the users in a linear fashion. However, in recent years, there has been a growing consciousness among key agencies involved to

develop and use innovative approaches to agricultural R&D and extension. Therefore, new approaches to agricultural R&E, such as RED, DSC, FITS, FSB and other similar strategies and policies, have emerged. This consideration of new approaches by the government agencies concerned is in part caused by the repeated failures of the top-down R&E programs to help achieve broad-based agricultural development.

Recent agricultural R&D and extension policies and strategies introduced by government agencies concerned have more room for participatory or bottom-up approaches. However, the speed with which these approaches have gained recognition and adoption by the agricultural R&D system has been constrained by funding and the institutional complexities and difficulties within the system. New linkage mechanisms to overcome these difficulties have been recently instituted. However, their implementation has not been long enough to impact on the delivery of agricultural R&D and extension.

A closer scrutiny of some of the technology transfer approaches in this chapter reveals possible areas of complementation among them. These elements tend to converge towards the development of rural-based enterprises. A new dimension in agricultural support services that can enhance the performance of rural enterprises is the provision of enterprise management support to co-operatives. This strategy gives credibility to co-operatives that are otherwise viewed by financial institutions as generally non-bankable. The chances of co-operatives obtaining loans from banks will be increased if there is this kind of management or mentoring support.

An analysis of the extent to which the theories and models covered in chapter 2 explain the technology transfer strategies of institutions involved in the R&E system is presented in chapter 10.

CHAPTER 5

AGRICULTURAL CO-OPERATIVES: ISSUES, DILEMMAS AND CHALLENGES

5.1 Introduction

The previous chapters dwell on the theoretical, political economy and structural contexts of technology transfer with emphasis on the agriculture sector in the Philippines. They consider the global and national landscape within which technology transfer operates. This chapter extends the contextual analysis of technology transfer by examining the history, nature and behaviour of agricultural co-operatives. Agricultural co-operatives are practical sites for the study of technology transfer in the context of organisations and interorganisational relations. They have been involved in major development programs of many developing countries. Since the 1950s, agricultural co-operatives in the Philippines have participated in the implementation of rural credit programs, agrarian reform policies, and other agricultural development programs of the government. They have rich experiences from which lessons can be drawn on agricultural technology transfer. In this thesis, three co-operatives are the subject of empirical studies of technology transfer at the field level. These studies are presented in chapters 7 to 9. This chapter examines agricultural co-operatives to better understand the organisational complexities of co-operatives in the case studies.

This chapter includes the following: a brief history of the development of co-operatives; a discussion on the extent to which governments accept and support these forms of organisation in developing countries; selected experiences on agricultural co-operatives of developing countries in general, and the Philippines in particular; the factors influencing the success and failure of agricultural co-operatives; the various motives of sponsoring or intervening institutions in the formation of co-operatives; and the dilemmas and challenges faced by agricultural co-operatives. The question of whether co-operatives in the Philippines measure up to the universally accepted ideals of co-operatives is partly dealt with in this chapter. Examples from my case studies in the Philippines are highlighted in certain parts of this chapter to clarify some of the discussions and arguments put forward.

Agricultural co-operatives in the developing countries are in general initiated and coordinated by their governments. This chapter observes that when government programs and policies encourage participation and democracy, co-operative members tend to be more responsible. When the activities of agricultural co-operatives are controlled directly and in detail by the government, they do not develop into independent rural organisations.

In the Philippines, a flawed framework dominates the history of co-operative development. Agricultural co-operatives during the 1950s, 1960s and 1970s were mainly used as channels for credit delivery and for collecting land amortisation from farmers covered by the agrarian reform program. There was little consideration for whether the co-operatives were developing their capabilities to manage their own affairs. This practice did not encourage the co-operative members to develop a sense of ownership and accountability for their organisations' operation and activities. In general, co-operative members became credit-oriented and had developed the dole-out mentality, characteristics that would not make their co-operatives suitable vehicles for technology transfer.

I contend that whether initiated and/or funded by public, private, non-government organisations, farmer organisations, or foreign donor, agricultural co-operatives are better instruments for rural development and technology transfer when they focus on building the capability of members/communities to make their own decisions, to solve their own problems, and to translate or absorb technologies into productive enterprises. The role of government remains crucial to co-operative development. Their laws, policies and programs can either facilitate or constrain the growth of co-operatives. These policies must be enabling and facilitating of the co-operatives ability to become independent, more capable, more sustainable local institutions. These would prepare the co-operatives to carry on and sustain rural development long after any project or program is finished.

Overall, this chapter argues that the durability or fragility of agricultural co-operatives as mechanism for rural development is contingent on government policies (whether enabling or constraining), the attitude of service providers or interveners (whether that of assistance or dominance), the degree of commitment and participation of members, the management capability of co-operative officials, and access of the co-operative members to resources.

5.2 Background and History

Co-operatives of different kinds and types have played a significant role in the quest of many developed and developing nations to achieve economic growth, and a more equitable and democratic society. Agricultural co-operatives, in particular, have been instrumental in the success of both government-directed and revolutionary agrarian reform programs. They have become common institutional forms in the agriculture sector of many developing countries. The creation of co-operative organisations seems to favour the marginalised status of many farmers and agricultural workers in these countries. Such institutions are generally considered as vehicle through which small farmers can take advantage of economies of scale and compete with capitalistic enterprises.[1] However, in the long history of co-operative development, there have been many discouraging results, for reasons that vary from the internal dynamics of co-operatives to the decisions and actions of agencies that introduce and sponsor them. Despite the many failures of various co-operatives, this organisational form has prevailed and continues to be regarded as a viable option for broad-based social and agricultural development. Co-operatives involve a large number of people in development and are difficult institutions to organise and manage but, when they succeed, can lead to more equitable distribution of developmental benefits and national wealth.

Co-operation is defined as any joint or collaborative behaviour that is directed towards an end and in which everyone involved has common interest or hope of reward.[2] Co-operatives are organisational forms that have developed from the social philosophy of co-operation. Defined by the International Co-operative Alliance, a co-operative is 'an autonomous association of persons united voluntarily to meet their common economic, social, and cultural needs and aspirations through a jointly-owned and democratically-controlled enterprise'.[3]

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[1] June Nash and Nicholas Hopkins, 'Anthropological approaches to the study of co-operatives, collectives, and self-management', in June Nash, Jorge Dandler & Nicholas Hopkins (eds), *Popular Participation in Social Change: Cooperatives, Collectives and Nationalized Industry,* Mouton, the Hague, Articles published for the 9th International Congress of Anthropological and Ethnological Sciences held in Chicago, 1973, p. 12.

[2] Robert Nisbet, 'Co-operation', *International Encyclopedia of the Social Sciences*, vol. 1, 1968, p. 384, quoted in John Craig, *The Nature of Co-operation*, Black Rose Books, Montreal, 1993, p. 11.

[3] International Co-operative Alliance (ICA), 'What is a co-operative', gopher://gopher.adp.wisc.edu.70/00/.info-source/.coop/.def-hist/.def/.what-is, 08 January, 1996, accessed on 02 June 1998.

The co-operative movement started in Europe in the early part of the nineteenth century in reaction to the socio-economic problems existing during this period.[4] The European working class was confronted with problems of low wages, rising cost of living, unemployment, and inequitable distribution of income and wealth. These conditions in Europe led its leaders and intellectuals to search for solutions, with co-operation explored as one of the approaches. Various co-operative organisations and communities were established to put the co-operative principles in practice. Since then, co-operatives have evolved around the world and varied considerably in form. Co-operatives have been proposed or regarded as alternative organisational forms to promote greater social participation in a range of different societies and historical settings. For instance, many consumer co-operatives were created during the height of consumer movements in Europe between 1844 to World War I. These co-operatives were established to meet the desire of members to obtain necessary goods at lower prices. Agricultural marketing co-operatives and savings and loans co-operatives were also started during this period in Germany. These credit co-operatives were meant to solve the problem of usury and act as agents for the bulk purchase of agricultural requirements. Worker-organised production co-operatives were also set up, particularly in France.[5]

The period from World War I to the 1950s saw the development of co-operative communities as people experimented with new ways of working and living together.[6] Examples of these comprehensive co-operative communities are the *Kibbutz* or collective settlement, and *Moshav* or co-operative smallholders' settlement, both in Israel.[7] In the *Kibbutz*, private property was abolished; thus everything was owned by the organisation. Agricultural land was rented on a leasehold basis and cultivated, with the produce sold collectively. Cash was then shared equally among those who cultivated the land. In the *Moshav,* the individual family units formed the basis of the co-operative.

After World War II, co-operatives were established by many independent governments as one of the means by which their countries could attain socio-economic development. Co-operative organisations were created by most of these governments with assistance from 'outside experts' through bilateral aid programs and volunteer groups

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[4] John Craig, *The Nature of Co-operation*, Black Rose Books, Montreal, 1993, p. 1.

[5] *Ibid.*, p. 33.

[6] *Ibid.*, pp. 34-35.

[7] Co-operative Development Authority (CDA), 'Module III - Beginnings and philosophy of co-operatives, Training Manual', CDA, Philippines, 1994, p. 46.

including Church missionaries from the USA and other countries.[8] By end of the 1960s, service co-operatives in most industrialised countries formed ties with the international business community.[9] Studies of co-operatives, such as those undertaken by the United Nations Research Institute for Social Development (UNRISD), showed that by end of the 1970s, most government-directed co-operatives tended to reflect the government's ideology, and there was no sense of ownership among the members.[10] During the period of the 1980s to the present, many forms of co-operatives have emerged out of people's initiative. The move towards privatisation of many government-sponsored activities and reductions in government spending in the 1980s encouraged the formation of people-initiated co-operatives as a way of continuing services no longer provided by the government.[11]

5.3 Co-operative Values and Principles

The 'value base' of co-operatives is shaped by the inherent principle of co-operation and the aspirations of the people who organise them.[12] In the 1960s, an attempt was made by the International Co-operative Alliance (ICA)[13] to review the values and principles of co-operatives in different types of societies in different political and economic conditions.[14] The review identified the common values and principles as they were advocated and applied by co-operatives all over the world. In 1995, during the ICA congress and general assembly held in Manchester, the 1966 *statement of co-operatives' values and principles* was updated and adopted by ICA members. Co-operatives, based on this new document, are said to be founded on the values of self-help, self-responsibility, democracy, equality and solidarity.[15] The current universally-recognised principles by which such co-operatives put their values into practice are the following: voluntary and

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[8] Craig, *op. cit.*, p. 38.

[9] *Ibid.*, pp. 38-39.

[10] *Ibid.*, p. 39.

[11] *Ibid.*, p. 40.

[12] *Ibid.*, pp. 41-42.

[13] The International Co-operative Alliance (ICA) is a non-government association that acts as catalyst and coordinator of the co-operative movement in most of the world. It gathers, assists and represents the interests of some 226 organisations or more than 760 million people from more than 101 countries. The Philippines is represented in ICA by the National Confederation of Co-operatives.

(Sources: ICA, 'What is the ACI?', http://coop.org/fr/introF.html, accessed on 02 June 1998; J. M. Rana, 'ICA Membership from developing countries', gopher://wiscinfo.wisc.edu:70/00/.info-source/.coop/.orgs/.ica/.pubs/.review/.vol-88/.member, accessed on 02 June 1998)

[14] *Ibid.*, p. 41.

[15] ICA, *loc. cit.*

open membership; democratic member control; member economic participation; autonomy and independence; education, training and information; co-operation among co-operatives; and concern for community **(Appendix 5.1).**[16] Co-operation is a social process and therefore is influenced by the socio-economic perspectives and cultural background of the co-operative sponsors, co-operators, and members. This issue is dealt with later in this chapter.

5.4 Types, Kinds and Categories of Co-operatives

Different types of co-operation may emerge under various social settings.[17] These types of co-operation have been identified by Craig[18] as follows: a) automatic co-operation, that is joint efforts of an impersonal nature which take place between individuals in physical proximity to each other;[19] b) spontaneous co-operation within close personal forms of association such as within a family or neighbourhood; c) traditional co-operation based on the customs of the people;[20] d) directed co-operation, which is facilitated by an organisational hierarchy such as the government; and e) contractual co-operation, in which co-operation is both voluntary and formalised among a group of individuals who agree to work together towards the achievement of a common goal.

Co-operatives can be classified by the functions and services they perform, as follows: credit; consumer; producer; marketing; service and multipurpose. *Credit co-operatives*, or savings and loans associations, encourage thrift among their members by paying interest on members' savings. They create funds in order to provide loans to members for productive and provident purposes. Credit co-operatives are particularly important in agriculture where financial institutions are not available and informal sources of credit are exploitative. *Consumer co-operatives* procure and distribute commodities to members and non-members. These co-operatives can lower prices by bulk buying of commodities or services. *Producer co-operatives* undertake joint production with the product of organised work divided on some equitable basis among the member-workers.[21] *Marketing co-operatives* engage in the supply of production inputs to members and try to

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[16] *Ibid.*

[17] Nisbet, *op. cit.*, pp. 385-386, quoted in Craig, *op. cit.*, p. 11.

[18] Craig, *op. cit.*, pp. 11-14.

[19] e.g. People queuing at bus stops.

[20] e.g. Rice terraces estimated to be more than 100 square miles in area in Ifugao, Philippines, developed since 3,000 years ago as an outcome of the co-operative work of the indigenous people in Ifugao.

[21] Nash and Hopkins, *op. cit.*, p. 11.

provide better prices for members by grading, processing and transporting products in common, or by storing and selling them when the price is more favourable.[22] *Service co-operatives* are involved in medical and dental care, hospitalisation, transportation, insurance, housing, labour, electric and power, communication and other services. *Multipurpose co-operatives* combine two or more activities of the aforementioned types of co-operatives. Multipurpose co-operatives are now fairly common in the agriculture sector, handling credit, agricultural inputs and marketing, and in some cases including consumer goods. In the Philippines for instance, almost 66% of registered co-operatives nationwide in 1994 were classified as multipurpose, agriculture-based co-operatives.[23]

Co-operatives can also be categorised by structure or scope, ranging from simple organisations operating independently, called 'primaries', or they can be federated into larger more complex organisations linking primary co-operatives together, termed as 'secondary' or 'tertiary'.[24] They can also be classified according to the main objectives. Co-operatives can have purely economic objectives with material gain of their members as primary consideration, or they can have socio-political goals such as the use of co-operatives as instruments for social change or advancement of political reforms. Co-operatives also vary according to type of membership. They can be exclusive to a particular group of people (e.g. farmers' co-operative) or they can be open to anybody who agrees to accept the terms of membership such as contributing a specified share to become a member. Co-operatives can be categorised according to whether they were initiated by their members on a voluntary basis or by government or private voluntary groups. While there are many studies indicating that co-operatives initiated by the people have been generally more successful than government-directed ones, it is difficult to draw boundaries on this basis. Co-operatives formed by their members may become co-opted by the government through some economic or legal means, while those set up by government may become quite independently run by its members.[25] Whether co-operatives are initiated

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[22] Norman Uphoff for the Rural Development Committee Cornell University, 'Local institution development for agriculture', *Local Institutional Development: An Analytical Sourcebook with Cases*, Kumarian Press, Connecticut, 1986, p. 128.

[23] IBON Philippines, 'Co-operatives: At the grassroots of development', *IBON Facts and Figures*, vol. 18, no. 4, 1995, p. 2.

[24] Primary co-operative is composed of individual members; secondary co-operative involves the partnership of two or more primary co-ops; and tertiary co-operative refers to co-operative federations and unions.

[25] Uphoff, *loc. cit.*

from the 'top' or 'below' does not matter as much as accountability, whether members see themselves as responsible for their own actions or not.[26]

5.5 Why Co-operatives?

Co-operatives have been established for a variety of reasons—as alternatives to private businesses and state-owned enterprises in Western countries, as instruments for involving people in new economic activities, and for securing local ownership of industries from colonial control in developing countries. During the early days of co-operative development in Europe, many co-operatives were formed by social movements out of shared discontent and frustration over their harsh living conditions. Co-operatives in a variety of structures and purposes were created for immediate self-help. They played a major role in rebuilding the economies of Europe and North America. Their contributions to these economies were as follows: breaking monopolies and international cartels; elimination of windfall profits by returning surplus back to users of the business rather than to owners of capital; elimination of middlemen; decentralisation of decision-making; more equitable distribution of wealth; and less vulnerability to market manipulation (e.g. transfer pricing) by multinational corporations as co-operatives have a share of the industry at each stage in the processing chain.[27] In some countries of Africa and Asia, co-operatives were introduced by colonial governments as part of the colonialist policy of social change or to keep existing forms of local institutions intact.[28] For example, in Singapore, co-operatives were formed by the British Colonial government through the Straits Settlements Co-operative Societies Ordinance in January 1925. The main purpose of this policy was to help out the employees of the colonial government whose morale and work efficiency were seriously affected by the indebtedness problem brought about by inflation. Thrift and loan, and credit co-operatives were thus encouraged.[29]

In the long history of the co-operative movement, central governments of many countries have promoted the formation of co-operatives for various motives. Some governments saw in co-operatives a bureaucratic structure through which the central

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[26] *Ibid.*, p. 129.

[27] Craig, *op. cit.*, pp. 93-100.

[28] Fals-Borda *et al.*, 'The crisis of rural co-operatives: Problems in Africa, Asia and Latin America', in Nash, Dandler & Hopkins, (eds), *op. cit.*, p. 452.

[29] R. O. Daniel, *Co-operative Societies in Singapore 1925-1985*, Singapore National Co-operative Federations Ltd., 1986, p. v.

government could reach and increase control over the rural areas. Other governments encouraged co-operatives to ensure that the excess production of agriculture would be channelled to the national capitalistic society. In other cases, co-operatives were envisioned as means through which rural people could be mobilised against some enemy of the government (e.g. monopolistic business, either foreign or domestic).

Co-operatives could also be promoted for broad-based social change.[30] For example in China, during the rule of Mao in the 1950s, Chinese peasants were collectivised.[31] Their agricultural lands were pooled together into directed production co-operatives with farm work done collectively by teams. In 1958, during the 'great leap forward', these co-operatives were integrated into large rural communes combining the political and economic organisations in the rural areas. Each commune was conceived as a microcosm of China's transformed society.[32]

Conversely, there were cases in which a successful local level co-operative structure could be used by the community against the national government's tendency to interfere.[33] A case in point was the Benduguba co-operative in the Kita area of Mali, an association of men active in farming. This co-operative succeeded at the village level because it was an accepted village institution that fitted into already existing local structures. It was a defence mechanism of the villagers against the Kita or central government's intention to transform the village into a co-operative of production. The villagers were opposed to this set-up because traditional methods of agricultural production placed considerable power with the head of a household. A shift from the household to the village as the unit of production would require a major reorganisation of their system.[34]

In other cases, the co-operative movement was also used to advance the political aims of its prime movers or sponsors. A case in point was the Co-operative Store Society that emerged in 1946 after the re-occupation of Singapore by the British from the Japanese. It attracted a lot of support from the community because of its objective—'to combat profiteering and racketeering in the black market'. However, it soon became evident that

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[30] Nash and Hopkins, *op. cit.*, p. 14.

[31] Craig, *op. cit.*, p. 146.

[32] John Dixon, 'The community based rural welfare system in The Peoples Republic of China: 1949-1979', *Community Development Journal*, vol. 17, no. 1, 1982, quoted in *ibid.*

[33] Nash and Hopkins, *op. cit.*, p. 15.

[34] Nicholas Hopkins, 'Participatory decision-making and modern co-operatives in Mali: Notes towards a prospective anthropology', in Nash *et al.* (eds), *op. cit.*, pp. 106-107.

the movement was being used by its prime movers—later proven to be pro-communist activists who ran the Malayan Democratic Union—for their own political purpose. The Co-operative Store Society was dissolved in 1951 after the arrest of many of its prime movers by the British government on the charge of being members of the Communist-led Anti British League.[35]

5.6 Experiences of Co-operatives in Developing Countries

The formation of co-operatives in the developing countries has been promoted by the United Nations (UN) since the 1950s, when many of these countries had gained their independence from colonial rule. The UN has always recognised the potential of co-operatives to alleviate poverty, declaring in 1995 that the International Day of Co-operatives be celebrated every year by governments in collaboration with their national co-operative movements.[36]

Soon after World War II, the governments of many newly independent states, with the encouragement of the UN, organised and incorporated thousands of co-operatives. The successful co-operatives formed by peasants in British India and Africa by the end of World War II inspired the leaders of these independent states. Co-operatives were seen as one of the reform mechanisms to build 'modern independent economies' out of the agriculture sector.[37] The governments of the developing nations were directly involved in organising and managing co-operatives to ensure that the desired economic changes were achieved.

But by the late 1960s and early 1970s, there were reports of massive failures in rural co-operatives, although some success stories were identified. The first ten years of co-operative development attempted by the UN were judged as a failure.[38] A 1975 UN study of rural co-operatives in developing areas concluded that 'rural co-operatives.....bring little benefit to the masses of poorer inhabitants'.[39] But in 1987, the then Secretary-General Perez de Cueller said to the UN General Assembly that there was 'sound evidence that co-

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[35] Daniel, *op. cit.*, pp. v-xi.

[36] ICA, 'Message from the International Co-operative Alliance: Co-operatives for sustainable development', 74th International Co-operative Day, 6 July 1996, gopher://wiscinfo.wisc.edu.70/00.info-source/.coop/.orgs/.ica/.events/.coop-day/.Co-operative-, accessed on 02 June 1998.

[37] Craig, *op. cit.*, p. 132.

[38] *Ibid.*, p. 133.

[39] Bruce Thordarson, 'Grassroots co-operatives in the developing world', from North-South Institute Briefing Paper, 1990, To the CUSO 'Common-Sense Economics' Ideas Bank Index, http://www.ccn.cs.dal.ca/CommunitySupport/CUSO/cse_gcdw.html, accessed on 20 June 1998.

operatives are an invaluable institution for promoting social and economic development, and achieving a more equitable distribution of income'.[40]

There seems to be contrasting opinions about the effectiveness of co-operatives in developing countries. For instance, ICA statistics on agricultural co-operatives in developing countries look very impressive: India has become self-sufficient in milk because of its network of dairy co-operatives; a major portion of India's milk production is marketed by the AMUL dairy co-operatives; the sugar co-operatives in India own some 106 factories representing 53% of the whole sugar industry in the country;[41] 25% of India's fertiliser is processed in co-operative factories; co-operatives dominate the marketing of coffee in Kenya; and 40% of cotton in Brazil, 60% of chickens in Bolivia, and 87% of pyrethrum in Kenya are marketed through co-operatives.[42] These figures look very impressive on the surface, but the fact remains that many of these co-operatives operate as government-sponsored monopolies with limited participation and commitment of co-operative members. Some have benefited from capital infusion from foreign donors, but many of these co-operatives could not even maintain and manage their assets once outside support has finished.

In view of this, it is tempting to conclude that co-operatives must be started and fully managed by the people in a community in order to be effective. However, success or failure of co-operatives depends on many factors internal and external to the co-operative. It is not just a matter of putting the blame or credit on the interveners or co-operative officers and/or members. A closer look at the conditions that favour or inhibit the success of co-operatives is necessary for better understanding of their behaviour and the reasons for their poor or good performance. For this purpose, selected case studies on co-operatives in developing countries are examined in this chapter.

India has a rich experience in co-operative development starting from the year 1904 when agricultural credit co-operatives were first established. Subsequent attempts to introduce co-operatives in the country were mainly through the Indian government's efforts. Co-operatives have been a major part of India's national development programs.

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[40] *Ibid.*

[41] Craig, *op. cit.*, p. 139.

[42] Michael Cracknell, 'Co-operatives in the context of globalisation and liberalization', *SD Dimensions/Rural Administration and Co-operatives/Analysis*, http://www.fao.org/sd/rodirect/ROan0001.html, posted on 31 March 1996, accessed on 22 June 1998.

The government invested heavily in co-operatives' formation with the condition that it could appoint up to three directors on the board of each co-operative sponsored.[43]

Co-operatives were organised by government employees and quickly grew into a huge bureaucracy such that by 1976, statistics on co-operatives showed the following: 135,000 local multipurpose credit societies with total membership of more than 40 million families or 45% of the rural population; 19 state co-operative Land Development Banks (LDBs) and 1870 primary LDB with some 15.7 million members; 25 general-purpose apex marketing federations at the state level, 3,278 general-purpose primary marketing co-operatives, and 590 specialized commodity marketing societies; 133 cold storage plants, 2,112 agricultural processing plants, and 721 rice mills owned by co-operatives; 27,000 co-operatives owning the Indian Farmers Fertilisers Co-operative Ltd.; 4,560 fishermen's co-operatives representing 20% of all fishermen in India; and tens of thousands of non-agricultural co-operatives.[44]

However, behind this rosy picture of co-operative structure in India were many problems and weaknesses. Many of these co-operatives were operating in name only, constrained by government and bureaucratic controls and with members not having internalised the co-operative principles. More specifically, the major weaknesses of co-operatives in India were observed by Craig[45] as follows: lack of local leadership; complicated rules and procedures; lack of resources; lack of innovative management techniques; and a general lack of commitment among members because their perceived needs were not being met.

One conclusion that can be drawn is that the co-operative superstructure in India appeared to stand on shaky ground—that if government support were to be withdrawn, very few co-operatives would survive. It seems that the existence of a massive state-sponsored co-operative structure had inhibited the development of grassroots self-sufficient groups. However, there were some co-operative institutions in India that have been successful in terms of increasing agricultural production and improving the lives of their members. The dairy co-operatives in India, following the Anand model,[46] under the aegis

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[43] *Ibid.*, p. 136.

[44] *Ibid.*, pp. 137-138.

[45] *Ibid.*, p. 139.

[46] The co-operative in Anand bought all the milk of the dairy farmers, paid on the basis of quality, gave honest measures, supplied high quality feed for cows, and provided veterinary services and medicines at no cost to members.

of the National Dairy Development Board (NDDB), elected their boards of directors from the local co-operative chairpersons; hence these directors were not government officials.[47] The AMUL Dairy and other dairy co-operatives developed trainers who provided three-day workshops on animal husbandry offered exclusively to women in the villages. The NDDB trained their managers on co-operative values and principles at the Institute for Rural Management.[48] The sugar co-operatives in the state of Maharashtra controlled 53% of the sugar industry in India. The members had a free hand in the selection of board of directors who were trained locally and not from the government.[49]

In China, two major reforms in 1978, namely the separation of political and economic functions and the responsibility system, led to the development and reorganisation of co-operatives.[50] These reforms provided economic rewards for performance and gave peasants greater freedom of choice about which farming system to adopt. Through these reforms, some communes were replaced by individual and group initiatives organised around co-operatives. Agricultural Production Co-operatives became the unit of agricultural production instead of the giant rural communes. Co-operative members were allowed to choose their leaders (rather than the state appointing them) and to make production decisions, as long as these did not conflict with collective production.[51] Co-operative membership had become voluntary and all members had equal voting powers. Production surplus went to taxes, special reserve funds, increased production and payments on shares. State planning still existed but excessive bureaucratic control and centralised management had been lessened. The state gave some support to the co-operatives in the form of investment funds, loans and credits, tax incentives, and priority for state supplies of raw materials. These policies encouraged the formation of new co-operatives, such that in 1985, there were some 35,000 basic supply and marketing co-operatives at the commune level representing 132 million members. These co-operatives

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[47] Craig, *op. cit.*, p. 140.

[48] *Ibid.*

[49] *Ibid.*, p. 139.

[50] *Ibid.*, p. 146.

[51] Some observers of China's agriculture sector argue that 'free choice of farming system' did not hold for most of the country. For instance Hinton (in W. Hinton, 'More on China's new family contract system', *Monthly Review,* vol. 35, April 1984, p. 43) claims that peasants who had a choice were in the minority and most of them areas controlled by the large municipalities of Beijing, Shanghai, and Canton. Hinton maintains that city party committees took various steps either to protect old collective forms or to ensure that contracting did not interrupt large-scale farming, mechanisation, etc.

were federated at the country and regional levels; they constituted the All China Federation of Co-operatives, which was accepted into ICA membership in 1985.[52]

In Latin America, co-operatives were generally imposed by the government, the church, the United States AID or other private individuals and organisations. The state-directed co-operatives were multipurpose in nature involving marketing, credit and distribution of consumer goods. They were usually associated with land reform and were part of larger government development programs.[53]

In Nicaragua, for example, the co-operative movement evolved from that which was formed by a rebel leader who fought for land reform in the 1930s; to one which was endorsed by the Sandinista government in the 1980s, with the government gradually prioritising land reform and co-operative assistance from 1980 to 1985 under the coordination of a government ministry; to the organisation of the national farmers and ranchers' union by the Sandinista party, which was later granted more autonomy; to the end of public assistance to the co-operatives in the 1990s after the change in government and the increase in structural adjustment measures.[54] Until 1985, the government, through centralised policies and bureaucratic process, exercised control over the co-operatives including decisions about production, use of farming techniques, inputs, prices, marketing, and even criteria on co-operative membership and other organisational matters.[55] With the 1985 policy shift, the co-operatives were allowed to organise their own production, and official controls on grain marketing were removed. Since then, the co-operatives increased in number with over 3,300 agricultural co-operatives formed in the 1980s.[56]

Elsewhere in much of Latin America, the development of social organisations that represent the interests of rural people, such as co-operatives, had been stifled by the political and economic influence of the traditional rural elites and by strict state control. However, under certain circumstances, the rural people were able to overcome these constraints by mass action leading to organisational forms that were more autonomous from the state.

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[52] Craig, *op, cit.*, pp. 145-151.

[53] Fals-Borda *et al.*, *op. cit.*, pp. 440-441.

[54] Caroline Kroeker, 'The co-operative movement in Nicaragua: Empowerment and accompaniment of severely disadvantaged peasants', *Journal of Social Issues*, vol. 52, no. 1, Spring, 1996.

[55] Marvin Ortega, "The state, the peasantry and the Sandinista Revolution', *The Journal of Development Studies*, vol. 26, no. 4, July 1990, pp.129-135.

[56] Kroeker, *op. cit.*

In Africa (northern, western, and eastern), rural co-operatives were sponsored by various groups, including the national governments, churches, World Bank, the USAID, political parties, and private individuals and organisations. The governments' task of organising co-operatives was facilitated in African countries where there were local development programs such as community development and 'animation rurale'.[57] The basis of co-operative leadership in Africa was diverse but the real decision-making powers on general policies and operation of the co-operatives rested with government officials rather than with the elected leaders.[58]

5.7 Agricultural Co-operatives in the Philippines

Co-operative development in the Philippines, like in many other developing countries, has been generally through government efforts and initiatives. Co-operatives have been historically viewed by the Philippine government as instruments for attaining social and economic reforms. Specifically, the development of agricultural co-operatives has been linked with the implementation of the country's agrarian reform laws.

There were about 41,000 registered co-operatives in the Philippines in 1996, 62% or 25,575 of which were classified as agricultural-based co-operatives.[59] Of the 45,000 co-operatives registered in 1998, one-third was found to be inactive.[60] For instance, in my study of the Integrated Jalajala Federation of Co-operatives (INJAFEDCO) located in the province of Rizal in the Philippines, it was noted that five out of its ten member-primary co-operatives were not fully operational as of 1996. In this case, some reasons for the inactivity include the following: huge debt due to high cost of maintaining their irrigation facilities; management problems; inability to sustain operations when the credit support of the Land Bank of the Philippines (LandBank) ended; and lack of knowledge of farmer-

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[57] 'Animation rurale' is one of the methods for promoting education, dialogue, and popular participation in the rural areas. Cited in Fals-Borda *et al. op. cit.*, p. 440.

[58] For examples, refer to the development of co-operative movement in Senegal with peanut production as their major concern, and in Tanzania involving the cotton and coffee co-operatives, *ujamaa villages*, and others. (Craig, *op. cit.*, pp. 141-145; Gabriel Gagnon, 'Co-operatives, participation and development: Three failures' in Nash *et al* (eds), *op. cit.*, p. 366; M'Baye Diao, 'Participation of rural populations in development in African countries: the Senegalese experience', in UNESCO, *Participate in Development*, Paris, UNESCO, 1986, pp. 352-355; Louis Putterman, 'Extrinsic versus intrinsic problems of agricultural co-operatives: Anti-incentivism in Tanzania and China', *The Journal of Development Studies*, 1985, pp. 181-185.)

[59] Leandro Rola, The role of agribased co-operatives in the agro-industrialisation and food security development programs of the Philippines, paper presented to the seminar-workshop on Alternative Farm Management Approaches for Sustainability and Economic Growth, PCARRD, Los Banos, Laguna, 6 November 1996.

[60] Clarissa Militante, quoting CDA Chief Verzosa in 'Globalisation threatens co-ops: Will government help?', *Manila Bulletin*, 14 August 1998.

members on the activities and goals of the federation and their co-operatives. Before the INJAFEDCO was formed, there were 34 co-operative societies in the province of Rizal, the majority of which were inactive due to lack of funds, facilities and guidance.[61]

Co-operatives in the Philippines are organised according to the general classification recognised worldwide or by the International Co-operative Alliance. They may fall under any of the following types: credit; consumer; producer; marketing; service and multipurpose co-operatives. As of 1994, the majority of the 32,766 co-operatives were multipurpose, totalling 21,688 (66%) for the agriculture sector and 6,391 (20%) for the non-agriculture sector.[62] This is understandable since a multipurpose co-operative is more flexible in operations than the other types. Co-operatives in the Philippines may also be classified according to their scope—primary, secondary and tertiary.[63]

Most agricultural co-operatives took the form of a rural association[64] first before becoming full-fledged co-operatives. Many of them that started as single or double-purpose co-operatives would later expand to a multipurpose organisation. Almost fifty percent of agricultural co-operatives received production loans from the LandBank in 1990. Many of the rural co-operatives of today were created due to the LandBank's credit program in support of the Comprehensive Agrarian Reform Program that was launched in 1988. For instance, most of the 34 co-operatives in the province of Rizal were organised to avail loans from the LandBank and other funding agencies. Specifically, 5 out of 10 member-co-operatives of INJAFEDCO started as credit co-operatives, with financial support mostly coming from the LandBank.

The co-operative movement in the Philippines formally started when the government had begun to pass laws for the organisation of co-operatives. The first co-operative legislations were passed during the American Regime (1900-1934). They focused on the organisation of agricultural and rural-based co-operatives.[65] During this period, two major laws on co-operatives were enacted, namely Agricultural Credit Co-operative Act (Republic Act 2508), in which rural credit co-operative associations were

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[61] Leticia Damole, 'Institutional development to sustain a rice processing complex: The case of the Integrated Rural Development Project, Philippines', MS thesis, Asian Institute of Technology, 1995, p. 127.

[62] IBON Philippines, *loc. cit.*, citing CDA statistics as of 1994.

[63] See section 5.5 for the definition of types, kinds and categories of co-operatives.

[64] Rural associations are pre-co-operatives or informal groups of people not yet incorporated into the officially-sanctioned co-operative system.

[65] Jacinto Batoon, 'Legislation on co-operatives in the Philippines: A historical perspective', Inaugural lecture delivered at University of the Philippines Los Banos, Laguna, Philippines, December 17, 1992, p. 79.

organised in the provinces,[66] and Co-operative Marketing Law, in which the Bureau of Commerce was appointed to organise farmers into marketing co-operatives.[67] Republic Act 2508 exempted co-operatives from payment of all types of registration fees and income tax. Aside from these privileges, the government did not give any other forms of support such as financial and technical assistance. Despite the minimal support given to co-operatives, the government interfered heavily into the internal affairs of the co-operatives. For instance, the Director of the Bureau of Commerce selected and determined the salary of the treasurers in the co-operatives. There was also lack of manpower from the Bureau of Commerce to oversee the implementation of the law.[68]

During the Commonwealth Period (1935-1946), legislations were directed towards agricultural financing and the formation of non-agricultural co-operatives.[69] The Co-operative Law (Commonwealth Act 565) provided for the formation of all types of co-operatives, the creation or designation of a government agency to supervise the co-operatives, and the establishment of a National Co-operative Fund. The law allowed 15 or more persons to form a co-operative, which for the first five years would be exempted from all taxes and government fees.[70] However, the same law was observed to be lacking in comprehensiveness. For instance, there was no clear demarcation between co-operative and corporation, and there was lack of a basic working framework in the co-operative program.[71] The co-operative movement was beginning to gain momentum but was cut short by the outbreak of World War II.[72]

The co-operative laws after the war were focused on the Filipinization of co-operatives, in which privileges and rights granted to foreigners in the previous laws were abolished; and the utilisation of co-operatives for relief goods distribution. A series of laws that organised and re-organised institutions authorised to promote and supervise co-operatives ensued.[73]

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[66] *Ibid.*, p. 71.

[67] Co-operative Development Authority (CDA), 'Module III - Beginnings and philosophy of co-operatives', *Co-operative Development Authority Manual*, Philippines, 1994, p. 111.

[68] Batoon, *op. cit.*, pp. 71-72.

[69] *Ibid.*, p. 79.

[70] CDA, *op. cit.*, p. 50.

[71] Batoon, *op. cit.*, p. 73-74.

[72] *Ibid.*, p. 79.

[73] *Ibid.*

Republic Act 821 or the Agricultural Credit and Co-operative Financing Act was promulgated in 1951. It was a large-scale program of rural financing where credit was extended to farmers without collateral other than their productive capacity.[74] This 'non-collateral-credit program' was considered as one of the radical moves of the government during that time. It was expected to considerably improve the living conditions of farmers in the Philippines. Loans were extended only to members of the Farmers' Co-operative Marketing Associations (FACOMAs). FACOMAs were promoted and organised as channels for liberal credit to farmers. The FACOMAs grew in number very quickly such that in 1956, there were about 453 FACOMAs representing some 260,000 farmers all over the country.[75] However, almost half of the FACOMAs collapsed a few years later. The debt-repayment rate by borrowers was very low, leading to the decline of the credit program. With the failure of the credit program, the marketing operations also suffered. Delinquent borrowers did not deliver their produce to their FACOMAs. Therefore, the volume of the marketing business of the FACOMAs dropped enormously.[76]

The government attributed the failure of the FACOMAs to operational and organisational problems of the co-operatives, such as lack of management skills, and lack of dedicated and well-educated leaders. However, observers of the co-operative movement in the Philippines had a common explanation of the fall of the FACOMAs. According to them, since the FACOMAs were simply used as conduits for credit delivery, the farmer-members perceived them as credit agencies not as the marketing arm of their produce. The members became loan-oriented, with their participation dependent on the availability of loan funds. The government's credit assistance was directed to individual members, and the co-operatives were used only as channels of the credit package. The government controlled the credit package including decisions on the loan limit per member, interest on loan, and required documents. It did not give the co-operatives the opportunity to decide on how the credit package would be loaned out to members.[77]

Another interesting explanation of the failure of the FACOMAs was the conflicting policies of government, to the disadvantage of co-operatives. For example, in the 1960s,

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[74] CDA, *op. cit.*, p. 52.

[75] *Ibid.*

[76] *Ibid.*, p. 53.

[77] Leandro Rola, 'The integrated co-operative system of the Philippines: Status, thrusts and directions', *Philippine Co-operative Review: Technical Journal of the Co-operative Movement*, vol. 1, no. 1, July 1988, p. 53.

the government allowed huge importation of rice (resulting in a drastic decline of the price of rice) when the FACOMAs had yet to sell their produce.[78]

Legislation during the Martial Law period attempted to integrate all co-operative laws. The Agrarian Reform Program of the Philippine government or Presidential Decree (PD) No. 27, implemented after the declaration of Martial Law in 1972, accelerated the establishment of agricultural co-operatives as corporate farms were divided into smaller production units.[79] The law (PD 27) mandated co-operative formation through the 'no-coop, no-title policy'. Land ownership was transferred to tenant-farmers from the landlords on the following conditions: that the farmers pay for the lands in 15 yearly instalments; that they be members of co-operatives; and that their co-operatives must guarantee their land repayment amortisation.[80] This provision practically disregarded the voluntary nature of farmers' co-operatives.

By end of 1980, the co-operative movement was revived. It consisted of more than 17,000 pre-co-operatives called Samahang Nayons (SNs), 110 full-pledged agricultural co-operatives, 78 Area Marketing Co-operatives, and 29 Co-operative Rural Banks.[81] As in the case of the FACOMAs, many co-operatives failed during this period with only 2,381 SNs reported to have remained active by 1987.[82]

The failure of the SNs can be explained by the following factors. Like the FACOMAs, the SNs were just conduits, rather than the focus and object of the government's development program. Their organisation was imposed to ensure that land reform beneficiaries would pay amortisation for their lands. Furthermore, since the land reform program was not successful, the co-operatives that were based on their implementation were correspondingly unsuccessful.

Another reason for the failure of the co-operatives was the fact that those who were not beneficiaries of land reform were allowed to become members. It was observed that the managerial positions of the co-operatives were usually occupied by landowners, the same group of people whom the small farmers wanted to be emancipated from.[83]

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[78] IBON Philippines, *op. cit.*, p. 3.

[79] CDA, *op. cit.*, p. 57.

[80] *Ibid.*

[81] Leandro Rola, 'Credit and co-operatives: Issues, problems and prospects to strengthen global competitiveness of Philippine agriculture', Report submitted to AGRICOM, Philippines, 18 June 1997.

[82] *Ibid.*

[83] IBON Philippines, *op. cit.*

During the Aquino Administration (1986-1990), the role of co-operatives was made more important. The 1987 Constitution in Section 15 of Article XII states that 'Congress shall create an agency to promote the viability and growth of co-operatives as instruments for social justice and economic development'. Two major 'co-operative-related' laws were enacted in 1990, namely Republic Act 6938 or Co-operative Code of the Philippines, and Republic Act 6939 which created the Co-operative Development Authority (CDA).

The Co-operative Code of the Philippines proclaims that 'the state shall foster the creation and growth of co-operatives as a practical vehicle for promoting self-reliance and harnessing people power towards the attainment of economic development and social justice' and ..... 'the state shall encourage the private sector to undertake the actual formation and organisation of co-operatives and shall create an atmosphere that is conducive to the growth and development of these co-operatives'.[84] Through this law, all government agencies were encouraged to provide technical guidance, financial assistance and other services to co-operatives to help them become viable and responsive economic enterprises.

Co-operative development in the Philippines had experienced many failures in the past that these newer laws have tried to correct. For instance, it was observed that more co-operatives organised through private initiative were able to successfully continue their operations than government controlled co-operatives. Therefore, RA6938 gave emphasis on private initiative and resources, self-help, and democratic control. It allowed more self-initiative and autonomy for co-operatives. However, this was the same policy that some observers claimed to have led to the neglect of co-operatives by the government in terms of incentives and other support services.[85]

The governments after Aquino have just continued to enforce the co-operative laws passed during the Aquino administration. However, the co-operatives encountered problems with government taxes, both during and after the Aquino administration. The Co-operative Code of the Philippines (RA6938) declares that tax exemption privileges will be given to co-operatives as long as they do not transact business with non-members and the general public. The Code further stipulates that even if co-operatives make transaction with both members and non-members, they can be exempted from government taxes provided

[84] Co-operative Code of the Philippines.
[85] Rola, 'The integrated co-operative system of the Philippines...', *op. cit.*, p. 12.

that they do not have US$400,000[86] in accumulated reserves and undivided net savings. However, these stipulations did not seem to have taken effect. Instead, two major tax policies that were unfavourable to the co-operatives were instituted by the government. Executive Order 93 of the Aquino government withdrew the tax privileges of the co-operatives, which were later granted to foreign investors registered with the Board of Investments.[87] The government also did not exempt co-operatives from the Expanded Value Added Tax (EVAT) law of May 1994.[88]

From the foregoing accounts, it can be observed that while the Philippine government has officially recognised the importance of co-operatives in national development, its policies have not been all that helpful. In the early history of co-operative development, legislation served to control or interfere with the co-operatives' operation. Then much later, the co-operative laws were reformed in a way that co-operatives would have more autonomy. However, as explained earlier, the government has been inconsistent in its written laws, and practice and actions. While its expressed and official objective for promoting co-operatives was to achieve social justice and economic development through these organisations, it appeared to hold other motives. These unofficial motives may include the use of co-operatives as channels of credit to farmers, and use of co-operatives to facilitate the collection of land amortisation from land reform beneficiaries. It was also observed that the government used co-operatives as counter-insurgency tools or to make peace with the rebel groups in the rural areas.[89] For instance, FACOMAs were observed to have been established in areas where rebel groups of the 1950s and 1960s were concentrated. The present-day rebel returnees have also been promised assistance in setting up their own co-operatives.[90]

Other sectors of society had their own agenda in setting up co-operatives. For instance, there were cases of co-operatives organised based on the true principles of co-operatives, mostly initiated and managed by the people themselves or non-government organisations. There were cases of co-operatives 'in name' only to get money from funding agencies, corporations assuming the title of a co-operative in order to avoid their tax

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[86] Exchange rate: US$1.00 = 25 pesos
[87] IBON Philippines, *op. cit.*
[88] *Ibid.*, p. 5.
[89] *Ibid.*, p. 4.
[90] *Ibid.*

responsibility, or corporations organising co-operatives among their workers to induce them not to form unions.

In recent years, the government has reduced its direct intervention to co-operatives. Many government instrumentalities have promoted and implemented their own rural development programs involving co-operatives. The degree and nature of intervention by the involved government agencies depended on the approach and strategies that they were using. Likewise, the degree of participation of co-operative members in the specific rural development programs of government depended on whether the approach and strategies of these interveners facilitated or constrained the members' participation.

This variation within government-initiated co-operatives can be illustrated by the two case studies in the thesis, namely the TABARGA Multipurpose Co-operative (MPC) engaged in bamboo and rattan production, and the INJAFEDCO, a federation of 10 primary co-operatives involved in rice production, processing and marketing. Both co-operatives were organised through government projects that had definite timeframe and objectives. Upon completion of the projects, the co-operatives were expected to fully manage and run the co-operatives themselves.

In the case of TABARGA, one government agency—the Department of Environment and Natural Resources Region 6 (DENR-VI)—served as conduit of all interventions to the co-operative. The TABARGA MPC was one of the project sites of a national program on bamboo and rattan. With INJAFEDCO, there was a tripartite linkage between one government agency—the Department of Agrarian Reform (DAR)—and two non-government organisations in implementing the project called the Integrated Rural Development Project (IJRDP). The IJRDP was mainly funded by the Japanese government through the Japanese International Cooperation Agency (JICA). It consisted of two components, namely infrastructure development and institutional development. The project was heavily biased toward physical infrastructure. The local institution-building component was originally overlooked and later included in the project packaging, but it lagged behind the infrastructure construction. Institution-building activities were critical for projects such as IJRDP, whose beneficiaries were previously credit-led co-operatives in the form of SNs or other type of imposed organisations. Co-operatives that existed previously as FACOMAs or SNs were most likely to have developed the dole-out

mentality and dependent attitude among its members. The failure of these earlier government programs could make them suspicious of the newer development programs.

With TABARGA, while the general areas of intervention were set at the national level through the national bamboo and rattan program, the approach used by DENR-VI at the grassroots level was bottom-up. The details of the project for TABARGA were identified and packaged with the active participation of the local community. With the guidance of the DENR-VI, the project beneficiaries participated in defining specific needs, formulated plans to address these needs, and undertook necessary actions to achieve their goals and plans, all within the boundary of the national program. The DENR-VI employed the combined strategy of local institution-building and technology training. The emphasis was on local institution-building during the initial stage of the project, then gradually phasing-in technology transfer activities until it became the major focus at a later stage of the project.

With INJAFEDCO, the manner of intervention was generally top-down from project planning, packaging, to implementation. There was an observation that the IJRDP's design was more a reflection of JICA's perception of the local situation. The infrastructure component, which was almost ninety-nine percent of the total project, was contracted mainly to Japanese firms. This includes the preparation of the detailed engineering plans and designs, and construction of infrastructure.[91] There was limited participation of the local community in all stages of project packaging and implementation. At one point, the DAR had a difficult time convincing farmers to donate lands for roads and irrigation because the farmers were not informed beforehand of the extent of the construction work that would be made and the damage to crops and properties expected. There was also a major problem in maintaining the irrigation facilities put up through the project, specifically in paying the high cost of electricity used to run the facilities. Had the intended beneficiaries been carefully consulted, the project proponents would have installed a more simple irrigation facility that would meet the available resources of the farmers.

Similar to the experience of many co-operatives in other developing countries, the co-operative movement in the Philippines had been confronted with the situation in which members were lacking in commitment to the activities of the co-operatives. In this case,

[91] Contracting of the preparation of feasibility study and detailed engineering and plans, and the infrastructure construction itself to Japanese firms was a common practice in the Japanese funded projects.

members could not identify themselves with the co-operatives, especially if a particular government agency or other sponsoring entities involved were directly controlling the affairs of the co-operatives.

In the case of INJAFEDCO, the co-operative members did not patronise the Rice Processing Complex (RPC) managed by the federation. Most of them did not bring their rice produce to the federation for processing and marketing. This lack of support by the members badly affected the operations of the RPC. The co-operative members could not see the RPC and the federation as belonging to them. The problem in this regard was that the institution-building activities of the project actively involved the co-operatives' officers but were unable to reach most of the members. Therefore, most of the co-operative members were unaware of the federation and how it could serve their interests. Furthermore, the operation of the RPC, which was turned over to the federation after the project ended, was closely identified with the project implementers. On the contrary, the members of TABARGA MPC had developed a strong sense of ownership for the co-operative because they were involved in all aspects of the project.

Various studies made about the co-operative movement in the Philippines reveal a range of problems confronting the co-operatives. A study of the Philippine rural organisations after the 1950s concludes that rural organisations failed to serve the interest of rural people and even resulted in greater inequalities between the rich and the poor. The study claims that services and resources made available, in a top-down manner, through these institutions benefited the better-off members rather than the needier ones.[92]

Other studies on co-operatives emphasise problems related with the organisation and management of co-operatives, such as haphazard organisation; inadequate resources; lack of proper understanding of the principles, aims and purposes of co-operatives; lack of participation by members; lack of highly trained and experienced management personnel; leadership problems; high dependence on government support; lack of adequate safeguard against corrupt officers; lack of co-operative education and training; members' unwillingness to patronise the co-operative due to high price and cost of services compared to other establishments;[93] and many other internal problems.

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[92] Blondie Po and Cristina Montiel, 'Rural organisations in the Philippines', Quezon City, Institute of Philippine Culture, 1980.

[93] Manuel Bonifacio, 'Strengthening rural-based organisations (RBOs) as a strategy towards higher productivity', a suggested research outline for studying RBOs submitted to the Socioeconomic Research Department, PCARRD, 23 June 1998.

Such studies also pinpoint political interference and stiff competition with big agribusiness enterprises as difficulties encountered by co-operatives. The latter can be illustrated by the following example. The Lutucan Multipurpose Co-operative (MPC) located in Southern Tagalog, Philippines, was engaged in coconut fibre manufacturing[94] and was planning to expand its operations to include the production of compacted dust[95]. The dust compacting proposal was approved for funding by the Department of Science and Technology (DOST) but the project did not materialise. The co-operative found out that the market for compacted dust was dominated and controlled by one of the biggest coco-fibre producers in the country. There was no way that the co-operative could penetrate the market unless it would agree to purchase the dust compacting machine from this big manufacturer, the cost of which was three times higher than what was offered by a local fabricator.

The proliferation of organisations conducting audit of co-operatives without clear delineation of roles is also cited as a problem.[96] Other studies on co-operatives focus on the problems related to the capability of co-operatives to integrate and sustain production, processing and marketing of products as well as supply and distribution of inputs. The factors necessary for attaining this capability were access to credit, production inputs, technology, information, training, processing facilities and market. Several problems were noted in this regard, as follows: lack of a comprehensive financing program covering all financing needs of co-operatives and federations from production to processing to trading or marketing activities; high rates of loan interests from lending institutions; non-bankability of small farmer-borrowers; difficulty on the part of farmer-borrowers to pay their loans; absence of a national co-operatives agro-industrial development plan; difficulty in marketing the products; and lack of market and technological information; and inadequate processing facilities.[97]

Regarding problems with credit, the government's policy of not lending directly to co-operatives except through the banking system left the co-operatives with little access to

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[94] Coconut fibre manufacturing involves the production of fibre from coconut husks through the process of decortication.

[95] Compacted dust is used as fertiliser component, soil mulcher or conditioner, trellises, pelletised fuel, and others.

[96] Agricultural Credit and Co-operatives Institute, Bureau of Co-operatives Development, and Department of Agriculture and Fisheries, Proceedings of the multisectoral conference/workshop on 'Strengthening the Co-operative Movement in Region IV', ACCI Auditorium, University of the Philippines Los Banos, Laguna, Philippines, 29-31 January 1987.

[97] Rola, 'Credit and co-operatives....', *op. cit.*

production funds. Commercial banks could not be forced to lend to small farmers if it would not profitable for them. The economic incentives to participate in the credit program of the government were too small for these banks. To the banks, lending to small farmers was not only tedious but also expensive. Not even the government's policy of requiring the banking industry to allocate 25 percent of their loan portfolio to agriculture and agrarian reform had improved this situation because the law was not strictly enforced. The government's credit programs were also covered by a lot of restrictions such as rules and regulations of the Commission on Audit. [98]

5.8 Factors for Success and Failure of Co-operatives

The preceding sections of this chapter demonstrate that too much government control or bureaucracy inhibited the success of co-operatives. In instances where government officials were directly controlling the affairs of the co-operatives, the co-operatives did not develop into self-reliant organisations. The members of these co-operatives were lacking in commitment, participation, accountability and responsibility over the co-operatives decisions, activities and achievements. However, when the governments gave more freedom and incentives to co-operatives through more suitable policies, the co-operatives were observed to have performed better.

Clearly, the role of governments and other service providers in the development of co-operatives must be that of assistance rather than dominance. In other cases, factors observed to contribute to the failure of co-operatives were the external pressures from big landowners or rural elites who were threatened by the co-operatives' existence; rebel or revolutionary groups that brought forward their political agenda into the co-operatives; and the attitudes of service providers such as whether they had complete understanding of the community and accorded the co-operative leaders and members with respect.

The internal dynamics of co-operative leaders and members and their relationship with other people and entities in their community affect the performance of co-operatives. In some cases outlined above, co-operative leaders were generally lacking in managerial capabilities and were observed to be autocratic. The co-operative management styles were mostly imported from Europe leading to the problem of incompatibility with local culture.

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[98] *Ibid.*

In some countries of Africa and Asia, the introduction of co-operative policies became part of the colonialist policy of social change.[99]

It could also be noted that co-operatives work well if members have shared values and principles; are clear about the co-operatives' objectives and goals; and possess the necessary knowledge and skills to be able to exercise their rights to participate in decision making. This implies the importance of continuous education and training of co-operative leaders and members to improve such knowledge and skills. A group of experts on co-operatives, (during a conference in Washington D.C. in 1984) identified a list of reasons why co-operatives fail **(see Appendix 5.2).**

There is also an observation about the efficiency and competitiveness of co-operatives in relation to the form of organisation. In a study by Deininger[100] covering seven countries, namely Israel, Ethiopia, Nicaragua, Cuba, Peru, China and Vietnam, agricultural production co-operatives were observed to be less efficient and competitive than service co-operatives. Production co-operatives' activities were limited to joint agricultural production while service co-operatives provide services in the areas of input supply, marketing, credit and technology. Service co-operatives were observed to be more beneficial because they utilised economies of scale (e.g. bulk buying of production inputs), could increase competitiveness of agricultural markets, and facilitated technology dissemination and rural credit formation.

5.9 Dilemmas and Challenges of Agricultural Co-operatives

Most agricultural co-operatives, being both social and business organisations, are caught in a dilemma between satisfying the needs of their members and dealing with the realities of the market economy. They exist in an economic and politicised environment whose values and principles of operation are likely to be different from their own. In principle, co-operatives eliminate the profit motive by applying fixed interest on capital. This provision discourages capitalists from investing and ensures the division of profits in proportion to participation.[101]

However, co-operatives must accumulate capital and operate as a business organisation in order to serve the common economic needs of their members. They must be

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[99] Fals-Borda *et al.*, *op. cit.*, p. 452.

[100] Klaus Deininger, 'Co-operatives and the breakup of large mechanized farms: Theoretical perspectives and empirical evidence', *World Bank Discussion Paper* no. 218, The World Bank, Washington D.C., 1993.

[101] Craig, *op. cit.*, p. 54.

able to compete successfully in both domestic and international markets in order to survive, especially with increasing globalisation. This calls for increased efficiency and growth, demands that sometimes compromise the general interests of co-operative members.

For example, Japan's agricultural co-operative system or the 'nokyo' has become one of the country's most powerful business organisations, dominating rice distribution and fertiliser and farm-machinery trades. However, the Japanese government's investigation of the 'nokyo' determined that it has become too profit-oriented. It has bloated and failed in its duty to look after its farmer-members in providing bulk purchases of farm supplies and credits. More specifically, the government found that the 'nokyo' charged excessive fees for providing goods where their position as a near-monopoly provider is sustained by law.[102]

The challenge for co-operatives, therefore, is to accumulate capital or to aim at being a successful business institution without contradicting their own principles. In this regard, co-operatives must see to it that member-workers or producers are not exploited and disadvantaged, that alternative employment is available for labour that will be displaced if more advanced technologies are used, and that its actions do not lead to unequal distribution of returns. This requires more innovative management techniques and creativity on the part of the co-operative's leaders and members.

The growth of the co-operative movement in developing countries, including the Philippines, has often resulted in bureaucratisation. In order for central governments to promote, coordinate and control the expanding movement, more bureaucratisation has occurred. However, too much bureaucracy often defeats the co-operative's basic principles of democratic member control, and autonomy and independence. In some instances, governments or politicians are unwilling to see co-operatives develop into independent organisations for fear that these co-operatives will pose a political threat to them.

In the context of globalisation and liberalisation, agricultural co-operatives are facing increasing competition. Co-operatives that are heavily dependent on government support and foreign donors are most likely to be affected. They will be unprepared for competition, considering that their own leaders have little exposure to decision-making and

[102] 'Knocking the nokyo. (Japan's agricultural co-operative system)', *The Economist*, vol. 307, no. 7555, June 18, 1988, p. 73.

experience in managing their own resources for increased efficiency. Co-operatives that are mainly involved in agricultural production are highly vulnerable to competition. Economies of scale can be improved if co-operatives expand their operations through vertical and horizontal business integration to include processing, marketing, credit and input supply, or by undertaking more value-added activities.

Given the scenario outlined above, it might be more practical for co-operative federations (secondary and tertiary) to assume the previous roles of central governments in promoting, developing and supervising primary co-operatives. The co-operative federations, being directly accountable to their member-co-operatives and whose board of directors are elected by primaries, are in a better position to support, educate and strengthen primary co-operatives. The role of the government in this regard is to create a favourable legal and policy environment in which genuine co-operatives can develop, and focus technical assistance and available financial support on building local co-operative management and organisational capabilities.

5.10 Future of Co-operatives in the Philippines

Despite the difficulties within the co-operative movement in the Philippines, agribased-co-operatives have remained indispensable in advancing the national goals of agricultural development. Recent developments within the agribusiness sector in the Philippines present new opportunities and threats for agricultural co-operatives. New partnerships between big agribusiness corporations and agri-based co-operatives are emerging in the form of joint ventures, new forms of contract growing, management contracts, build-operate systems and other arrangements. These new arrangements are attractive to both MNCs and local agribusiness corporations because they do not have to invest in land, hire labour, or manage large-scale farming operations.[103] With these corporation-farmers partnership schemes, the corporations are able to avoid issues on labour and land ownership.

The problem with these arrangements is that the farmers could easily be exploited by the corporations. Furthermore, there is no room in these arrangements for the farmers to incorporate their indigenous practices, since the corporations dictate the technologies to be

[103] IBON Databank and Research Center Peasant Desk, *Contract Growing: Intensifying TNC Control in Philippine Agriculture*, IBON Books, Metro Manila, Philippines with the assistance of World Council of Churches, p. 5.

used in production. It is necessary that the agricultural co-operatives and their federations, with assistance of government agencies concerned, carefully study the conditions of the agreements and become fully aware of their rights before entering into contract with the corporations. Joint ventures have the better potential for benefiting the small farmer-landowners and agribusiness corporations. In this set-up, farmer-co-operatives and partner firm put in their respective equity to a joint venture company (in processing or marketing) or joint venture commercial farm. The corporation provides the infrastructure, technology and training while the farmers provide the labour. The profit is divided between the corporation and the co-operative.

The role of co-operative federations is important especially with increasing globalisation and liberalisation. Agricultural co-operatives in the Philippines will face more competition when quantitative restrictions and tariffs are removed in the year 2004. Since most co-operatives in the Philippines are very small, they may easily be weeded out by big competitors. However, co-operatives' smallness can be overcome through linkages and co-operation with each other and by organising themselves into federations that will take advantage of the economies of scale in production, processing and marketing operations including the application of more efficient technologies. Federations are increasingly engaging in the procurement and distribution of inputs and in the buying, processing and marketing of the produce of member-co-operatives.

The role of the local government units (LGUs) is important in co-operative building. The LGUs are directly in touch with the local communities. With the responsibility for agricultural extension devolved to the LGUs, they are in the best position to assist the co-operatives.

5.11 Conclusion

Co-operatives in the Philippines generally have adhered to the principles of co-operation. However, the voluntary nature and democratic member control principle of co-operatives were often compromised, as in the case of the FACOMAs in the 1950s and 1960s, and the SNs in the 1970s. In these programs, membership in co-operatives was made a prerequisite for land ownership and credit availment. Moreover, the government, at that time, exercised direct control over the co-operatives in the implementation of these programs. Many agricultural co-operatives today in the Philippines were previously FACOMAs and SNs. This is the case for INJAFEDCO (see chapter 9). Having had the bad

experience with these programs, such co-operatives need training and other activities that will increase awareness of their members about the true values and principles of co-operatives.

The experiences presented in this chapter demonstrate that the actions of governments are crucial in the success and failure of co-operatives. The co-operative laws, policies, programs and projects of governments can either facilitate or constrain the growth and development of co-operatives. When government programs and policies promote participation and democracy, co-operatives tend to be more successful. In cases where governments directly control the activities of co-operatives, the latter may not develop into independent self-help organisations. However, this is not to say that governments should no longer intervene in co-operative development. Governments have an important role to play in co-operative building especially in developing countries where many small and poor farmers exist. I argue that the government policies and strategies must help to increase the co-operatives' access to resources and support services such as credit, information, technology, market, education and training. Such policies must be enabling and enhancing of the co-operatives' capability to manage their own organisations and enterprises.

With this background on the nature of agricultural co-operatives, and the issues, dilemmas and challenges confronting them, I present in the next four chapters case studies in which three co-operatives are examined.

CHAPTER 6

CASE STUDIES: A SUMMARY

6.1 Introduction

The preceding chapter examines the nature and behaviour of agricultural co-operatives in the developing countries with the aim of helping to understand the case studies in this thesis. This chapter summarises the basic information about the three co-operatives studied in the Philippines. It systematically outlines the general features of these co-operatives in terms of their background and form, the intervening agencies involved, the source of funding, manner of linkages observed among the key players, effectiveness of linkages, and the technology transfer approach identified in the case studies **(Table 6.1).** This summary emphasises the manner and effectiveness of linkages among the various actors in the co-operatives, and the technology transfer approach employed by the dominant intervening agency. The summary is set out this way because, as discussed in chapter 1, the objective of the case studies is to examine the interrelationship of a co-operative with its interveners and the degree of coordination among these intervening agencies. The case studies analyse the extent to which these linkages and the technology transfer approach used by the dominant interveners have contributed to the success and failure of the co-operatives.

The effectiveness of linkages (point 9 in Table 6.1) is evaluated based on the indicators described in chapter 1, namely responsiveness to the needs of the target clients or how well it facilitates the flow of information on farmers' needs to researchers; capacity to transfer relevant technology or how well it facilitates the flow of information and techniques from the research system to the farmers; sustainability of the linkage mechanism given various institutions involved; and capacity to increase farmers' access to available resources.

6.2 Similarities and Differences

In Cases 1 and 3, the combined strategy of local capability building and technology training was employed. Cases 1 and 3 were both 'project-type' in nature with definite

Table 6.1 Summary features of the three case studies.

Feature	Case 1	Case 2	Case 3
1. Co-operative under study	Taminla Bamboo and Rattan Growers Association Multipurpose Co-operative (TABARGA MPC)	Lutucan MPC	Integrated Jalajala Federation of Co-operatives (INJAFEDCO) with focus on Alibangbangan Multipurpose Farmers Co-operative, Inc. (AMFCI)
2. Major enterprise	Bamboo and rattan production	Coconut fibre processing	Rice production, processing and marketing
3. Form			
-Function	Multipurpose	Multipurpose	Multipurpose
-Objective	Economic	Economic	Economic
-Structure	Independent primary co-operative	Primary co-op but member of two big Federations in Quezon	Federation and primary co-operative
-Membership	22 members, 68% farm owners and 32% labourers	4,000 with 80 to 85% coconut farmers	Federation - 10 co-operatives of almost 1,000 total membership AMFCI - 70 members, all farmers and agrarian reform beneficiaries
-Initiative	Government	Private	Government
4. Case study site	Dueñas, Iloilo province, Visayas	Sariaya, Quezon province, Luzon	Jalajala, Rizal province, Luzon

Feature	Case 1	Case 2	Case 3
5. Dominant intervening agency	Government line agency - Department of Environment and Natural Resources Region 6 (DENR-VI)	Private Sector - machine fabricator and banks (Land Bank of the Philippines and United Coconut Planters Bank)	Foreign donor - Japan International Cooperation Agency (JICA) and tripartite relationship among one government line agency Department of Agrarian Reform (DAR) and two non-government organisations (one academic and one training centre for co-operatives)
6. Other intervening agencies	Local government units (provincial and municipal government units) Philippine Council for Agriculture, Forestry and Natural Resources of the Department of Science and Technology (PCARRD-DOST) Regional R&D Consortium State, Colleges and Universities	Philippine Coconut Authority Department of Science and Technology Region 4 Local government unit (provincial office) Department of Trade and Industry	National Irrigation Administration Local government units
7. Major source of funding or credit	PCARRD-DOST	Banks and co-operative' s equity	JICA and DAR

Feature	Case 1
8. Manner of linkages	One government agency (DENR-VI) served as major conduit of all interventions. It facilitated all linkages of the co-operative. The relationships among the different intervening agencies and the co-operative were covered by MOAs, with DENR-VI always included as signatory.

Case 2	Case 3
The co-operative took care of its own linkages. There was no one agency coordinating the interventions. Services and projects of intervening agencies for the co-operative were largely independent of each other. Some activities supported by different agencies had similar objectives and there could be duplication of efforts. The linkage with the private manufacturer was formalised through a five-year marketing agreement. Linkage with banks was covered by rules and procedures of these banks' accreditation and lending programs. Linkage with DOST 4 was formalised through the involvement of the co-operative in the DOST's interagency council for S&T.	There was tripartite linkage among one government agency and two NGOs in the implementation of institutional development component of the project. The federation/co-operatives did not have direct linkage with the foreign donor that funded the infrastructure projects, of which the former were the beneficiaries. The project was covered by 'exchange of notes' between the Philippine and Japanese governments. The intervening agencies drew MOA among themselves with very clear delineation of functions. The federation/co-operatives were not part of the MOA because they were not organised yet at the time of signing. The activities of the two NGOs were compartmentalised and not synchronised. The coordinating mechanism of the DAR was not sufficiently effective.

Feature	Case 1
9. Effectiveness of linkages	Linkage facilitated the flow of information on farmers' needs to the research system through demonstration farms. With DENR as primary source of forest-related technologies and as dominant intervener, the flow of information from the research system to the farmers was assured. In terms of sustainability of linkage with LGU, free access to land has been assured for 20 years through a MOA. The local government code gives the co-operative and the LGU legal basis to continue their collaboration. Direct linkage with DENR-VI ended after completion of the project but the linkage provided the co-operative training on how to access technology, market, and other support services. The linkage was not enough to enable the co-operative to acquire confidence in negotiating with financial institutions and the skill in packaging of business proposal required by banks. Linkage among DOST, DENR and the co-operative provided the co-operative a chance to know the experiences of other co-operatives involved in bamboo and rattan production in other parts of the Philippines. Feedback from DENR on farmers' needs was important input to the national R&D program on bamboo and rattan. After the project, it is likely that future national programs on bamboo and rattan (e.g. processing aspect) will involve the co-operative because of its established bamboo, rattan and other forest-tree plantations.

Case 2	Case 3
Through linkage with the manufacturer, co-operative gained access to the market. Since the co-operative has proven its credit-worthiness, the banks included the former in its priority list of borrowers. The active involvement of the co-operative in the programs of the banks enabled the former to grab lending opportunities as they arose. Linkage of the co-operative with DOST's interagency S&T council was not certain because of the *ad hoc* nature of the council.	Linkage among DAR, SEARCA and NATCCO facilitated the flow of information among the IDC implementers through the coordinative mechanisms installed (e.g. management committee). There was little direct interaction among them at the beneficiaries' level so linkage was responsive only to the needs of the co-operative/federation officers. The tripartite linkage did not facilitate the flow of information and capability building of majority of co-operative/federation members. The linkage has provided the co-operatives access to rice processing centre, new production technologies, market and link with other GOs and NGOs. The responsibility of a) managing irrigation facilities was transferred to the primary co-operatives (but with lots of problems); b) managing RPC was handed over to the federation and c) road maintenance transferred to the local government. Linkage with NATCCO ended with completion of the project. SEARCA signed new MOA with the federation and LGU to sustain gains from the project.

Feature	Case 1
10. Technology transfer approach	Project approach with definite timeframe and objectives with project staff compliment. Top-down at the national project level (the general areas of R&D were set at the national level). Bottom-up at the grassroots level (the details of the project for the site were worked out with the local community) DENR-VI used the community-based approach, where beneficiaries actively participated in defining specific needs, formulating plans to address the needs, and undertaking necessary actions to achieve goals and plans. Technology transfer strategy incorporated farmers' knowledge and indigenous practices. It encouraged innovations such that farmers had short-, medium- and long-term sources of livelihood. It had strong business and commercial orientation and clear identification of products to sell. The dominant intervener employed the strategy of intensive institution-building during the initial stage of the project. It gradually phased in the technology transfer component, such as training, demonstration farms, etc. until it became the major component towards the last stage of the project.

Case 2	Case 3
Simple and direct technology transfer process; bottom-up approach with the co-operative taking the initiative based on what its perceived needs were.	Multi-sectoral project approach with two major components—infrastructure and institutional development, but heavily leaning on the former. Institutional development component was not originally part of the project and lagged behind the infrastructure construction. Generally top-down from project planning, packaging to implementation. There was limited participation of the local community in all these phases. In terms of infrastructure component, there was practically no technology transfer from Japanese firms to the local community; only the skills in physically operating the rice processing complex were transferred. Technology transfer approach under the IDC component was combination of the strategies of local capability building and training on technical aspect. However, since different agencies were responsible for these strategies, there was problem with synchronisation of activities at the field level. Technology transfer was limited to the rice production technologies and the skills in managing the rice processing centre and benefited only the co-operative/federation officers and active members. The inactiveness of many farmers was an indication of the failure of the IDC component to fully harness the co-operatives.

duration and objectives. The project was the primary vehicle for technology transfer and other kinds of intervention. Technology transfer was intended to happen within the given timeframe. Afterwards the co-operatives should be able to manage or run their own affairs.

While Cases 1 and 3 had the same technology transfer strategy, they differed in the implementation aspect. In Case 1, there was one agency coordinating the interaction between and phasing-in of the strategy of local capability building and the strategy of technical training. In Case 3, two NGOs were separately responsible for the two respective strategies, and the coordinating agency failed to provide mechanisms for monitoring the activities of the NGOs at the field level.

Case 2 was mainly bottom-up in approach with the co-operative members identifying the kind of interventions that they needed. Case 1 was top-down at the national project level (where the general areas of R&D were set at the national level) and bottom-up at the grassroots level in which the local community was actively involved in determining the details of the project or intervention. Case 3 was generally top-down from project planning, packaging, to implementation with some consultation with the beneficiaries in the aspect of transfer of production technologies.

In Case 1, one government agency served as conduit of all interventions to the co-operative. In Case 2, the co-operative took care of its own linkages. In Case 3, there was tripartite linkage among one government agency and two NGOs.

In Cases 1 and 2, the co-operatives were signatory to the MOAs while in Case 3 the co-operative or federation was not included in the MOA because they were not organised at the time of signing. This had an effect on the degree of participation of and importance accorded to the beneficiaries. In Cases 1 and 2, the co-operatives were seen as major participants of the project activities, while in Case 3 they seemed to be viewed only as objects of intervention rather than active participants.

The detailed discussion and analysis of the case studies are covered in chapters 7 to 9 while the main threads of argument drawn from these studies are presented in chapter 10.

CHAPTER 7

CASE 1: TABARGA MULTIPURPOSE CO-OPERATIVE

Engaged in Bamboo and Rattan Production

7.1 Introduction

This case study looks at a co-operative whose dominant intervener in terms of technology transfer is a government line agency. In this modality, the dynamics of technology transfer involving a co-operative, a government line agency as dominant intervener, and other agencies providing support services was investigated.

The chapter begins with a description and background of the Taminla Bamboo and Rattan Growers Association Multipurpose Co-operative (TABARGA MPC). It describes the linkages and networking activities of the co-operative and analyses the nature of interrelationships among the key players in the case study. The concepts of coordination and resource dependencies are useful basis for analysing these interrelationships. Effectiveness of linkages is evaluated based on the indicators described in chapters 1 and 6. The chapter ends with an analysis of the technology transfer approach identified in this case study.

This case study highlights the successful linkage among a co-operative—the TABARGA MPC, a national government agency—the Department of Science and Technology (DOST), a regional unit of a line agency—the Department of Environment and Natural Resources (DENR) Region-VI, and a local government unit—municipality of Dueñas. Their relationship revolved around a project entitled, 'Demonstration and Pilot Application of Technology Packages and Production Systems of Bamboo and Rattan'. The project involved the transfer and commercialisation of technologies on the propagation and utilisation of bamboo and rattan for improved ecological and livelihood security of the community. The roles of each actor were well defined and coordinated. The DOST provided national guidance and linked TABARGA with other co-operatives and research agencies involved in the project. The DENR-Region VI facilitated all linkages for and provided technical and management assistance to the co-operative. The municipal government offered the use of a 10 hectare land for bamboo and rattan production and

extended other important local government services to the co-operative. It linked the co-operative to higher level local government units. The co-operative operated various techno-based livelihood activities including nursery seedling production. It actively participated in the research component of the project through the demonstration farms, and in the technology transfer component through training on new practices and entrepreneurship.

This linkage mechanism facilitated the flow of information and technologies from the research group to the farmers because the co-operative had direct access to DENR, one of the primary sources of bamboo and rattan technologies in the Philippines. The demonstration farms, jointly managed and operated by the co-operative and the DENR, provided both parties first hand experience and knowledge on location-specific needs, information and technologies. The linkage outlined here also widened the co-operative's connections to include research units and co-operatives from other parts of the country, and state colleges and universities, private entrepreneurs and other government agencies in region VI. It presented the co-operative with opportunities to develop its technical and management capabilities. For instance, the co-operative had the chance to train other farmers and entrepreneurs on bamboo and rattan production, and in the process increased their level of confidence and self-worth. The linkages mentioned here are observed to have produced positive results when there was commonality of purpose among the different stakeholders and clear understanding of the benefits that would be derived from such linkages.

The case study also demonstrates the effectiveness of a strategy that combines features of top-down and bottom-up approaches to research and technology transfer. The general areas for research and technology transfer were set at the national level through the national project on bamboo and rattan. Specific need-based and market-oriented plans and activities were formulated and implemented by the co-operative members and the community with the expert guidance and mentoring from DENR-VI. Several lessons can be drawn from the technology transfer strategy in this case study. Consideration of farmers' knowledge and indigenous practices in the development and implementation of co-operative's activities increased the members' sense of project ownership. Research and technology transfer plans and activities that were locally determined, dynamic and flexible encouraged innovations that supported short-, medium- and long-term sources of livelihood. Technology commercialisation was facilitated when projects of the co-operative

were market and product-oriented. The case study also illustrates the soundness of an approach that gives equal importance to local institution building, technology intervention and networking/linkaging with agencies providing support services.

7.2 Description of the Site and the Co-operative

Taminla Bamboo and Rattan Growers Association Multipurpose Co-operative (TABARGA MPC) is located in Barangay Taminla, Dueñas, Iloilo, Philippines **(Figure 7.1)**. Iloilo is one of the 5 provinces in Region 6 or Western Visayas region[1] of the Philippines. It consists of six municipalities including the Municipality of Dueñas. Barangay Taminla is one of the 47 barangays in the Municipality of Dueñas. **Appendix 7.1** defines province, municipality, and barangay, all of which are political subdivisions of the local government units (LGUs). The town proper of Dueñas is 44 kilometres away from Iloilo City. Iloilo province has a total land area of about 471,940 hectares with 256 hectares occupied by Barangay Taminla. Barangay Taminla has a total population of 180 households or 872 people. TABARGA MPC is accessible by public utility jeepney from the town proper by taking a 3 kilometre ride to crossing called 'Bangga Tonoy' and nine kilometres of rough road from crossing to the site. The people in Taminla speak the dialect called 'Karay-a' among six dialects spoken in Western Visayas. There are two pronounced seasons in the area—dry from November to May and wet during the rest of the year. Barangay Taminla is generally flat to rolling and moderately sloping along the valleys with an elevation of about 300 to 500 feet above sea level. The place is suitable for growing rice, corn, vegetables and bamboo. Up to this writing, the major portion of Barangay Taminla, including the TABARGA MPC site, has no public electricity supply yet.

The co-operative was born out of the project entitled, 'Demonstration and Pilot Application of Technology Packages and Production Systems of Bamboo and Rattan'. The general objective of the project was 'to transfer and commercialise technologies for the propagation and utilisation of bamboo and rattan for improved ecological and livelihood security'.[2] The project was funded by the Department of Science and Technology (DOST)

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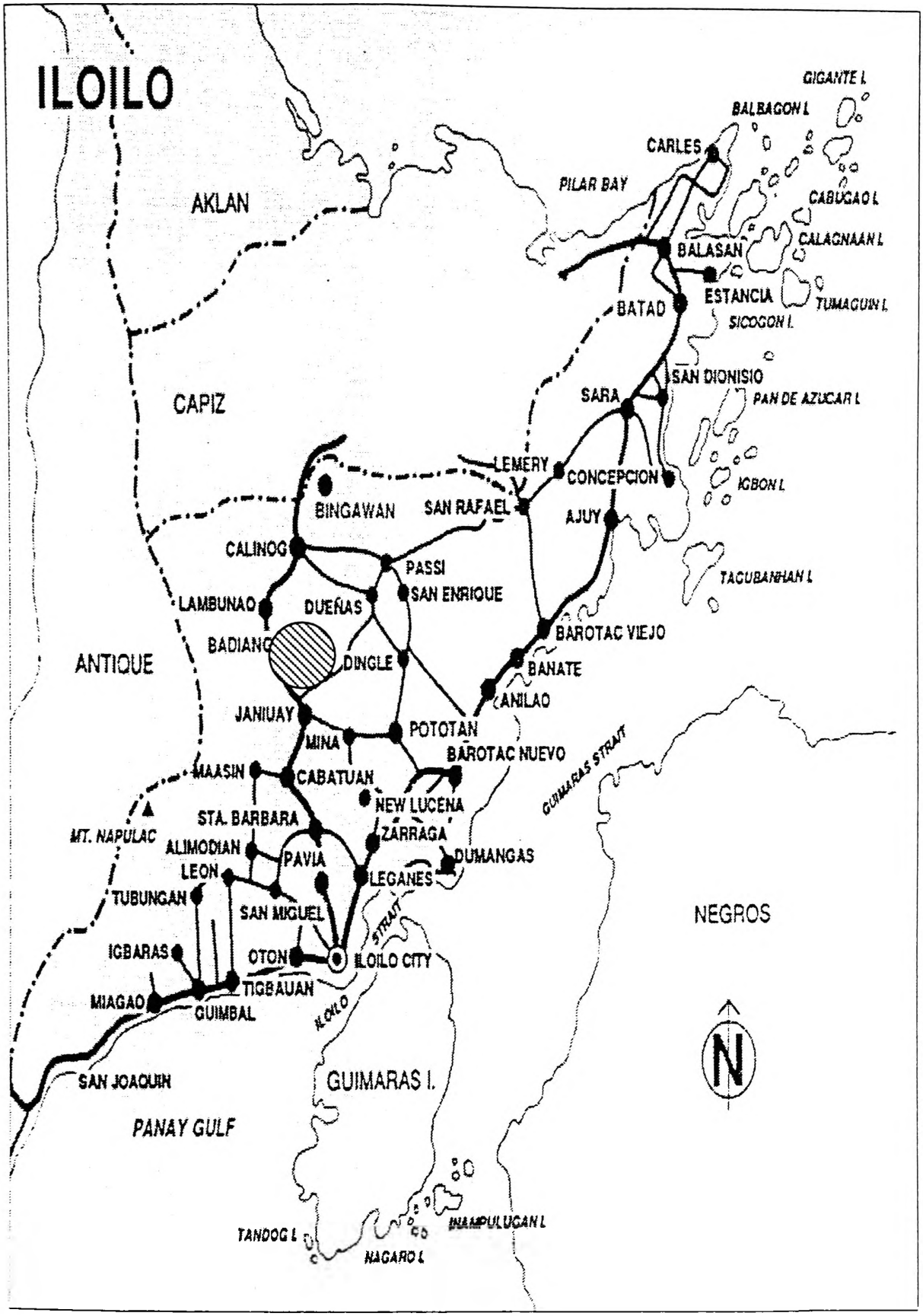
[1] The Region is an administrative district in which the field units of national government departments and bureaus are established. There are 14 regions in the Philippines and 3 major geographical areas namely Luzon, Visayas and Mindanao. They are not vested with political and corporate powers and therefore not considered local governments.

[2] Francisco Binoya, A. Tiolo-Dalawis, N. Gigare, and Arturo Repospolo, 'The integrated bamboo-rattan livelihood project: The TABARGA MPC experience', *Techno Transfer Series*, vol. 5, no. 5, DENR, Iloilo City, Philippines, November 1994, p. 1.



Legend: Tabarga MPC site: Barangay Taminla, Dueñas, Iloilo Province. Philippines

Figure 7.1 Location map of TABARGA Multipurpose Co-operative (Case 1)

through the Philippine Council for Agriculture, Forestry and Natural Resources Research and Development (PCARRD). It was implemented by the Department of Environment and Natural Resources Region 6 (DENR-VI) in cooperation with the local government of Dueñas. It had two major components, namely long-term bamboo and rattan production or plantation establishment, and the integration of various activities for a medium-term and short-term livelihood component. The specific project activities included the following:

- site survey and selection;
- participative community appraisal;
- consultation with the community regarding the design of appropriate production systems and training modules;
- establishment of linkages with other government agencies external to the community;
- introduction of production and utilisation systems and technology packages;
- production of communication materials such as posters, manuals, primers and radio materials;
- conduct of community training sessions;
- actual demonstration of production and utilisation systems and technology packages;
- provision of technical assistance on planting stock production, nursery establishment and maintenance, harvesting and utilisation; and
- data and information collection and analysis, and process documentation.

It also had a built-in research component where bamboo and rattan production technologies were field-tested and improved as needed. Some of the research activities undertaken are shown in **Appendix 7.2.**

Through the project, the following production systems were established in Barangay Taminla: 6.48 hectares of rattan plantation (3 ha communal plantation and 3.48 ha individual farms of co-operative members); 6 hectares of assorted bamboo species plantation (3 ha communal plantation and 3 ha farmer-owned); and commercial seedling production or nursery operation of bamboo, rattan and other fast-growing tree species such as mahogany and acacia mangium. Communal or compact forests were collectively established and managed by the co-operative members. These communal forests served as demonstration farms that gave the co-operative members the opportunity to learn together and transfer their skills to other clientele. The project began in January 1993, was completed in December 1995 and fully turned over to the co-operative in 1996. The

emphasis of the project was community organising during the early stage of implementation. The focus of attention shifted from community organising[3] and social preparation[4] to technical assistance at the ratio of 50-50 during the second year. Technical assistance was in full swing at the third year of implementation.

TABARGA MPC started as an association called, 'Association of Farmer Co-operators' before becoming a full-fledged co-operative in 1994. It did not precede the project in any form. Previous to the project implementation, there was no formal organisation in the site except the Barangay Council. The formation of the association followed after the project site and beneficiaries had been selected. The project site was chosen by DENR-VI, in consultation with the municipal council, after a thorough survey of the areas in the municipality, and upon approval by the mayor of the use of a ten-hectare lot for plantation establishment. Brainstorming sessions with the barangay officials and residents were conducted by the DENR-VI and representatives from the municipal office to identify the beneficiaries or co-operators of the project. Some of the criteria used to select the farmer co-operators were: proximity to project site, with own farm area for technology application, leadership potential, and household size in terms of working members. Before the project, the co-operators were mostly upland rice farmers earning an average annual income of P9,584.00 (US$370.00). A few others were employed as barangay officials and teacher, worked for daily farm wages, produced charcoal during the summer months, and did carpentry work. The average annual income of farmer co-operatives increased by almost 90 percent after three years of project implementation due to the various livelihood activities. The Association of Farmer Co-operators was initially headed by the barangay captain because of his educational background, experience and leadership quality. When the association became a co-operative, a new set of officers was elected.

The TABARGA MPC is composed of 22 members, 68% of whom are farm owners and 32% labourers. Ninety two percent of the members are married, with an average

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[3] Community organising is defined by the DENR (in DENR Memorandum Circular no. 77-01, 20 January 1997, p. 2) as 'the process and the set of activities aimed at mobilising the community, developing and strengthening their capabilities to plan, implement and manage a project through the community-based approach.

[4] Social preparation is defined by Stuart (in Teresa Stuart, PCARRD Monitor vol. 22, no. 2, March-April 1994, p. 2) as 'conditioning activities to any kind of intervention'. Stuart explained that these activities include pre-planning that will identify from the start how ideas, problems, needs, pre-occupations and aspirations are inputted into the planning process. She added that 'interactions in social preparation activities will enable the local people and project facilitators to discover each others talents, draw out potentials and establish friendships, establish new contacts with outsiders who could be instrumental in meeting their needs'.

household size of 6.7 persons. In terms of educational attainment, 40% have reached primary level education, 32% secondary level, and 28% were graduates of either technical or Bachelor degrees. Almost all registered members were male.

The leading economic activity of TABARGA MPC was nursery operation of bamboo, rattan and other forest tree species such as mahogany, cacao, acacia mangium, gmelina, pilinut and citrus. Seedlings were planted in both the communal and individual areas of the co-operative members. The nursery operation contributed almost 75% to the co-operative's total income. It was expected to be the major source of livelihood of the members until such time that bamboo, rattan and other forest tree species in their plantation areas would be ready for harvesting. **Figure 7.2** shows some pictures of the co-operative's nursery operation. Other activities and sources of livelihood of the co-operative included palay (unshelled rice), livestock and vegetable production; contract job for plantation establishment; sericulture;[5] catering service during training conducted on site; rental of farming tools and equipment (such as sprayer and drying net/screen); rental of cellphone; and micro-lending for crop production.

The co-operative engaged in the production of swine and goats using the technology of the Comprehensive Agrarian Reform-Integrated Social Forestry Agrilivestock program of DENR-VI. The technology consisted of improved animal breeds, and feeding and health management. Feeding and other activities were undertaken by the participating members in coordination with the project staff in-charge. Income from the enterprise was shared between the member-caretakers and the co-operative's trust fund at 20:80 for swine and 50:50 for goats. Upgraded breeds of chicken were obtained from the Northern Iloilo Polytechnic State College (NIPSC) and were used to improve the existing poultry stock of co-operative members.

The co-operative raised fish in a 750 sqm fishpond using the fish production technology—pond preparation, fertilisation, and stocking density—of the Department of Agriculture (DA) in Iloilo. The fish project was supported by the Office of the Governor. The co-operative provided the DA-Iloilo with giant bamboo planting materials in exchange for fingerlings. A vegetable garden was also established by the co-operative with most of the produce utilised for home consumption by participating members.

[5] Sericulture is the art of raising silkworm for the production of raw silk.

Giant bamboo propagules in clonal chamber

Potted rattan seedlings

Figure 7.2 Bamboo and rattan nursery operations: TABARGA MPC

The co-operative and DENR-VI coordinated with the Southern Cultural Communities to help the cultural minorities in Barangay Taminla. They provided farming opportunity to cultural minorities called 'Ati' by allowing them to plant cash crops, such as rice and corn, in the vacant spaces between bamboo plants. With the success of the giant bamboo nursery operation, the co-operative board of directors later decided to use these open spaces for expanding their bamboo plantation to include the giant bamboo species.

The contract planting business of the co-operative is an innovative income generating strategy that supported the tree planting and greening programs of private entrepreneurs and local government units (LGUs). The co-operative members acted as trainers and resource speakers during training activities for LGUs and the Department of Agrarian Reform. They also participated in an information campaign about bamboo and rattan production including guestings in radio programs within Western Visayas.

Through the bamboo and rattan project, the co-operative developed and adopted a scheme of capital build-up (CBU) formation to generate funds that they could use to support other business projects. As a matter of policy, the co-operative's income was allocated as follows: 50% went to revolving fund; and 50% to individual co-operative members as their share in income. With the CBU, the co-operative was able to extend crop loans to members at 5% interest rate per month for purchase of farm inputs. The co-operative and DENR-VI were responsible for the repair of the rough road leading to the project site through representations made with the local government units. The co-operative has also been negotiating with the regional government, through the municipal LGU, for the electrification of their barangay.

With the involvement of some co-operative members in the Barangay Council and Barangay Agrarian Reform Committee, the co-operative had some degree of participation in the local decision-making process. Their concerns could be articulated through these persons. TABARGA MPC was active in social activities such as organising tree plantation project that involved teachers, students and other residents in the barangay. During these activities, the co-operative donated seedlings and coordinated the planting operations.

The co-operative, through the project, had instituted mechanisms to ensure the smooth operation of their enterprises. They had organised different working committees as responsibility centres for each of their business projects. The Board of Directors met every month to monitor the progress of their projects. As a strategy to encourage regular and

punctual attendance to these meetings, three door prizes (1st, second and third) were given out every meeting. Funds for this purpose were drawn from the co-operative's income. The co-operative also kept a simple diary and logbook to record activities related to the communal and individual projects of members. The information recorded as well as financial records were open to all members to promote transparency within the co-operative.

7.3 Linkages and Networking

The co-operative has established linkage with many government, non-government and private sector groups. This section describes the roles and manner of intervention of these entities with respect to the co-operative.

The DOST-PCARRD provided the largest financial support in the form of grant to the project of which TABARGA MPC was the beneficiary. Bamboo and rattan are two of the top priority commodity areas of PCARRD[6] under the 'Science and Technology Agenda for National Development (STAND)'. A national bamboo and rattan program, entitled 'Integrated R&D Project on Bamboo and Rattan (Phase III)' was packaged by PCARRD through its National Bamboo and Rattan Team in support of STAND. The team consisted of experts in bamboo and rattan from both the government and the private sector. The program was extensively reviewed by groups working on other areas affected by bamboo and rattan such as furniture, environment, reforestation, and gifts, toys and housewares. It was developed as an offshoot of Phases I and II of the bamboo and rattan project that were supported by the International Development Research Centre (IDRC).

Through Phases I and II, various technologies and information on production and processing of bamboo and rattan (see **Appendix 7.3** for list of technologies) were generated and sourced from other countries. Hence, the emphasis of Phase III was technology transfer and commercialisation. The project had four components: demonstration and pilot application of production systems and technology packages; policy and socioeconomic studies; technology improvement; and species improvement and

[6] PCARRD manages the National Agriculture and Resources Research and Development Network (NARRDN) in the Philippines. The NARRDN is composed of 127 member-agencies from Schools, Colleges and Universities, DA, DENR station/centres, and other government and private agencies. The members of the NARRDN conduct basic or applied research on specific commodity assignments to avoid duplication of R&D efforts. A member-agency could be any of the following: national multicommodity R&D centre; national single commodity R&D centre; regional R&D centre; or cooperating station.

conservation. Component 1 was the centrepiece of the program. It involved six cases[7] defined in terms of the existing resources and skills of the community and location of the area whether upland or lowland.

The project, of which DENR-VI and TABARGA MPC were involved, corresponded to Case #1 in which land resource was essentially wasteland and people were not really skilled in ways to rehabilitate or reclaim the land. Funds for this project was released by PCARRD-DOST to DENR-VI. The financial support covered expenses for the implementation of project activities and hiring of project staff who would assist the co-operative members in their daily operations. PCARRD coordinated directly with the DENR-VI for monitoring and evaluation of the project. PCARRD-DOST's support for the project was covered by a Memorandum of Agreement (MOA) among PCARRD-DOST, DENR-VI and TABARGA MPC. The agreement provided for the joint undertaking of the project by these organisations. In this kind of set-up, PCARRD-DOST usually provided counterpart funding and DENR gave its own material contribution such as time and salary of staff, use of office facilities and others.

The municipal government of Dueñas offered the free use of a 10 hectare land in Barangay Taminla for the establishment of bamboo and rattan plantation, nursery seedling production space, and construction of staff and training house. This support was formalised through a MOA among DENR-VI, the local government of Dueñas, and TABARGA MPC when it was still an association. The MOA stipulates 20 years free use of land and a profit sharing scheme of 25:75 percent (in favour of the coop) on the bamboo and rattan harvest. The local government unit also provided grant, in kind and cash, for swine production expansion project, nursery commercialisation and the establishment of the two-hectare communal forest plantation. Their assistance to the co-operative graduated from the more 'material or physical support', during the first two years of the project, to moral and linkage support such as acting as conduit to the higher local government units for representations made by the co-operative. The support extended by the municipality of Dueñas to the co-operative was consistent with their annual development plan, specifically the program on 'environmental protection and tree planting'.

[7] Case #1: Wasteland/lowland; Case #2: Wasteland/uplands; Case #3: Degraded areas/lowland; Case #4: Degraded areas/upland; Case #5: Resource rich areas/lowland and Case #6: Resource rich areas/upland

The DENR-VI, as the implementing agency of the project, had the most extensive and direct assistance to the co-operative until its full withdrawal from the project in 1996. The project was consistent with DENR's 'Agroforestry Development Program' and 'Agroforestry Curriculum Development Program'. Through the project, DENR-VI was able to facilitate the formation of the co-operative in coordination with the Co-operative Development Authority (CDA). The DENR-VI extended management and organisational assistance to the co-operative. Its leadership style was autocratic during year 1; democratic during year 2, and laissez-faire during year 3 of the project. It was a deliberate strategy of the DENR-VI to go through these stages (firm guidance in the beginning and loosening of the reins towards the end of the project) to ensure that activities were implemented as planned considering that the project period was limited to three years.

DENR-VI took the major management responsibility and provided leadership during the early stage of the project. While these tasks were supposed to be fully absorbed by the co-operative during the later stage of the project, the co-operative members seemed to have developed a dependent attitude on DENR-VI in the aspect of strategic planning, financial and linkage management. DENR-VI provided the co-operative with technical assistance on nursery operations and plantation establishment and assisted in market linkage, information dissemination, and other networking activities. Marketing of the co-operative's products was facilitated through the linkages, networking and information dissemination efforts of DENR-VI.

The technology transfer scheme of DENR-VI was anchored on community-organising in which all activities, including the necessary technical skills, were undertaken as part of the strengthening process of the organisation. DENR-VI followed a '3 year, phase-in/phase-out scheme' that was made clear to the co-operative from the beginning of the project. The strategy called for greater effort on social preparation during the first year, technology or technical skill focus during the 2nd year until the final turning over of the project to the co-operative during the 3rd year.

Social preparation involved, among others, the following activities: various groundworking and brainstorming sessions with municipal and barangay officials and prospective co-operators; training on values re-orientation, team building, co-operative organisation and management, leadership, decision making, organisational and project assessment; and cross-visits to existing bamboo plantations in Region 6. While bamboo

and rattan plantation was the major focus of attention, the co-operative engaged in other activities in the form of livelihood projects that would give them short to medium-term benefits. These livelihood projects are discussed in section 7.2.

The DENR-VI tapped its existing linkages with other government, SCUs, NGOs, and the private sector to put the other livelihood components of the co-operative on the ground. It guided the co-operative through the process taking into account the co-operative members' indigenous knowledge and practices.

At one time, there was major disappointment over the sales of rattan seedlings as immediate source of income. Although there was the plantation to look forward to, the co-operative needed income generating projects as source of immediate income.

It was during this time of the 2nd year project operation that DENR-VI introduced another bamboo species called 'giant bamboo'. Since there was no natural stand of giant bamboo in Iloilo, DENR-VI ordered giant bamboo cuttings from DENR Region 10 in Mindanao[8] and tried them in the co-operative's nursery. After several failed attempts at getting the desired level of germination and just when they were ready to give up on giant bamboo, DENR-VI and the co-operative experimented on simple old technologies such as use of rooting hormone, clonal chamber and vermi-culture. The package of technology **(Appendix 7.4)** was very successful that they ended up getting 90 to 95 percent germination rate. This was very high compared to a level of 10 percent when cuttings from Mindanao were planted as they were. Soon, the co-operative was selling giant bamboo seedlings like 'hotcake' through the marketing efforts led by DENR-VI.

DENR-VI used its own linkages and membership in consortia and interagency group such as Western Visayas Agriculture and Resources Research and Development Consortium (WESVARRDEC)[9]—a group of government R&D agencies; and the Regional Agriculture and Forestry Council (RAFC)[10]—a group of representatives from both the government and private sectors, to promote the co-operative's products and services. Through these linkages, two of the consortia members became satellite nurseries of TABARGA-MPC with the co-operative providing the necessary planting materials.

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[8] Mindanao is one of the three major geographical areas in the Philippines and located in the southernmost part of the country.

[9] Refer to discussion about WESVARRDEC in later part of section 7.3.

[10] Regional Agricultural and Fishery Council (RAFC) is the Department of Agriculture's main agency for coordinating private sector participation in the development of the agricultural and fishery sectors in the regions. It aims to establish productive partnerships between government and the private sector, and between the DA and the local government units (LGUs).

DENR-VI also linked the co-operative to its Agroforestry Curriculum Development Program.

In this scheme, agroforestry students of selected universities in Iloilo underwent on-the-job training on nursery operations under the supervision of the co-operative members. These students were given an incentive of five percent for every seedling grown and sold.

DENR-VI received two major awards in 1996 for their project with TABARGA. The first one, Best Development Paper Award, was conferred by PCARRD to DENR-VI for its entry entitled 'Integrated Bamboo Rattan Community-based Livelihood Project'. The other award was given by WESVARRDEC during the 1996 Regional R&D Symposium for the paper entitled, 'Demonstration and Pilot Application of Technology Packages and Production Systems on Bamboo and Rattan'. These papers were based on DENR-VI experience with TABARGA MPC. They discussed their efforts in community organising and technical training for the propagation and production of bamboo and rattan. These undertakings provided the co-operative with opportunities for alternative sources of income and access to other support services and market.

The Provincial government of Iloilo, through the Provincial Environment and Natural Resources Office (PENRO), provided the co-operative with some funds for the expansion of its municipal nursery. This support was in line with the Greening Program of the Governor. The amount granted to the co-operative was in the form of soft loan at 6% interest rate per annum payable after two years. TABARGA MPC was also a recipient of the fish dispersal project of the Provincial Agriculturist.

The Office of the Governor came to know of the co-operative through its close coordination with DENR-VI. The Governor's office has promoted the use of bamboo and rattan to reforest the province and raise farmer's income. It procured several planting materials from TABARGA for the rehabilitation of a major watershed area in Iloilo. It also hired the training, food and accommodation services of TABARGA MPC for on-site training on bamboo production of the technicians of the Office of the Governor. TABARGA MPC was invited during exhibits and fairs sponsored and organised by the provincial government.

WESVARRDEC is a consortium of R&D institutions in Western Visayas of which DENR-VI was a member. It provides the venue, in which the different agencies concerned, can pool their resources together to support activities of their common interest.

WESVARDDEC has identified and packaged bamboo and mango as their flagship R&D programs for Western Visayas. The applied communication group of WESVARRDEC assisted in the documentation of bamboo project based on the experience of TABARGA. It invited TABARGA members to join the 'information caravan' so that the co-operative could promote the bamboo production technology and market its nursery products. It facilitated farmer-to-farmer demonstration and dissemination of the bamboo nursery operations and plantation establishment technologies. WESVARRDEC has assisted DENR-VI and the co-operative in their information needs on bamboo since this commodity has been a major focus of the consortium's 'one-stop-information-shop' project. WESVARRDEC is one of the 14 regional R&D consortia in the country that PCARRD had initiated and provided regional R&D management support.

The Fiber Industry Development Authority (FIDA), a government agency under the administrative supervision of the Department of Agriculture (DA), is responsible for providing continuous leadership and support for the integrated development of the fibre industry. Its authority involves the aspects of research, production, processing, marketing, trade regulation and fibre quality regulation. In line with FIDA's National Integrated Sericulture Development Program in Western Visayas, it has assisted co-operators or co-operatives interested in sericulture or silk production. TABARGA MPC was a recipient of FIDA's financial and technical assistance. This support was intended for the establishment of a 0.5 hectare mulberry plantation and construction of cocoon rearing house. The co-operative members provided the labour requirement for these activities.

FIDA knew TABARGA MPC through its association with DENR-VI officials. It provided the co-operative members hands-on training on mulberry plantation and cocoon rearing. FIDA fielded its own technician for this purpose. There was no repayment required of the co-operative, and after five years it could own the rearing house.

However, there was a problem with the sericulture project, and activities were temporarily suspended. The problem could be viewed from two perspectives. From the point of view of the co-operative, the problem was seen as irregular supply of eggs for rearing (thus monthly rearing as planned was not performed), non-appearance of FIDA technician for some time, and FIDA not fulfilling its promise to give cocoon drier for use during the rainy days.

On the part of FIDA, the staff involved perceived the problems as non-compliance with the MOA and lack of interest by the co-operative to pursue the project. As one of the FIDA staff members put it, 'maybe TABARGA preferred projects that yielded immediate cash'. To FIDA, this lack of interest by the co-operative was manifested by the following: use of rearing house for other purposes, such as training venue and accommodation, without permission from FIDA; and use of the area allocated for mulberry plantation for bamboo production. There was also a perceived lack of confidence of the co-operative to make decisions for itself and dependence on DENR-VI project leader and staff for decision making. These problems prompted FIDA to defer supply of eggs to the co-operative.

Apparently, there was conflict of expectations and objectives between the co-operative and FIDA. The conflict of expectations could have been confounded by the fact that the co-operative experienced different kinds of system and incentives from one intervener to another. Based on the experience of FIDA, it would be easier to deal with individual co-operators than co-operatives.

The Northern Iloilo Polytechnic State College (NIPSC) is a member-agency of WESVARRDEC. The manner of linkage with TABARGA MPC was in the form of 'barter trade' in which NIPSC provided the co-operative with different strains of chicken for breeding purposes in exchange for rattan seedlings. NIPSC personnel also acted as resource speakers on livestock production.

The Dingle Agricultural and Technical College (DATEC) is also a member-agency of WESVARRDEC. DATEC came to know of the co-operative when they joined the training on bamboo production conducted by the co-operative for the Office of the Governor. There was exchange of information and technologies between TABARGA MPC and DATEC. DATEC established its own nursery of giant bamboo by procuring cuttings from Mindanao through TABARGA. It sought the assistance of TABARGA when they lacked agroforestry planting materials and vice versa. It was planning to rescue the sericulture project of the co-operative by providing them with eggs and by buying the cocoons that would be produced by the co-operative. DATEC brought their own visitors and students to TABARGA for field visits and on-the-job training.

Both NIPSC and DATEC are considered as satellite nurseries of TABARGA in which they buy planting materials from TABARGA and raise and sell them as seedlings. TABARGA has also created two satellite nurseries in Negros.

MONPHIL, producer of bamboo tiles in Iloilo City, has been planning to procure bamboo seedlings from TABARGA and hire its services for plantation establishment if its plans to develop some 115 hectares land were pushed through. This expansion is envisioned to support MONPHIL's growing bamboo tiles business.

7.4 Problems and Solutions

As perceived by the co-operative members, their most serious problems were the absence of electricity in their area and the poor road network condition. Unless electricity would be installed, the co-operative could not diversify into more value-added business projects such as semi-processing of bamboo products. Hauling of their products was also expensive and difficult because of the unpaved road network. For these reasons, the co-operative has continued to negotiate with the local government units. The co-operative also cited their problems with the sericulture project as discussed in section 7.3.

The co-operative members expressed confidence in being able to manage the co-operative themselves, but were apprehensive on the aspects of marketing and linkages. They were not too confident on their ability to sustain and expand linkages as these activities required special skill and resources. Therefore, they decided to hire their coordinator on consultancy and commission basis for one more year after the three-year project with PCARRD-DOST was completed. They would also rely on the established network and the linking experience gained through the project.

DENR-VI, the leading agency providing interventions to TABARGA MPC, experienced bureaucracy problems such as delays in the release of project funds and appointments of project staff. Release of project funds was delayed because of some administrative problems at DOST, the agency giving major financial support to the project. Delayed submission of the audited financial reports by the other implementers of the National Bamboo and Rattan project in other parts of the country also affected the release of funds to DENR-VI. In the release of project funds, an authority to hire project staff was required by DOST. However, authority had to be sought from the Civil Service Central Office instead of the Regional Civil Service Office because the regional office had different hiring procedures. Bureaucracy was counterproductive for technology transfer and commercialisation because time was of the essence in business related projects. The linkages with other government and non-government agencies initiated by DENR-VI

helped in ensuring the smooth implementation of the project while waiting for the release of funds from PCARRD-DOST.

The period of 3 years was observed to be inadequate for a community development project such as this. An official from DENR-VI said that based from experience with development projects, a co-operative needed more than three years to develop capabilities for long-range planning, linkages and financial management.

The co-operative members had developed a dependent attitude on the project staff in the areas of financial transactions, preparation of reports, conduct of meetings, planning and decision-making, marketing and linkages. To lessen this dependent attitude, the following strategies were instituted by the project team: assigning responsibility centres or committees for each co-operative activity; assigning the managerial planning task to members who had the capability to do so (the strong points of most members were in the manipulative skills not on managerial aspect); hiring of a bookkeeper outside the co-operative members; and operating the under-study system in which the project staff trained capable co-operative members to handle the project activities. The Board of Directors were trained on how to deal with other people or agencies by bringing them along during business transactions, outside meetings, fairs and conferences, and letting them speak about their projects. The co-operative members were given a free hand in coordinating the bamboo and rattan production training programs offered to other agencies. They were encouraged to speak as resource persons during this training.

7.5 Strengths and Weaknesses of TABARGA MPC

The strengths of the TABARGA MPC were observed by the interveners as follows: members had a unity of purpose and self-discipline; were resourceful, hardworking and honest; and were very attentive to the agreed plan of activities. The co-operative members had internalised the spirit and values of a cooperative. On the other hand, the weaknesses of the co-operative were noted as follows: the level of education of the majority of members was quite low hence their absorptive capacity for new developments was slow; and the members were not yet fully equipped to handle and establish linkages with financial institutions.

7.6 Future Plans of TABARGA MPC

The co-operative has drawn up the following plans to ensure the viability of their business:

- Link and work closely with the private sector to ensure market for their bamboo poles harvest.

  It has been expected that demand for giant bamboo seedlings will decline before the year 2000. However, bamboos from both communal and individual farmers' plantation will be harvestable by year 2000. Rattan will be ready for harvesting by year 2010.
- Entertain women members in recognition of the contribution of the wives of the co-operative members to the implementation of their livelihood projects.
- Apply for a bank loan to expand forest tree plantation.

  They have three options for expansion, namely acquire own land, lease land, or contract growing.
- Make representations with LGUs and other agencies concerned to develop the co-operative into a Bamboo and Rattan Training Centre for Western Visayas.

  The objective here is to introduce the integrated bamboo and rattan livelihood technologies to other interested entrepreneurs in the region utilising the expertise of the co-operative members.

7.7 Lessons Learned from the TABARGA MPC Experience

In the co-operative's own perception, the most important lessons they have derived from the bamboo and rattan project is the realisation of the importance of working together to achieve a common goal, and the presence of committed and competent project staff, who provided the needed technical and managerial assistance to the co-operative.

From the point of view of the interveners, primarily the DENR-VI, the following are some observations from their TABARGA MPC experience.

It was easier to intervene in an area that had not been a victim of failed development projects before. For instance, the community was not involved in the Masagana 99 project,[11] which was considered a failure in many respects. However, there was also some initial resistance on the part of the community because of what they normally heard about government programs. They had the impression that government

[11] Refer to chapter 4, section 4.6 for the discussion about Masagana 99 program.

development programs were generally not sustainable or what was locally referred to as 'ningas-kugon'.

The advantage of being an association first (*ad hoc* organisation without full legal entity) before becoming a co-operative was noted. The 'association' served as a trial run in which members could observe each other's capabilities and commitment level. It gave the members an opportunity to adjust to the idea of working together. Starting an organisation from a manageable size was also observed to be an effective institution-building strategy. Manageable size, based on DENR's experience, meant certain number of people that matched the intervening agency's capability in terms of development staff and resources. In DENR-VI case, manageable size was around 30 people.

Planning and implementing project activities based on the needs of the community improved the sense of project ownership by the co-operative members. The needs of the community were assessed by the DENR VI and municipal council through the use of benchmark data and use of rapid assessment tools for problem identification such as Quick Resource Appraisal (QRA)[12] and Rapid Rural Appraisal (RRA).[13] These needs were constantly monitored through monthly meetings with the co-operative Board of Directors and in consultation with the members. Other strategies that the DENR-VI found useful were giving the co-operative bigger roles to play in the project and emphasising the secondary roles of the interveners.

The strategy of having short, medium and long-term sources of livelihood for the beneficiaries guaranteed their strong interest and commitment towards the co-operative. Short to medium-term supplementary projects were meant to provide immediate sources of income to the co-operative's members. This was important because income from bamboo, rattan and other forest tree species plantations would only be realised starting year 2000.

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[12] Quick Resource Appraisal (QRA) is a quick and systematic method for evaluating technologies of their potential to support or improve enterprises. The QRA guides the Rural-based Enterprise (RED) team in identifying and evaluating the gaps which may hinder the establishment of an enterprise, in terms of R&D, technology packaging, production system, organisation and management, and linkages. QRA uses a specific rating system that requires the consensus of RED team members. Ratings based on team's consensus are determined and justified based on first hand information from the farmers. The process of deliberation, justification, and consensus on the ratings lead to the identification of gaps and the extent to which they prove limiting.

[13] Rapid Rural Appraisal (RRA) is an assessment procedure with multi-disciplinary teams collecting data from people in the community. The RRA concept expanded into participatory rural appraisal (PRA) to focus on the development of techniques involving the community as partners in information collection and analysis and the decision-making process (Source: Hugh Annett and Susan Rifkin, *Guidelines for Rapid Participatory Appraisals to Assess Community Health Needs*, Division of Strengthening Health Services, World Health Organisation (WHO), Geneva, 1995, pp. 2-4.)

This strategy, vis-a-vis the development of compact or communal forest,[14] was observed to have reinforced camaraderie among community members and promoted sustainable rural development.

Employing the different groups in the community, such as women and children, in the livelihood projects of the co-operative strengthened their relationship with the community. Since family solidarity was very strong in the community, the commitment of a family member (mostly a man) to the co-operative became the commitment of the whole family including wives and children. Women and children were most effective in raising seedlings of bamboo, rattan and other forest-tree species.

Establishing linkages and aggressive networking activities with government, NGOs, the private sector, and R&D consortium opened up a lot of opportunities for the co-operative in terms of market, exchange of information and technologies, logistics, tenure and many others. These linkages were stronger when parties involved (i.e. co-operative and intervening agencies) mutually benefit from the relationship. Examples of such mutuality are discussed in section 7.8.

Focusing on products (such as seedlings) or services (such as contract planting) that sell helped the co-operative members achieve an appreciation for business. Generally, farmers are adept in production system management but this orientation limited their focus to increased yield as a measure of performance. Enterprise management required a product and profit-orientation. For instance, the bamboo and rattan project could have focused on bamboo and rattan plantation establishment alone. However, instead of doing that, the project treated bamboo and rattan production as enterprises and identified possible products that would give the co-operative short, medium and long-term income. For the short-term, in the case of bamboo, the co-operative engaged in bamboo and rattan seedling production with 'seedlings' as the product to sell. For the medium-term, the co-operative expected to harvest 'bamboo poles' from the bamboo plantation they established. And for the long-term, the co-operative was planning to produce semi-processed bamboo products.

Contract planting was also a viable business venture that the co-operative undertook. They offered their expertise and labour in plantation establishment and forest-

[14] Compact or communal forest refers to the three (3) hectares each of communal rattan and bamboo plantations that the co-operative members collectively established and managed. It may also refer to the common service facilities of the co-operative such as: staff or training house, nursery with clonal and vermi chambers, water system, access road and trails, sericulture rearing house, poultry house, goat shed, piggery house, and guest shed. Some of these common facilities did not only benefit the co-operative members but the whole community as well like the access road and trails and water system.

tree species seedlings to the private sector. Contract planting was observed to be a good vehicle for transferring the plantation establishment technology to the private sector and other co-operatives.

The national bamboo and rattan project framework did not limit local implementers such as the DENR-VI to 'pre-set' technology packages. Specifically, the national project document stated that 'interventions will be designed participatively by the community and be allowed to evolve as the environment improves and peoples' needs changes'. This provision encouraged and allowed room for the incorporation of indigenous knowledge and practices into the production system design of the project. In the case of TABARGA MPC, the use of indigenous knowledge and practices increased the relevance and appropriateness of the different activities of the co-operative. It enhanced the feeling of project ownership by co-operative members. For instance, the local people had the belief that the best time to cut bamboo were months without the letter 'r' (i.e., May, June, July, August). This practice was followed in the package of technology for bamboo production and harvesting. There was however, scientific explanation to this belief. These were the dry months in that part of the region, therefore the starch content of bamboo and incidence of bamboo pest (such as beetles) were relatively low. Another example was that the bamboo planting techniques in the package of technology in terms of bamboo pole length and planting distance were modified considering the practice of the local people. In terms of harvesting practices, the local people harvested bamboo shoots while the shoots were still under the soil to avoid its bitter taste.

Technological breakthroughs widened the options and opportunities of the co-operative for increased income. For instance, the introduction of giant bamboo technology, which was not part of the original project plan, gave the co-operative considerable income opportunities at least in the short-term considering that the sale of giant bamboo seedlings earned a lot for the co-operative. Giant bamboo was not traditionally grown in Iloilo, but conscious effort on the part of DENR-VI to search for alternative sources of livelihood for the co-operative led them to the testing of the giant bamboo technology in Barangay Taminla. The original technology, as it is shown in **Appendix 7.4**, was modified to suit the local conditions.

The co-operative members, having gone through the experience of being trainers, contractors, and extension workers, have established their credibility to other agencies and

their fellow farmers as well. Farmer-to-farmer training was observed to be a very effective method of technology transfer.

7.8 Analysis of Interrelationships

The interrelationships among the three major stakeholders in this case study are represented by **Figure 7.3**. Numbers 1, 2, 3 and 4 refer to roles of major interveners with respect to the co-operative and letters A, B, C and D refer to the nature of interrelationships among the different entities involved in the case study.

7.8.1 Roles

#1 DENR-6

- Association/co-operative formation
- Technical and management assistance
- Demonstration of production systems and technology packages
- Linkage assistance for market, policy support and other services
- Project monitoring and evaluation at the project level
- Information dissemination

#2 PCARRD-DOST

- Financial support
- Linkage with other bamboo and rattan project implementers
- Project monitoring and evaluation at the national level

#3 LGU

- Land
- Financial support
- Linkage with higher LGUs

#4 TABARGA MPC

- Bamboo and rattan plantation establishment
- Operation of nursery and other livelihood activities
- Co-operative management
- Capital build-up formation

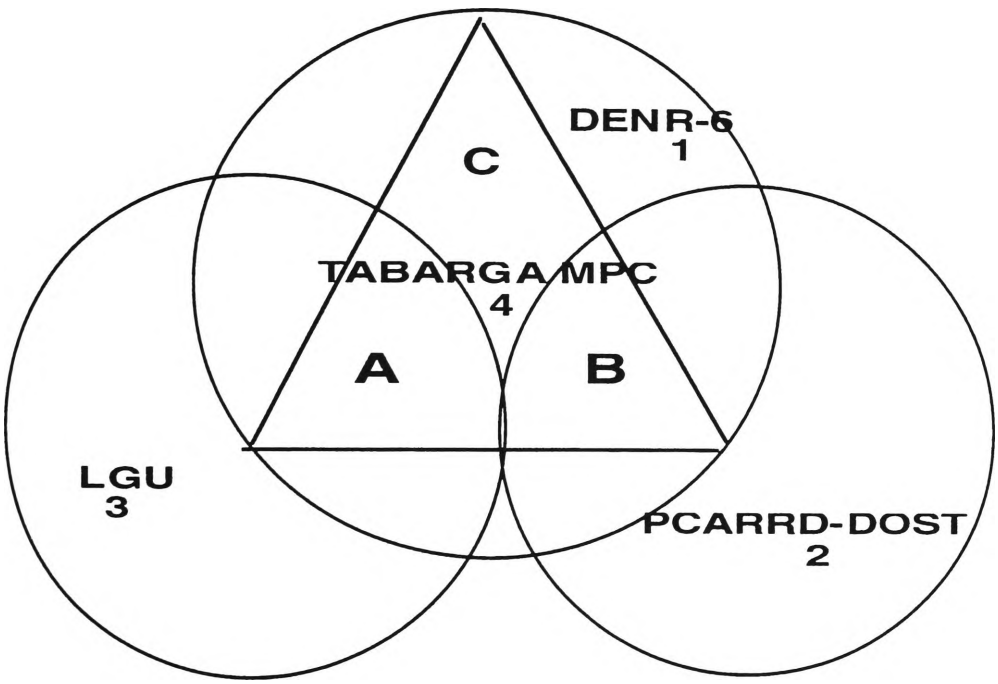


Figure 7.3 Interrelationship among key players in TABARGA MPC case

7.8.2 Interrelationships

A - Among DENR-6, LGU and Co-operative

Linkage was formalised through a tripartite MOA. The agreement was focused on the rules and responsibilities of DENR-VI as project implementer, LGU as conduit implementer and TABARGA MPC as beneficiary. This linkage facilitated the flow of information on farmers' needs to the research system through the compact demonstration farm in the ten-hectare lot provided by the LGU. Through the demonstration farm, research problems and further needs of the farmers were immediately pinpointed and fed back to DENR-VI. The flow of information from the research system to the farmers was accelerated because the DENR-VI is one of the major sources of forest-related technologies in the Philippines. The relationship between the co-operative and DENR-VI provided the co-operative with hands-on training on how to access technology, market and other support services. However, this linkage was not able to develop the capability of the co-operative to package business proposals required by financial institutions and to negotiate with these institutions for credit. This skill is important to the co-operative for the planning and implementation of their future expansion and processing projects. The direct assistance of DENR-VI to the co-operative ended in 1996 and there are signs of weakening linkage between the two. In terms of sustainability of linkage with the LGU, the free access to land by the co-operative has been assured for at least 20 years. The local government code provides the co-operative and the LGU the legal basis to continue their collaboration.

B - Among DENR-6, PCARRD-DOST and Co-operative

The relationship among PCARRD-DOST, DENR-VI and the co-operative was also covered by a MOA. Detailed monitoring and evaluation of the TABARGA project were undertaken by DENR-VI. However, PCARRD-DOST conducted annual monitoring and evaluation of TABARGA as a built-in activity of the Integrated R&D Project Phase III, of which PCARRD was the National Coordinator. This linkage facilitated the flow of information from the farmers to the national research system and vice versa. Since the project involving TABARGA was part of a national R&D program in bamboo and rattan, access to information from other projects of the national program in other places of the country was made possible. Feedback from the project implementers on farmers' needs to the national agency was done through regular monitoring and evaluation at all project

levels. This mechanism was no longer in effect beyond the project duration. However, the co-operative will likely be involved in future national programs on bamboo and rattan (for example bamboo and rattan processing) because its established plantations will become sources of raw materials for processing.

C - Co-operative and Major Interveners

TABARGA MPC was the point of convergence of all interventions. 'C' represents the combination of all types of assistance provided directly and indirectly by intervening agencies to TABARGA MPC. DENR-VI served as the main conduit of these direct and indirect support to the co-operative. PCARRD-DOST did not have direct linkage with the co-operative and LGU. However, their common interest of seeing bamboo and rattan-based enterprise of TABARGA MPC succeed, served as their binding mechanism. With DENR-VI/PCARRD-DOST ending its management assistance and financial support to the project, the active linkage that will remain in **Figure 7.3** will be that between the LGU and the co-operative.

TABARGA's linkage with other intervening agencies, such as FIDA, WESVARRDEC, State Colleges and Universities (SCUs), and the private sector, stemmed from DENR's networking efforts. However, the co-operative has its own indigenous linkages that hinged on the participation of some of their members in some local government units' councils.

The intervening agencies benefited from their linkage with the co-operative in some way or the other. The greater their stakes were, the more benefits they seemed to derive. PCARRD's gain from the linkage can be viewed from the perspective of bamboo and rattan in support of STAND. The TABARGA case has provided lessons that PCARRD-DOST can use as bases for assisting similar enterprises on bamboo and rattan in other parts of the country. Its linkage with TABARGA MPC was a mechanism by which technologies on bamboo and rattan can be validated.

The success of TABARGA has added credibility to DENR-VI as an implementer of integrated research and development project. The awards and recognition granted by PCARRD and WESVARRDEC to DENR-VI for their TABARGA experience were additional feathers to their cap. The success of TABARGA has proven the feasibility of their technology transfer strategy—that of social preparation cum technical training in varied ratio of combination at different levels of the project life.

The LGU of the Municipality of Dueñas benefited from the linkage with TABARGA MPC in the sense that supporting the co-operative's enterprise has boosted the morale of the local government's constituents. It meant an additional source of income, in the form of tax collection, for the municipality.

WESVARRDEC's benefit from the linkage was indirect. The co-operative has, in a way, contributed to the realisation of the consortium's development objectives related to the bamboo flagship program.

In the case of FIDA, although the sericulture project had stalled, there were many lessons that FIDA and the co-operative could derive from the experience.

The SCUs (DATEC and NIPSC) gained from their relationship with the co-operative in terms of their agroforestry students getting first-hand experience in nursery operation and plantation establishment, and exchange of information and technologies.

The TABARGA MPC case demonstrates the successful interaction of the co-operative with various intervening agencies, with DENR-VI facilitating these linkages. Where there was commonality of purpose, these linkages produced positive results. However, failure in linkage occurred when there was major conflict of purpose such as in the case of the sericulture project with FIDA. In this situation, the sericulture project competed for the valuable resources used by the co-operative for its leading economic activity, which was bamboo and rattan nursery operation and plantation. In the case of the SCUs, their linkage with the co-operative can be described as 'symbiotic'. There was reciprocity between the co-operative and the SCUs in the sense that whatever gains each one had from the linkage benefited both parties.

7.9 Technology Transfer Process

The technology transfer approach identified in this case study can be represented in **Figure 7.4**. It was organised around a project with defined timeframe and objectives and with project staff complement. Its purpose was for an implementing agency to facilitate technology transfer and withdraw from the project after three years when the targeted project activities had all been completed. The approach was a combination of 'top-down' and 'bottom-up' technology transfer efforts. The top-down approach was employed at the national level, and the bottom-up strategies were more pronounced at the ground or beneficiary level. At the national level, a bamboo and rattan program guided the general areas of R&D and technology transfer activities that would be implemented by different

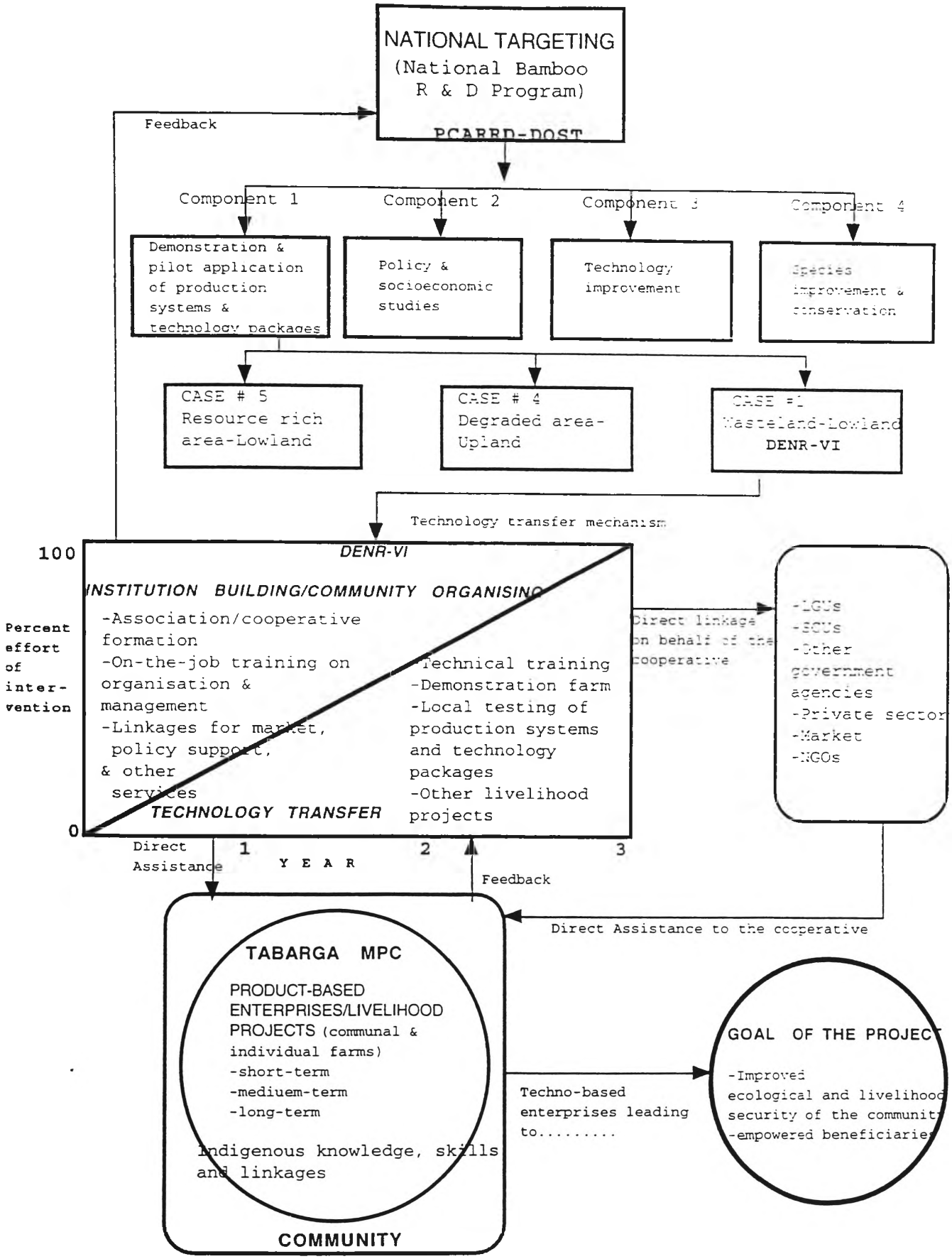


Figure 7.4 Technology transfer approach: TABARGA MPC case

participating institutions. At the ground or beneficiary level, DENR-VI used the community-based approach on technology transfer and commercialisation. Through this scheme, the beneficiaries actively participated in defining the specific needs in their community; formulating plans to address these needs; and undertaking the necessary actions to achieve their goals and plans.

The strong support of the local government unit during this stage accelerated the community organising efforts of DENR-VI. The project went beyond the promotion of bamboo and rattan technologies and extended its coverage to include other opportunities for livelihood and community development. The technology transfer strategy did not adhere to technological fixes but incorporated the 'farmer's knowledge and indigenous practices'. It encouraged innovations, such as the breakthrough on giant-bamboo seedling production and commercialisation, which was not part of the original project activities. Innovations were done in such a way that beneficiaries had short, medium and long term sources of livelihood to ensure sustainable development of the community. Another characteristic of the technology transfer approach in this case study was the business or commercial orientation of the project and the clear identification of products to sell.

To further demonstrate the technology transfer approach in this case study, a sample technology is discussed in terms of the following aspects: what the technology was about and what would be transferred; where it originated; by what organisational route it came; the manner by which the technology was extended to TABARGA MPC; and adaptation or non-adaptation of the technology by the co-operative.

A package of technology (POT) on bamboo plantation establishment was available as a result of phases I and II of the National Integrated R&D Project on Bamboo and Rattan, which was funded by the International Development Research Centre (IDRC). Specific technologies in this POT, as presented in **Appendix 7.3,** were locally generated and others were sourced from abroad through this IDRC funded project. With these technologies available, PCARRD packaged a national project focused on technology transfer and commercialisation for local funding by the DOST. The project was implemented in three sites representing the following conditions: lowland community which was essentially wasteland; upland community that was poor in resources—in skills of community members, available raw materials and land that was quite degraded; and community that was rich in raw material resources but community members had low skill

levels. The TABARGA case in Iloilo was represented by the first condition. Bamboo was found to be adaptable in various biophysical conditions even in submarginal areas such as Barangay Taminla. It could provide the basis for an industry since bamboo had many uses and applications and could be processed into high value products such as furniture.

In particular, the bamboo plantation establishment technologies included the aspect of propagation techniques (e.g. culm cuttings), field planting or appropriate planting distance (e.g. 7m x 7m), and care and maintenance in terms of weeding and fertilisation. These technologies were introduced to the co-operative by DENR-VI via the project described earlier. The establishment of a communal demonstration farm facilitated the transfer of these technologies from the national integrated project through DENR-VI, to the co-operative members, and to the rest of the community and the private sector. The package of technology introduced by the DENR was re-designed considering the local people's beliefs and practices such as the proper time of planting, planting distance and node cutting length. Information on the local practices was obtained as a result of the participatory project planning conducted with the community. The technologies used by the co-operative were continually improved based on the results of the built-in research component of the project. The design of training modules was custom-made to the needs of the revised package of technology and the training needs of the co-operative members. The DENR-VI, as the leading intervening agency of the co-operative, employed the technology transfer strategy of combining community organising and institution-building with technology training activities **(Figure 7.4)**. This was done at different levels of combination such that focus was greater on community organising at the early stage of the project and on technology training towards the middle and end of the project. The objective here was to prepare the co-operative for the changes expected of the introduction of technologies and be ready with the responsibility of enterprise development and management.

Utilisation of the bamboo plantation establishment technology was reinforced by the success of the co-operative's giant bamboo nursery operation. Anticipating an increase in demand for giant bamboo poles by the furniture and fishing industries, the co-operative was encouraged to expand their bamboo plantations by integrating the giant bamboo species. Adaptation of the bamboo plantation establishment technology was also strengthened when the co-operative engaged in the contract planting business. Assimilation

of the technology by the co-operative members was evident when they applied the skills and techniques gained from their plantation establishment experience to the private sector and LGU reforestation areas. By acting as resource speakers and trainers on bamboo production systems for students and visitors, the TABARGA MPC members have become more adept at the technology and more confident of their skills and knowledge of bamboo plantation establishment.

CHAPTER 8

CASE 2: LUTUCAN MULTIPURPOSE CO-OPERATIVE

Engaged in Coconut Coir Manufacturing

8.1 Introduction

This case study looks at a co-operative whose dominant intervener in terms of technology transfer is from the private sector. This allows investigation of the dynamics of technology transfer involving a co-operative and the private sector as dominant intervener, with other agencies providing support services.

The chapter begins with a description and background of the Lutucan Multipurpose Co-operative (MPC). It describes the linkages and networking activities of the co-operative and analyses the nature of interrelationships among the key players in the case study. The concepts of coordination and resource dependencies are useful basis for analysing these interrelationships. Effectiveness of linkages is evaluated based on the indicators described in chapters 1 and 6. This chapter ends with an analysis of the technology transfer approach identified in the case study.

Unlike TABARGA MPC in Case 1, Lutucan MPC directly managed its own linkages. The advantage of this arrangement is that it eliminated a lot of bureaucratic procedure in the delivery of information, technologies and other services to the co-operative. However, it also resulted in some duplication of services provided by various institutions because there was no independent body that performed checks and balances of the linkages of the co-operative.

This case study emphasises the advantage of a self-reliant, well-established and resourceful co-operative in obtaining access to technologies, credit, and other important services. It shows that a co-operative that has established its credit-worthiness with banks become attractive to various support service institutions. The case study also points to the importance of networking and building coalition with other co-operatives through federations and other interagency boards. These linkages enabled the co-operative to seize opportunities as they occurred. However, the case study also indicates that no matter how strong and independent the co-operative was, there were some forces beyond its control

that could hamper its business decisions and implementation. For instance, the co-operative's plan to expand its coconut by-product production enterprise was hindered by two big coconut fibre corporations that dominated and controlled the market for the said product. It illustrates the strong influence of those who controlled the technology and market on the decisions and viability of the business of the co-operative. The technology transfer approach in this case study was straightforward and direct. Therefore, the flow of information and technologies from the private sector to the co-operative was quick and need-based.

8.2 Description of the Site and the Co-operative

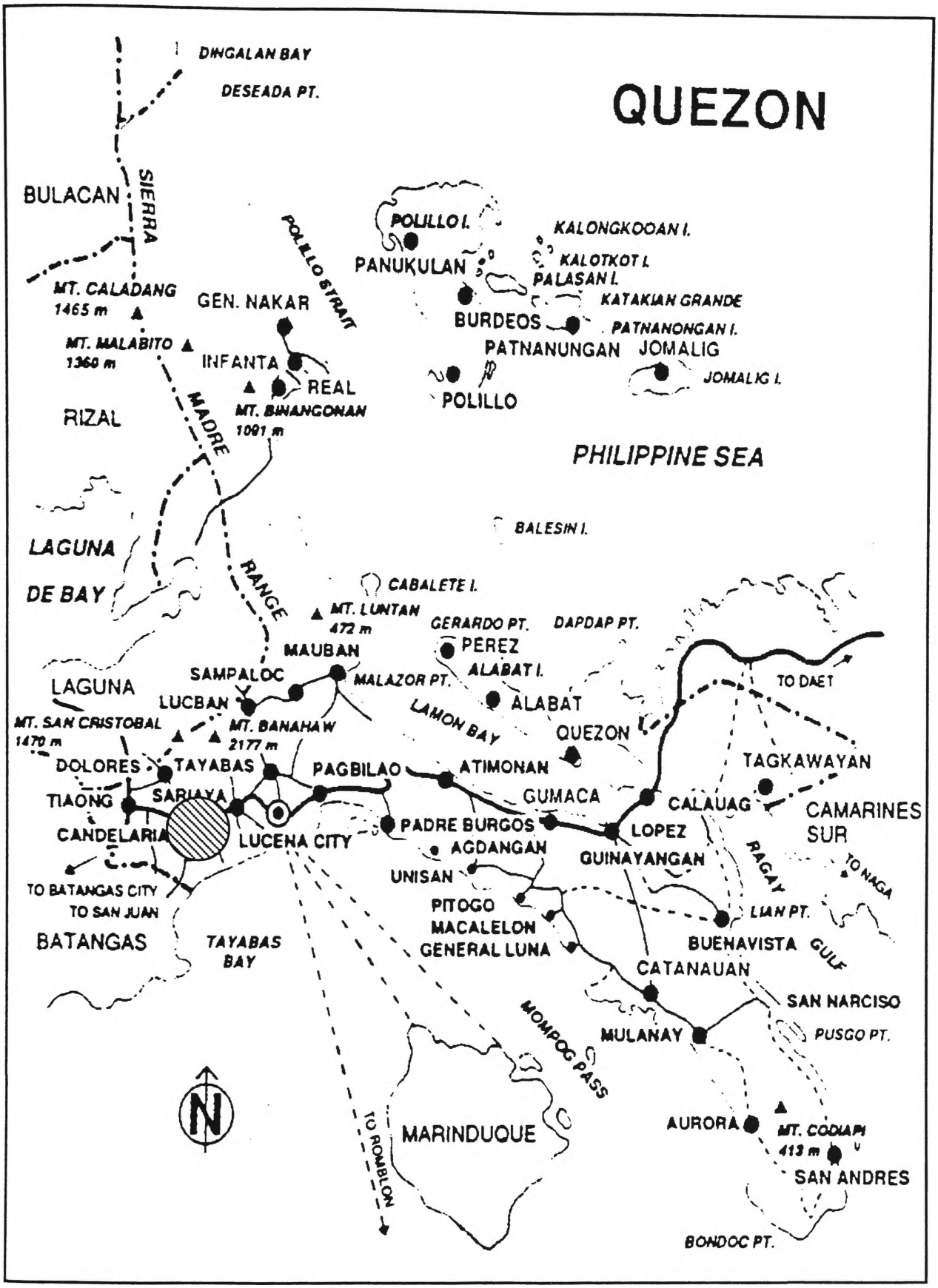
8.2.1 The Site

The Lutucan Multipurpose Co-operative's office is located in Barangay Lutucan, Municipality of Sariaya, Quezon Province **(Figure 8.1)**. Its coco-coir decorticating plant,[1] which is the focus of this study, is situated in Barangay Montecillo, about 3 kilometres away from the co-operative's main office. The Municipality of Sariaya is one of the 40 municipalities of the province of Quezon and is located 126 kilometres south of Metro Manila and 12 kilometres from the Provincial Capital City of Lucena. Barangay Lutucan, one of the 43 barangays of Sariaya, is approximately 2 kilometres away from the main highway. The road leading to Lutucan from the main highway is asphalted and accessible by public utility vehicle. The municipality of Sariaya has a total land area of 24,530 hectares with Barangay Lutucan occupying 5.6 percent or 1,381 hectares. The total population of Lutucan as of 1990 was 6,767 or 7.1 percent of the total population of Sariaya (91,081 people).

Sariaya is relatively dry from the months November to April and wet during the rest of the year. It is basically an agricultural municipality with coconut plantation occupying 75% of total land area. The major economic activities in Sariaya include copra[2] making, rice farming, fruits, vegetables and rootcrops production, cattle and poultry production, bakery products, cottage industry (such as hat making and wood carving) and others.

[1] Refer to appendix 8.1 for the definition of coco-coir decortication.

[2] Copra is dried coconut meat processed into coconut oil.



Legend: Lutucan MPC site: Barangay Lutucan, Sariaya, Quezon Province, Philippines

Figure 8.1 Location map of Lutucan Multipurpose Co-operative (Case 2)

Source: Conrado Lancion, *Fast Facts About Philippine Provinces*, Tahanan Books, Manila, 1995, p. 131.

8.2.2 The Co-operative

The Lutucan Barangay Credit Co-operative was incorporated on 20 May 1981 through the initiative of Mr. Higino H. Atienza, the co-operative's Executive Director. Before the co-operative's formation, Mr. Atienza organised a core group of fifteen persons consisting of school teachers, other professionals and members of the community. He introduced to them the idea of forming a credit co-operative as a strategy to control the proliferation of usurers[3] in Sariaya. The core group of 15 persons laid down the foundation and made the initial arrangements necessary for organising the co-operative. The co-operative started as a purely credit co-operative with thirty five members. Its goals were to give members easy access to credit at rates lower than those prevailing in banks and among usurers, and to encourage thrift and savings mobilisation among members. The co-operative re-registered itself on 24 May 1992 into Lutucan Multipurpose Co-operative (Lutucan MPC). It has expanded its operations to include other economic, social and educational services and activities. In 1996, Lutucan MPC had more than 4,000 members which included 10 percent of the population of Barangay Lutucan and had more than $US680,000[4] worth of assets. About 80 to 85 percent of co-operative members are coconut farmers.

The co-operative has diversified its operations and services into the following:

1. Loaning and relending (loans for personal, housing, and agricultural and livestock production purposes)
2. Social services (including pension plan, health fund and scholarship grant)
3. Training services (pre-membership education seminar, project orientation seminar, management training, officers and staff training program)
4. Communication and transport services (cellular phone and two-way radio rental, truck rental)
5. Trading (groceries, feeds, fertiliser and pesticides)
6. Manufacturing (coco-coir decorticating plant, laundry soap making and hollow blocks production,[5] and others)

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[3] One who lends money at an exorbitant rate of interest.

[4] Conversion rate used in this chapter—US$1 = 26 pesos

[5] Temporarily stopped in 1996-1997.

The co-operative has built a three-storey multi-purpose building which was completed in December 1996. The building houses the co-operative's office, a warehouse, and a space for seminars and training. Lutucan MPC has also operated a medical clinic and provided high school scholarship grants on a limited basis as part of its social service program.

The Lutucan MPC started to venture into coco-coir processing in 1994 by putting up a coco-coir decorticating plant.[6] Lutucan MPC's decorticating plant consists, among other things, of two decorticating machines to extract fibre from the husks, drying area, baling machine, soaking tank, stockroom and maintenance house. The plant layout is shown in **Figure 8.2.** Mr. Atienza's attendance in various interagency and multisectoral seminars and meetings gave him the idea of procuring a decorticating machine and engaging in coco-coir fibre production. His interest in coconut by-product manufacturing was reinforced by his long experience in chemical processing as Head Operator and later as Production Supervisor of companies such as Caltex Refinery, Coco-Chemicals Philippines, and Colgate Palmolive Philippines.

The coco-coir processing proposal was welcomed by the co-operative's Board of Directors (BOD) because of the abundance of coconut husks in their community and nearby areas. Coconut husks are waste materials from copra making. The co-operative's BOD evaluated two proposals for a decorticating machine, namely:

1) $US38,000 worth of machine offered by Mr. Soriano, owner of Soriano Fiber Corporation, one of the biggest coconut-fibre producers in the Philippines; and

2) $US11,000 worth of machine fabricated by Mr. Mariano Sazon.

Mr. Sazon is an independent manufacturer of various coconut processing equipment, whom Mr. Atienza met in one of the seminars they both attended. The proponents discussed their respective offerings to the board. The BOD finally settled for Mr. Sazon's machine because it was more affordable and had almost the same capacity and capability as with Mr. Soriano's machine. Lutucan MPC procured one decorticating unit in 1994 and another unit in 1995 from Mr. Sazon. **Appendix 8.1** describes the technology of coconut-coir fibre production as applied by Lutucan MPC. **Figure 8.3** shows pictures of the

[6] A coco-coir decorticating plant produces fibre from coconut husks. See appendix 8.1 for details of the process.

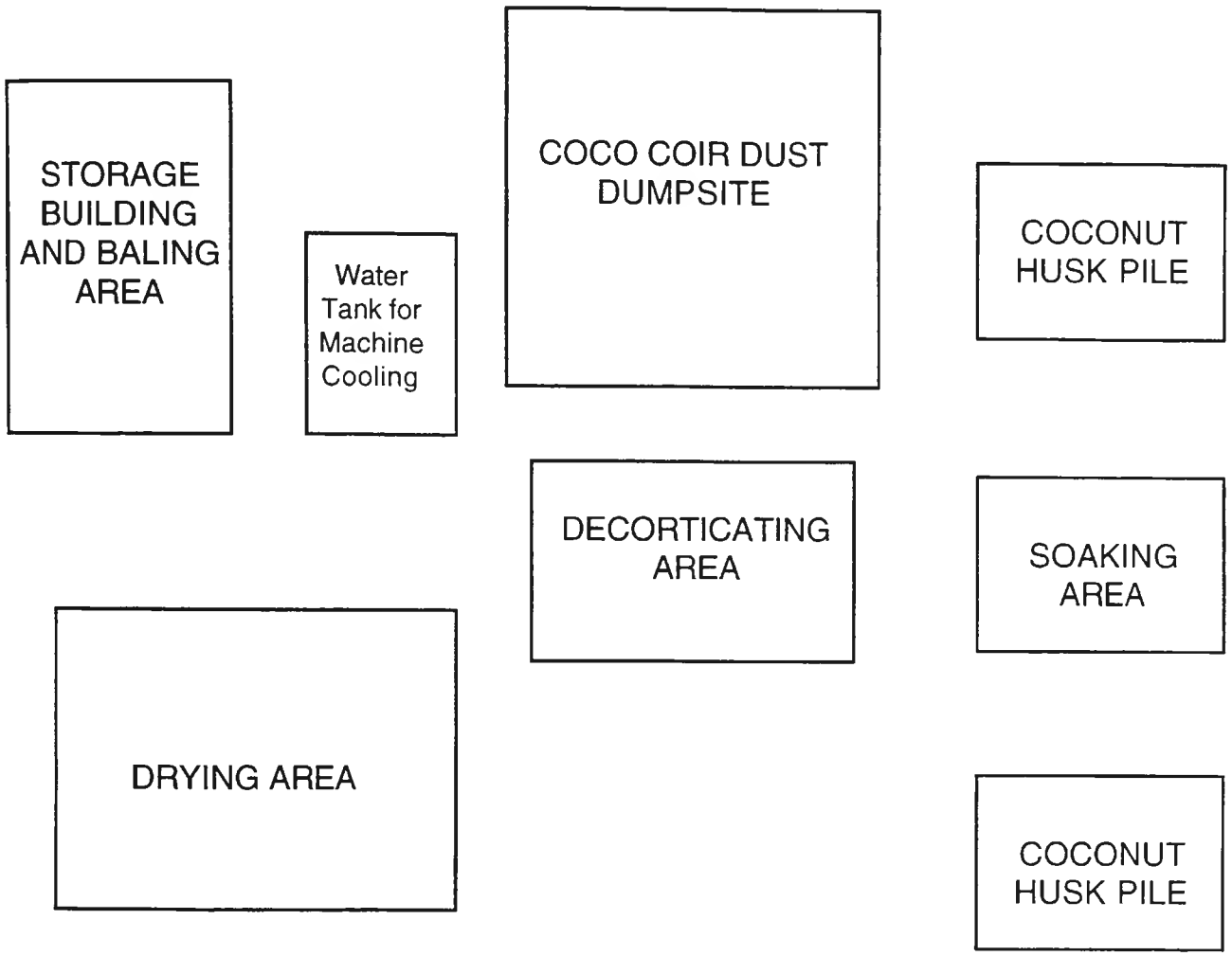
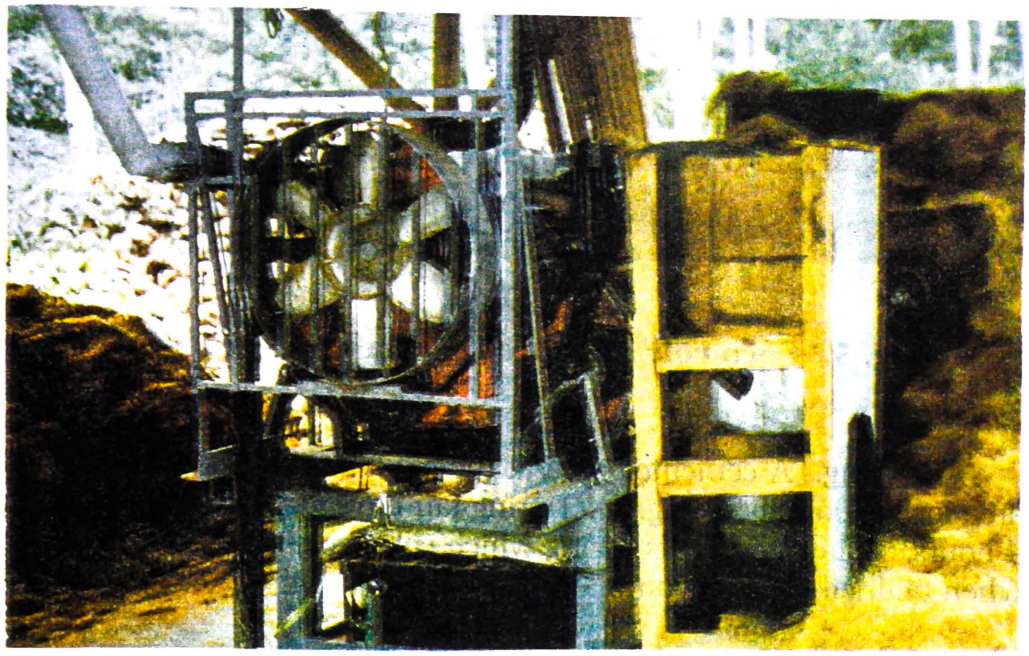
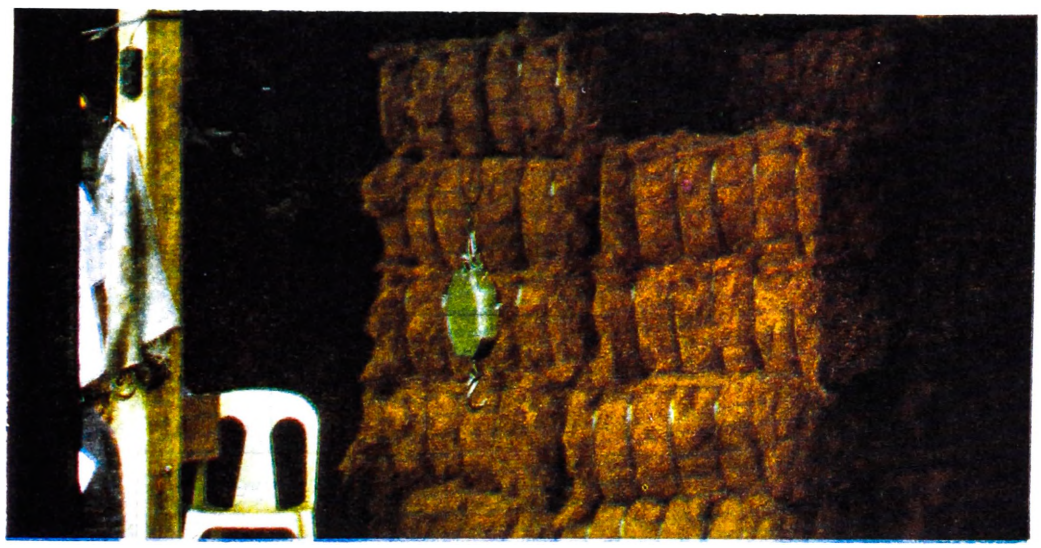


Figure 8.2 Plant Layout: Coco Coir Production of Lutucan MPC, Sariaya, Quezon, Philippines

Source: S. Medina, E. Matienzo, C. Medina, D. Manalo, and E. Aguilar, *Documentation and Assessment of Successful Coconut Production, Processing and Marketing Enterprises in Luzon*, UP Los Banos, College Laguna, PCARRD and FSSRI, Philippines, 1997, p. 8.



Coir fibre decorticating machine



Baled coir fibre

Figure 8.3 Coconut coir fibre manufacturing: Lutucan MPC

Source: S. Medina, E, Matienzo, C. Medina, D, Manalo, and E. Aguilar, *Documentation and Assessment of Successful Coconut Production, Provessing and Marketing Enterprises in Luzon*, PCARRD and Farming Systems and Soil Research Institute, Los Banos, Laguna, Philippines, 1997, pp. 13, 15.

decorticating machine, the finished product (baled coco fibre), and the dust produced from the decortication process.

The co-operative derived almost 25 percent of its total income from coco-coir processing in 1995-1996. The coco coir plant has been generally funded out of the co-operative's equity and bank loans. It has been under the supervision of Mr. Atienza, but the day to day operation and the implementation of plant activities are the responsibilities of the plant manager and leadman. The organisational structure of the coco coir plant in relation to the overall structure of the co-operative is shown in **Figure 8.4.** The General Assembly is the highest body of the co-operative. It selects the members of the Board of Directors, whose main function is policy formulation.

Lutucan MPC was recipient of four prestigious national awards: *Best Co-operative* award for exceptional membership expansion, granted by Land Bank of the Philippines (LandBank) in both 1993 and 1995; *Best NGO* award in terms of socioeconomic contribution to the community, accorded by the Department of Trade and Industry (DTI) in 1995; and *Best Co-operative* award for having the largest number of members who had improved their living conditions due to the co-operative, given by LandBank in 1994.

8.3 Linkages and Networking

Lutucan MPC has established a good track record with banks, has strong representations in various federations or groups of co-operatives, and has good linkage network with government agencies, other NGOs and the private sector. The following entities have provided interventions to the co-operative.

8.3.1 Mr. Mariano Sazon, Private Manufacturer of Decorticating Machine

Mr. Sazon specialises in the manufacture of different coconut processing equipment. His machine shop is located about 5 kilometres away from the co-operative's office. He designed and fabricated the decorticating machines of Lutucan MPC. Before fully turning over the machines to the co-operative, Mr. Sazon trained the co-operative's plant personnel and workers on how to operate the machines. Lutucan MPC's coco-coir plant was patterned after Mr. Sazon's own plant layout. The expected life span of the decorticating machines is 10 years if important parts are regularly replaced and if engines are regularly checked-up. Mr. Sazon performed this regular service and repaired the machines as the need arose. Lutucan MPC has signed a 5-year marketing contract with

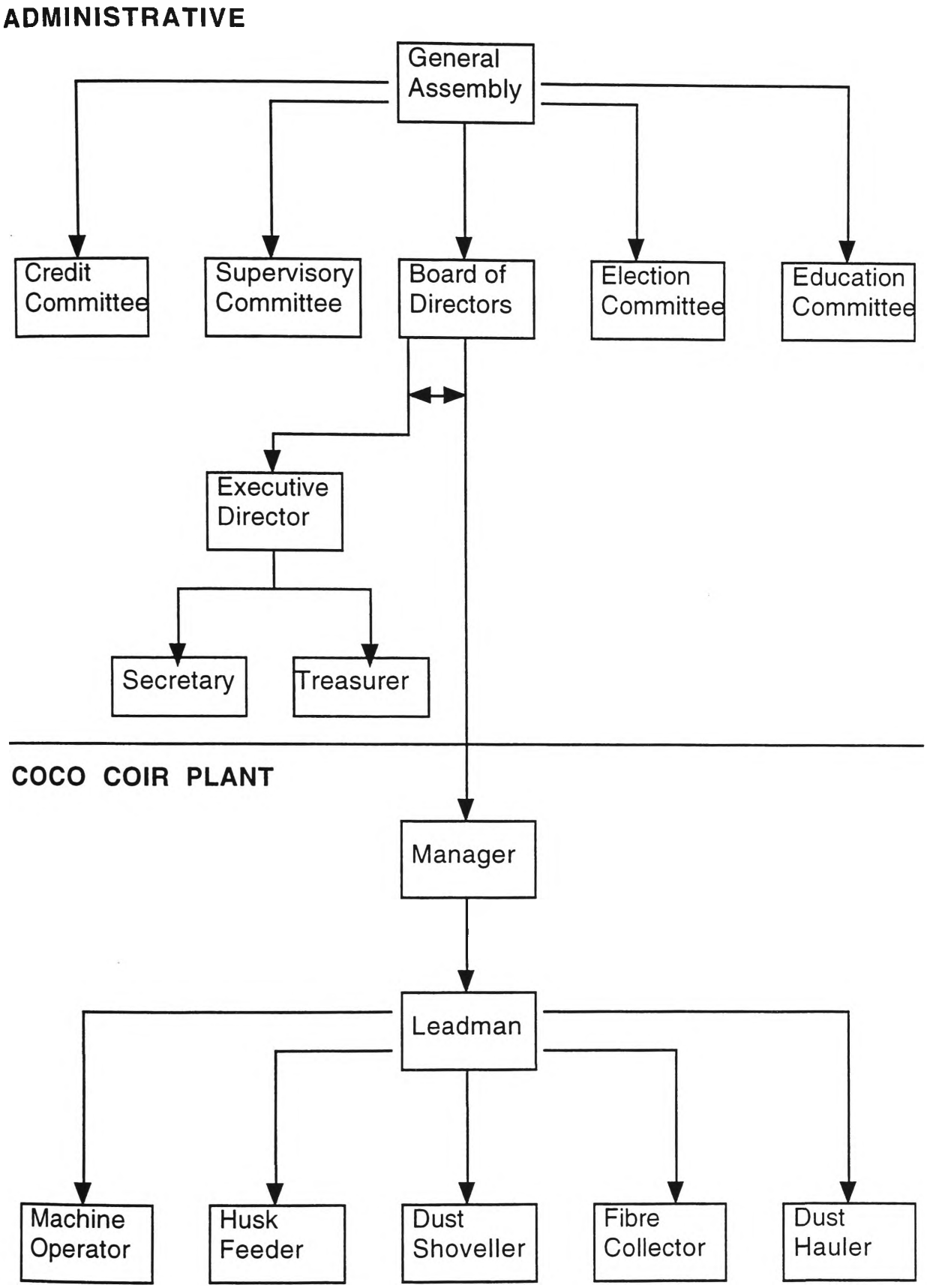


Figure 8.4 Organisational Structure of Lutucan MPC

Source: S. Medina, E. Matienzo, C. Medina, D. Manalo, and E. Aguilar, *Documentation and Assessment of Successful Coconut Production, Processing and Marketing Enterprises in Luzon*, UP Los Banos, College Laguna, PCARRD and FSSRI, Philippines, 1997, p. 7.

Mr. Sazon. Through the contract, at least 3 tons of baled fibre have been collected by Mr. Sazon from the co-operative's coco coir plant every week. The rest of the co-operative's fibre output can be sold to other buyers. Mr. Sazon has sold the collected fibre to Asia Fiber Corporation, a Taiwanese-owned company in Batangas, Philippines. Whenever Lutucan MPC's equipment needed major repairs, Mr. Sazon tried to immediately attend to them, otherwise, he would jeopardise his own delivery contract with Asia Fiber Corporation. In early 1997 however, Mr. Sazon and the Asia Fiber Corporation gave Lutucan MPC the authority to directly sell its fibre output to Asia Fiber Corporation. With this arrangement, the co-operative benefited from the buying price of Asia Fibre Corporation which was 10 percent higher than the price offered by Sazon, but at the same time incurred additional costs in terms of hauling and transportation. Overall, the benefits from this new marketing arrangement outweighed the costs incurred by the co-operative.

8.3.2 Land Bank of the Philippines

The LandBank was created by the Philippine government in 1963 in connection with the implementation of the Agricultural Land Reform Code. Its main function then was to purchase vast tracts of private agricultural lands and distribute these to small farmers. In 1988, when the government launched the Comprehensive Agrarian Reform Program (CARP), LandBank spearheaded the co-operative movement and extended support services to communities in the rural areas. In 1995, the law increased LandBank's authorised capital and amended its charter so that it could perform vital financial and developmental assistance to small farmers and fishermen nationwide. LandBank has been by far the largest contributor to rural credit delivery in the Philippines. It has an extensive countryside network with over 300 branches and field offices nationwide. It has linkages with some 8,000 co-operatives and about 400 rural financial institutions all over the country.

LandBank offers three types of service programs, namely:

a) *LandBank Agrarian Sector* handles operations related to CARP such as land transfer financing and forming or strengthening of co-operatives whose members are CARP beneficiaries.

b) *The Countryside Lending Program* provides short and long-term credit facilities to co-operatives of small farmers and fishermen. The program covers loans for agricultural crop and livestock production, cattle importation, livestock breeding and dispersal financing,

mechanisation, post-harvest processing, irrigation facilities, fishery activities, and operating or working capital.

c) *LandBank's Technical Assistance Program* extends technical support services in cooperation with other GOs/NGOs. The assistance covers project identification and loan packaging, capability building of co-operatives or federations, technology transfer training, farmer-coop-market linkages, and ecosystem rehabilitation and development.

The LandBank-Lucena branch started to have linkage with Lutucan MPC in September 1991 when it granted the co-operative with livestock production and rediscounting or relending loans.[7] According to LandBank-Lucena representative, the co-operative had proven itself to be a responsible borrower. This led to more projects between Lutucan MPC and the bank. These projects were as follows: construction of office building and warehouse; financial support for the coco-coir processing business in terms of working capital and hauling truck; office equipment grant such as computer units and filing cabinets; and training of other LandBank supported co-operatives by Lutucan MPC. Through LandBank, the co-operative was granted financial assistance from the Countryside Development Fund (CDF)[8] of some officials from the Senate and House of Representatives for livelihood projects (such as hog and cattle fattening). The LandBank-Lucena invited Lutucan MPC representatives to some of its sponsored training on entrepreneurship and coconut production and processing-related topics either as participants or resource speakers. The coco-coir decorticating plant was generally funded out of the co-operative's equity and LandBank-Lucena's support in terms of working capital and hauling truck.

The bank links with other agencies such as the Philippine Coconut Authority (PCA) in identifying potential co-operative-borrowers. In like manner, other agencies refer to LandBank-Lucena for 'certification of good standing' of its supported co-operatives. The bank also has joint projects with the local government units (LGUs). For instance, in the Rebel Returnee project,[9] the bank endorsed co-operatives that will be supported by the LGUs. Lutucan MPC was being eyed as one of the recipients (not yet implemented as of

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[7] Loans granted by the bank to borrower institutions at discounted or lower interest rates than regular loans so that the borrower can relend this amount to its members.

[8] Countryside Development Fund (CDF) are amounts appropriated to each member of the House of Representatives and the Senate of the legislative branch of the Philippine government. These are intended for funding some development projects in their respective provinces and areas of responsibilities.

[9] Rebel returnee project is part of the comprehensive peace program implemented by the government of the Ramos government.

1996) because some of its members used to be part of the left-wing movement. LandBank also acts as a conduit in the rural areas for selected members of the legislative branch of government for managing and disbursing the Countryside Development Fund.

8.3.3 Philippine Coconut Authority (PCA)

The PCA is a government agency under the Department of Agriculture. It is mandated by law to formulate and implement policies and programs for the development of the coconut industry and other palm oils in the country. Its functions also include research on coconuts, and development and regulation of domestic and foreign markets for coconut and other palm oil products and by-products. It consists of three research centres, each headed by a manager; eight regional offices around the country, each headed by a regional administrator; 55 provincial offices; and one extension and training centre.[10]

Lutucan MPC has linkages with both the national office of PCA in Manila and PCA Region II in Lucena City. The PCA Manila invited Mr. Atienza and other co-operative representatives on several occasions to talk about the operations and activities of Lutucan MPC. Mr. Atienza is also President of the Federation of Small Coconut Farmers Organisation in Sariaya under the aegis of PCA. PCA Region II started to have linkage with Lutucan MPC when the co-operative, being an entity engaged in coconut-related enterprise, sought accreditation from the PCA. The assistance provided by PCA Region II to Lutucan MPC were: coconut planting materials under PCA's replanting or rehabilitation program; spare parts needed in the repair of equipment in the coco-coir plant; and general market information and linkage. The Head of PCA Region II admitted that their agency has not yet provided the co-operative with significant interventions. PCA staff members have visited the co-operative once every semester for their regular coconut production survey.

8.3.4 Department of Science and Technology-Provincial S&T Center (DOST-PSTC)

The provincial S&T centres are extensions of the thirteen regional offices of the Department of Science and Technology (DOST). They are tasked to identify the needs and opportunities in S&T in the provinces; implement the DOST's programs or projects such as technology demonstration and transfer, S&T promotion, and information dissemination;

[10] PCA, *Primer of the Philippine Coconut Authority,* The Public Information Office, PCA, Quezon City, nd.

and develop institutional linkages with other government and non-government agencies in the provinces.

The DOST-PSTC for Quezon province, through its Officer Mr. Luis Cervantes, first met the officials of Lutucan MPC during one of the meetings of the Federation of Co-operatives of Quezon province. The DOST-PSTC invited the co-operative to join the Provincial S&T Coordinating Council (PSTCC). The PSTCC is the first grouping of government, non-government, and private agencies in the province of Quezon involved in S&T, trade and industry, agricultural R&D, and economic planning. The DOST-PSTC endorsed the co-operative for Manufacturing Productivity Extension (MPEX) assistance program of the DOST-Technology Application and Promotion Institute (DOST-TAPI). The MPEX Program assisted small and medium-sized enterprises in the manufacturing sector to attain higher productivity. Through the program, a study team composed of industrial engineers and educators was commissioned by DOST-TAPI to assess the coco-coir decorticating operation of Lutucan. The team recommended productivity improvement measures for immediate implementation by the co-operative.

The recommendations made by MPEX were related to the co-operative's organisational structure and factory systems and procedures. These recommendations were as follows: hiring of a full-time production manager to supervise coco-coir production; acquisition of another unit of decorticating machine; improvement of factory lay-out and process workflow to maximise time, materials, labour and space; and use of forms such as finished goods monitoring sheet, daily quality inspection report and others. Most of these recommendations were followed by the co-operative. During the validation activity conducted by DOST-TAPI, they were convinced that the level of production of the co-operative had increased when the co-operative followed the MPEX recommendations.

It was also during the assessment that the potential for utilisation of coir-dust—waste material from decortication—was identified. It was agreed that a pre-investment study of dust compacting machine would be prepared by the co-operative through the help of DOST-PSTC. All the required documents and the feasibility study were submitted to DOST-TAPI for consideration under its joint venture financing scheme.[11]

[11] Joint venture financing is one of the technology promotion programs of the Department of Science and Technology (DOST), which provided equity financing with no interest required to small associations or co-operatives for the application of new technologies with high commercial potential.

Under the venture financing program, DOST-TAPI was expected to put up the amount for machine fabrication while the co-operative's counterpart would be land, building and working capital. Lutucan MPC had an agreement with other coco-coir fibre producers in Quezon for them to supply dust to the co-operative if the project would be approved and implemented. Mr. Sazon was being eyed to fabricate the compacting machine. The proposed compacting machine would press and mould the dust into three design features (12x12x12 in., 6x6x6 in., and 1x6x6 in.) to suit the specific needs of the market. Some of the uses of coconut fibre dust are as follows: fertiliser component; soil mulcher or conditioner; trellises; medium in growing plants; pelletised fuel; and for golf area landscaping.

When the proposal was finally approved and the budget for machine fabrication was released to the co-operative by DOST-TAPI, the co-operative discovered an information that was very critical to the business. When Soriano Fiber Corporation learned that the co-operative was contracting the services of Mr. Sazon for dust compacting machine fabrication, Mr. Soriano approached the co-operative and offered his US$77,000 worth of equipment with an accompanying offer to buy all of the co-operative's output. At that point, it became clear to the co-operative that the market for compacted dust was dominated and controlled by Soriano and another big coco-coir producer in the Bicol Region. This meant that if the co-operative would pursue the dust compacting project using Mr. Sazon's machine, market for its products would be uncertain.

The interventions provided by the DOST-PSTC to Lutucan MPC were as follows:

- scientific or technical assistance (for example, DOST-PSTC made sure that the fibre output had the right moisture content by recommending the purchase of moisture tester);
- assistance in the preparation of pre-investment study of dust compacting machine; and
- providing the venue in which the co-operative could link with other GOs and NGOs through the Provincial S&T Coordinating Council (PSTCC).

These services were in line with the technology transfer, promotion and commercialisation program of DOST's S&T Agenda for National Development (STAND) 2000.[12] They were in support of the flagship programs of the province of Quezon focusing on coconut by-products utilisation and coconut industry rehabilitation.

[12] DOST STAND 2000 is a list of goods and services in which superior technology will be concentrated on to realise the vision of Philippines 2000. It outlines the areas which will be the focus of S&T efforts from 1994 to 1998.

The performance of the DOST-PSTC was limited by the following problems: few staff members to perform its functions; and low budget allocation for counterpart funding of technology commercialisation projects recommended for implementation by the PSTCC. Therefore, depending on the nature of the project, member-agencies concerned put their resources together to implement these projects. But this system put a strain on the part of the member-agencies since the financial requirements of the projects were not pre-programmed in their budgets. An alternative action of the PSTCC was to endorse projects to financing institutions such as banks.

The DOST-PSTC monitored the technology commercialisation projects it supported through the monthly meeting of PSTCC. In the case of compacting machine, a management committee composed of representatives from the co-operative, PSTC and DOST-TAPI would have been organised to monitor the progress of the project.

When Mr. Atienza was asked about its perception of the PSTCC, he said that the Council can be an effective venue for linking with other GOs and NGOs on matters related to their scientific and technological needs. However, he expressed concern about the limited resources of DOST-PSTC to facilitate and mobilise the Council. Many member-agencies could not attend the monthly meetings because of budget constraints.

8.3.5 Local Government Unit

The Office of the Governor of Quezon Province supports the development and enhancement of co-operatives in the province. Twenty percent of its Internal Revenue Allocation[13] has been earmarked as a development fund to assist co-operatives. Financial assistance is in the form of soft loans which are free of interest but with collateral. Aside from financial assistance, the Office of the Governor, through its Provincial Planning and Development Office, coordinates with other provincial offices on the following: training for strengthening of co-operatives in coordination with the provincial Co-operative Development Authority; assistance in the preparation of feasibility study of co-operatives; market matching in cooperation with the provincial Department of Trade and Industry; skills training in cooperation with the Technical Education and Skills Development

[13] Internal Revenue Allocation is the share of the local government units (LGUs) in the national revenue taxes based on the collection of the third fiscal year preceding the current fiscal year as follows: on the first year of the effectivity of the Local Government Code, thirty percent (30%); on the second year, thirty five percent (35%); and on the third year and thereafter, forty percent (40%).....(Section 284, Local Government Code). The share of the LGUs shall be allocated in the following manner: provinces-35%; cities-23%; municipalities-34%; and barangays-20%.... (Section 285, Local Government Code).

Authority (TESDA);[14] infrastructure development, extension service through the Provincial Agriculturist; and funding of seedling bank.

Lutucan MPC was one of the first co-operatives to avail itself of assistance from the Countryside Development Fund of the Governor. This happened after the Office of the Governor informed the co-operatives of its assistance program for community development during one of the meetings of the Federation of Co-operatives in Quezon Province. A financial loan was extended to the co-operative for the purchase of the second unit of decorticating machine. The loan was payable in five years without interest. The Governor's Office had not experienced any difficulty in collecting the quarterly amortisation or payment from the co-operative.

Proposals that the Governor's Office received from co-operative-applicants are referred to government agencies concerned for comments and recommendations, then endorsed to the Provincial Development Council[15] for final approval. However, the Office of the Governor directly acts on proposals costing less than US$7,700.

8.3.6 United Coconut Planters Bank

Lutucan MPC sought accreditation from the United Coconut Planters Bank (UCPB) Foundation Inc. in 1990 to be able to avail itself of the services extended by the bank under its Countryside Economic Development Program. Lutucan MPC was one of the first co-operatives that applied for accreditation to the foundation. The UCPB Foundation Inc. offers the following services[16] to its accredited co-operatives, whose coconut farmers-members constituted at least 30% of total membership:

- Funding of training programs of co-operatives whether in organisational development, livelihood skills of value formation seminars;
- Market linkages to UCPB clients who are in local or export business and to the network of integrators or processors which are under the marketing desk of the bank;

[14] TESDA is a government agency mandated to develop and implement skills development programs with the participation of the industry groups, trade associations, employers and workers.

[15] Provincial Development Council or Sangguniang Panlalawigan (in Pilipino) is the legislative body of the province. It has the power and authority to enact ordinances, approve resolutions and appropriate funds for the general welfare of the province..... It shall generate and maximise the use of resources and revenues for the development funds, program objectives and priorities of the province....with particular attention to agro-industrial development and .....(Section 468, Local Government Code).

[16] UCPB-CIIF Foundation, Inc., information sheet on 'Countryside Economic Development Program' and 'Coop/Non-Traditional Financing Organisations (NTFO) Accreditation Program'

- Funding livelihood programs of co-operatives through loans at a subsidised rate of interest;
- Scholarships; and
- Participation in the Adopt-a-School program by accredited co-operatives.

The Foundation, Inc. financed part of the working capital requirement of Lutucan MPC's coco-coir fibre business. The co-operative also availed itself of their training program and marketing linkage services. The Foundation approved the co-operative's loan for building construction. However, the co-operative deferred taking up of loan because the foundation required collateral in addition to the building. The co-operative finally took a loan from LandBank that did not require collateral other than the building itself. For projects funded by UCPB Foundation, Inc., the co-operative submitted quarterly progress and financial reports. The Foundation visited Lutucan MPC once a month to check the status of their projects and examined the co-operative's book of accounts.

The UCPB Foundation, Inc. coordinates with other agencies in the delivery of their services. It works closely with the DOST-PSTC for their technological information needs. The Foundation refers its accredited co-operatives to DOST if these co-operatives needed technical information and assistance. The DOST-PSTC, on the other hand, endorses proposals made by some of its client-co-operatives to the Foundation for funding. There are many projects being implemented by DOST-PSTC which are being coordinated with the foundation but none in the case of Lutucan MPC. Also a member of the PSTCC, the Foundation through Mr. Gucilatar, felt the importance of the Council for interagency collaboration. However, he emphasised the PSTCC's limitation, that it had no direct staff and no full time secretariat to do the necessary work or services. The Foundation also collaborates with the Department of Trade and Industry (DTI) on a project to project basis as the need arose. It also establishes linkage with PCA in terms of implementing the coconut replanting program. The Foundation facilitates the distribution of PCA's coconut planting materials to its accredited co-operatives.

8.3.7 Department of Trade and Industry

The Department of Trade and Industry (DTI) is mandated to be the primary coordinative, promotive, facilitative and regulatory arm of the Executive Branch of government in the area of trade, industry and investments. It promotes and develops an industrialisation program to accelerate and sustain economic growth through the following:

comprehensive industrial growth strategy; a progressive and socially responsible liberalisation program; policies designed for the expansion and diversification of trade; and policies to protect Filipino enterprises against unfair foreign competition and trade practices.

DTI operates regional and provincial offices in each of the country's administrative regions and provinces. DTI-Quezon province branch identified Lutucan MPC as one of the qualified NGOs eligible for its 'NGO micro credit project'. DTI-Quezon refers to the Co-operative Development Authority (CDA) Regional Office for the list of co-operatives in Quezon province that can be included in DTI's assistance program.

The 'NGO micro credit project' involves the following components:

- credit for NGOs for relending to beneficiaries for micro-enterprises and livelihood projects;
- NGO strengthening through assessment of needs, provision of training in livelihood project management, market development and other related activities; and
- beneficiaries or self-help groups strengthening through assistance in the identification of viable micro-enterprises, entrepreneurship development and market development.

As for Lutucan MPC, DTI-Quezon extended credit for livelihood projects of co-operative members at an interest rate much lower than prevailing commercial bank rates. DTI also disbursed a US$40,000 grant to the co-operative from the Countryside Development Fund of Quezon Province's 2nd District Congressman. The grant was intended for the construction cost of a Training Center in the 3rd floor of the co-operative's new building. The DTI-Quezon monitored their projects quarterly to check if loans were used properly and conducted a regular assembly of beneficiaries (at least three times a year).

DTI is also a member of the PSTCC and coordinates with other agencies such as LandBank for credit investigation of borrowers and with NGOs for joint conduct and sponsorship of training related to trade and industry.

8.3.8 Other Linkages

During the early life of the co-operative, it obtained assistance from an NGO called Philippine Business for Social Progress (PBSP). Through the Small Enterprise Assistance

Program of PBSP, seed fund[17] was extended to the co-operative for livelihood projects such as cattle fattening and palay (unshelled rice) production. The National Economic and Development Authority (NEDA) made the co-operative a conduit for funding of livelihood projects of seventy non-coop members belonging to the 'poorest among the poor' in the community.

The Lutucan MPC has maintained linkage with other government agencies such as the Department of Agriculture Region 4 and Fiber Development Authority (FIDA). However, Lutucan MPC expressed concern that seldom did extension workers, both during the time that they were under DA and recently under the LGU, visit them. The co-operative also observed that while FIDA visited them from time to time, it was only for the purpose of collecting data and monthly fees on fibre sales.

The co-operative, through its Executive Director, has actively participated in different interagency organisations in Quezon such as: Quezon Federation and Union Co-operatives (as member of Board of Directors); Quezon Co-operative Development Foundation, Inc. (President); Provincial Co-operative Development Council (one of the two representatives of the 2nd district of Quezon); Federation of Co-operatives in Quezon Province coordinated by LandBank (President); Provincial Agrarian Reform Committee (member); and LGU Pre-Bid Awarding Committee for infrastructure projects in the barangays (member). The involvement and active participation of Lutucan MPC in these venues made it possible for the co-operative to take advantage of opportunities as they occurred.

8.4 Problems

According to Lutucan MPC management, their coco-coir business did not perform very well in 1996 compared to previous years, hence proposals for expansion could not be recommended to the Board of Directors. The coco plant's lower production or financial performance could be attributed to frequent machine breakdown and some problems with the plant manager and workers. The co-operative realised that some of the repairs were minor that could be fixed without waiting for the availability of Mr. Sazon, the machine fabricator, to attend to them. Hence, the co-operative acquired a welding machine for the purpose. Lutucan MPC was aware of the fact that too much dependence on Mr.

[17] Amount loaned to members with repayments used to support other projects.

Sazon for repairs and other technology needs was risky since Mr. Sazon was growing older and his fabrication business relied heavily on his expertise. Only one of two decorticating machines was functioning because the engine of the newer unit (one year old) broke down and had not been replaced yet. According to Mr. Atienza, the engine used by the fabricator was observed to be of inferior quality. The co-operative stopped its decorticating operations for two months because its major market outlet (Asia Fiber Corporation) stopped buying from Mr. Sazon due to oversupply of fibre in the country. The Asia Fiber Corporation resumed its buying operations two months later.

Coco-coir dust had accumulated in the co-operative's plant because the decorticating process produced 10 percent fibre and 90% dust. Coir dust could not be disposed of economically. The co-operative tried to sell it to cutflower producers in another town but it was too bulky. Furthermore, there was too much competition with coir dust producers who were nearer the market. The dust compacting machine proposal was thus packaged with the assistance from DOST. However, lack of proper market scanning resulted to the project being shelved and the money for machine fabrication refunded to DOST-TAPI. The co-operative discovered this marketing problem only when it started negotiating for the fabrication of the dust compacting machine.

The co-operative used a solar drying technique to dry the coco fibre output. Therefore, the decorticating operation stopped during rainy days to prevent further accumulation of fibre for drying. This work stoppage had significantly reduced the co-operative's revenue from coco fibre.

In terms of linkages, Lutucan MPC did not encounter major difficulty because of its credibility and active participation in both NGO and government-based committees or councils. However, Mr. Atienza, the Executive Director, felt that the Local government units especially the municipality of Sariaya were still lacking in their efforts to strengthen the co-operatives. For instance, officers of the Provincial Co-operative Development Council mostly came from government and if there were officers from co-operatives, they occupied the lower posts. Mr. Atienza also noted the absence of a Municipal Co-operative Development Council that could promote the interests of co-operatives at the municipal level.

8.5 Strengths and Weaknesses of Lutucan MPC

When Lutucan MPC officials were asked about their positive qualities, they claim that members are generally honest, responsible borrowers and very religious, majority of whom were Catholics. The intensive 'pre-membership education seminar' and 'ownership seminar' are two of the co-operative's mechanisms to instil among prospective and incoming members their rights, duties and responsibilities as co-operative members.

Mr. Atienza closely coordinated with the Board of Directors on every aspect of the co-operative. He closely supervised the management staff and saw to it that they follow the Code of Conduct and Ethical Standard. To Mr. Atienza, this Code embodied everything that a community servant must observe for an honest, sincere and sound delivery of service.

When people around the neighbourhood, most of whom were co-operative members, were asked on their opinion about the co-operative and its management staff, they expressed their high regard for Mr. Atienza and staff members specifically mentioning their virtues of honesty and commitment. When asked what improvements in the community could they attribute to the co-operative, they mentioned the following: a clinic-pharmacy was established and operated by the co-operative; small businesses were put up through loans from the co-operative (including bakery, wood carvings, small grocery stores, footwear making); there were increasing numbers of college graduate children; and co-operative manufacturing businesses, such as coco-coir plant, provided employment opportunities to people in Sariaya.

According to the co-operative's interveners, Lutucan MPC is credit-worthy, resourceful, risk-taker and willing to diversify activities, dynamic and pioneering, highly motivated, with 'word of honour', with strong leadership, good management and planning ability, and with well-trained personnel and able Board of Directors. Having been an awardee by LandBank and DTI as one of the best co-operatives in the country, Lutucan MPC is well-known among GOs and NGOs and other co-operatives. Guests from other co-operatives in the country and foreigners interested in coconut by-product utilisation have visited the co-operative and observed its coco-coir plant operation.

Some weaknesses that were observed of the co-operative are lack of second generation leaders who can take over Mr. Atienza's role in case something will happen to

him, and increasing difficulty of monitoring the more than 4,000 members (and still growing).

8.6 Future plans of Lutucan MPC

The co-operative decided not to pursue the dust compacting project because of reasons cited earlier. Other plans, such as acquisition of a fibre stitching machine, mechanical drier, and twining machine (for use in doormat making), were put on hold because of the unstable performance of the coco-coir plant in 1996.

8.7 Lessons Learned from the Lutucan MPC Experience

A major lesson inferred from the Lutucan MPC experience is the strategic importance of the following: strong leadership; clear vision of end-goals; clear understanding by the co-operative of the concept of development (i.e. taking the initiative and 'no dole-out' mentality); establishing credibility to invite assistance programs and expand membership; and involving the community and nearby localities in its various projects. For instance, the coco-coir decorticating plant provided a market for the coconut husks of coconut farmers and provided additional income to coconut farmers who were members of Lutucan MPC. Another observation in this case study is the strong influence of those who controlled the technology and market on the decisions and viability of the business of the co-operative.

8.8 Analysis of Interrelationships

The interrelationships among the three major stakeholders in this case study are portrayed in **Figure 8.5.** Numbers 1, 2, and 3 refer to roles of major interveners with respect to the co-operative and letters A, B, C, D, E, F refer to nature of interrelationships between and among major stakeholders in the case study.

8.8.1 ROLES

#1 Private Manufacturer

- Technology and technical assistance
- Market
- Repairs and regular equipment servicing

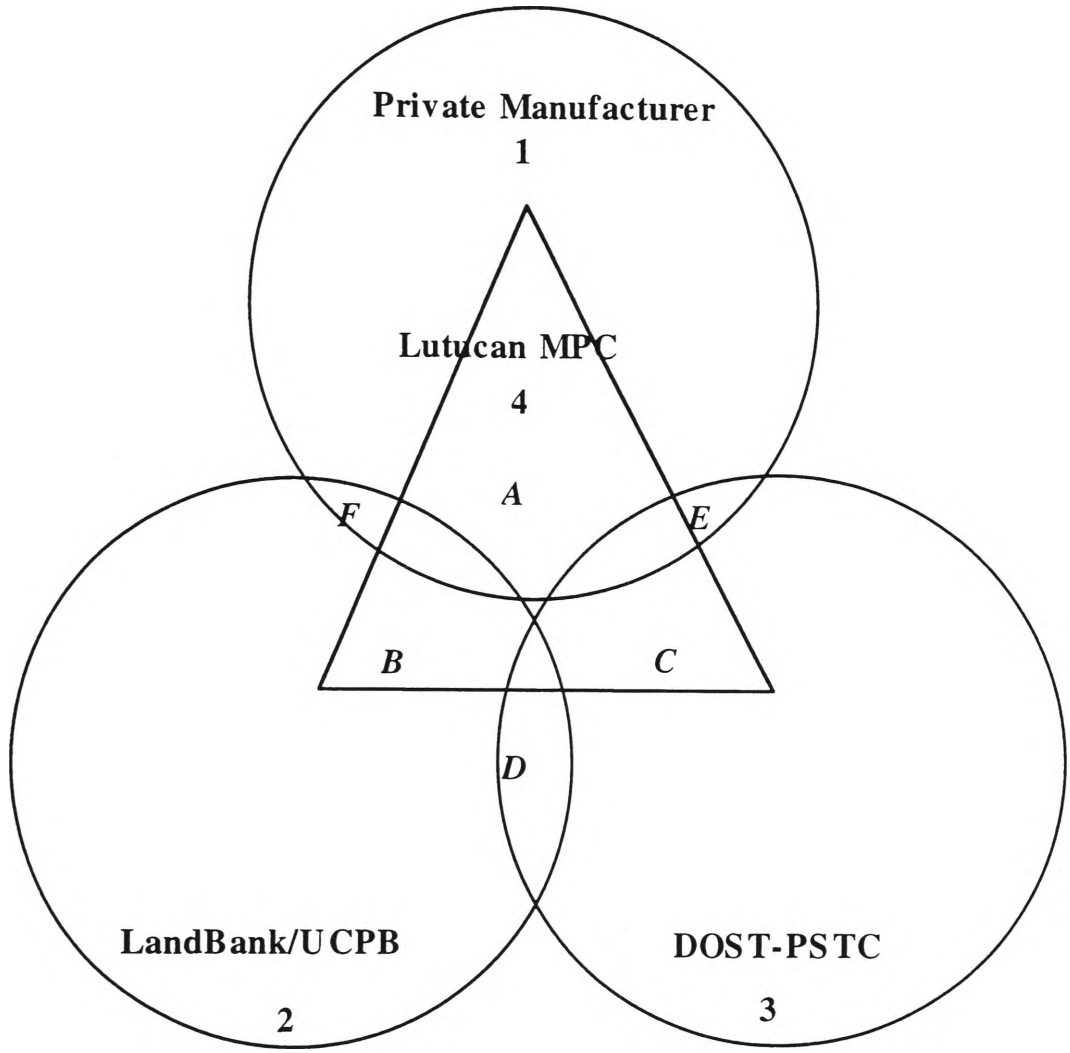

Figure 8.5 Interrelationship among key players in Lutucan MPC case

#2 LandBank-Lucena/UCPB Foundation, Inc.

- Financial support
- Facilitation of linkage with other LandBank/UCPB supported co-operatives

#3 DOST-PSTC

- Scientific and technical assistance
- Assistance in pre-investment study preparation
- Linkage with other technical GO, NGOs and private sector

#4 LUTUCAN MPC

- Production system
- Organisation and management
- Linkages
- Capital build-up formation

8.8.2 Interrelationships

A - Private Manufacturer and Lutucan MPC

The co-operative depended on Mr. Sazon for technologies needed in its coco-coir decorticating plant and future projects related to coconut by-product utilisation. This linkage and exchange of information between them in terms of technology needs and opportunities were facilitated by the proximity of the co-operative's site to Mr. Sazon's office. However, this would not assure sustainability of linkage between the co-operative and Mr. Sazon. Mr. Sazon was getting older and he was the only person in his company who had the fabrication expertise. Through linkage with Mr. Sazon, the co-operative gained access to the market for coco-coir fibre and this was formalised through a five-year marketing agreement. However, the case of the shelved coco-dust compacting project proved that both Mr. Sazon and the co-operative could be easily pushed out of business by the big coconut by-products manufacturers who controlled the technologies and market in the industry.

B - LandBank-Lucena/UCPB Foundation and Lutucan MPC

The relationship between the banks and the co-operative was covered by specific rules and procedures of the banks' accreditation and lending programs for co-operatives.

Both banks were responsive to the credit needs of Lutucan MPC because the co-operative had proven its credit-worthiness and was engaged in activities that were included in the banks' priority list of projects. The active involvement of the co-operative in the lending programs of the banks facilitated the flow of information between them. This enabled the co-operative to seize opportunities as these were presented at certain point in time.

C - DOST-PSTC and Lutucan MPC

The co-operative's linkage with DOST-PSTC was formalised through the involvement of the co-operative in the PSTC Council which was covered by a MOA. The participation of the co-operative in the PSTC Council provided it easy access to services provided by other government agencies, local government units, state colleges and universities, and NGOs in the province of Quezon that were members of the Council. However, the sustainability of this linkage with the Council was not certain because the Council was *ad hoc* in nature.

The major interveners of the co-operative had direct relationships with each other that were not centred on the co-operative. For instance, in relationship D, the DOST-PSTC had direct interaction with LandBank and UCPB through the PSTC Council. In relationships E and F, the private manufacturer had its own relationship with the DOST-PSTC in terms of fabrication of machines of the DOST's clientele including the co-operative, and the LandBank/UCPB in terms of the manufacturer's own commercial loans for his business.

Lutucan MPC was the point of convergence of all interventions provided by the different GOs, NGOs and private sector concerned. However, the services and projects of these entities/agencies were largely independent of each other. There was no deliberate effort on the part of the interveners to jointly plan and support collaborative projects for the co-operative. There were a few exceptions such as the joint DTI-LGU (Countryside Development Fund) project and the LandBank-National Housing Authority (NHA) co-operative housing program. The intervening agencies separately pursued activities that sometimes had similar objectives. There were instances when banks would compete for the co-operative's attention in terms of lending since banks normally had to meet certain quota for co-operative's lending. While this was good for the co-operative in terms of availability of credit, there could be duplication of efforts. The DOST-PSTC Council could have been the mechanism that would bring the different stakeholders together for joint project

planning and implementation. However, the Council was lacking in clout, budget and full-time secretariat. At best, this group provided the venue for information exchange and referral system among the different entities or agencies involved.

The different intervening agencies in this case study derived benefits from the interrelationships outlined here. On the part of the private manufacturer, Mr. Sazon's dealings with the co-operative has assured him of a client of his coconut by-product processing equipment and services. The co-operative, having been frequented by visitors to observe its operation has, in some ways, promoted the products and services of Mr. Sazon to other entities or agencies. Through the marketing agreement with the co-operative, Mr. Sazon has been assured of fibre supply for at least 5 years which he sold to an exporter. In the case of LandBank and UCPB, their interest in the relationship with Lutucan MPC was in terms of meeting their quota for co-operative lending, fulfilling their rural service mission, and the financial return on their investments. With DOST-PSTC, the benefit it derived from the relationship with the co-operative was the contribution to the realisation of the S&T Agenda for National Development (STAND) and the provincial flagship program, of which the coconut industry was a priority area.

8.9 Technology Transfer Approach

The technology transfer approach in this case study is a simple and direct process **(Figure 8.6)** with the technology generator using the technologies (equipment plus decorticating process) on a commercial basis himself and selling the technologies to the co-operative. The process is bottom-up in the sense that no other agency dictated the co-operative in pursuing the coco-coir fibre project. The co-operative acted on its own volition based on various ideas it derived from the interagency and interco-operative meetings. It has the capability of assessing business opportunities vis-a-vis its own resources and capabilities (i.e. Mr Atienza's previous work experience contributed to the motivation). Unlike the TABARGA case, Lutucan MPC managed and controlled its various linkages with the different GOs, NGOs and the private sector.

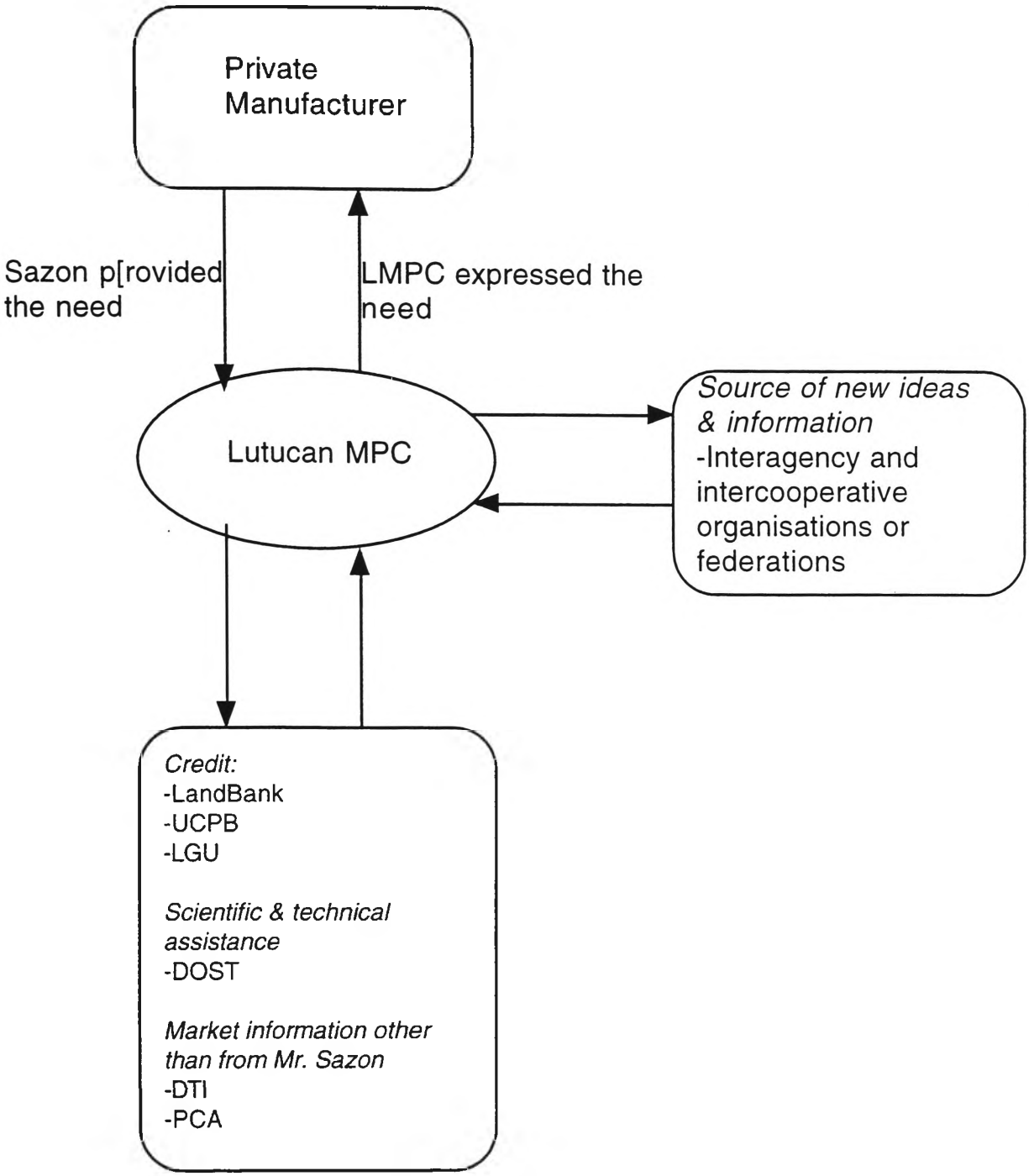

Figure 8.6 Technology transfer approach: Lutucan MPC case

CHAPTER 9

CASE 3: THE CASE OF THE INTEGRATED RURAL DEVELOPMENT PROJECT, JALAJALA, RIZAL

Rice Production, Processing and Marketing

9.1 Introduction

To understand the case of the Integrated Jalajala Rural Development Project (IJRDP), presented here are its history and background; its beneficiaries; and the interrelationships of the different entities involved in its conceptualisation, funding and implementation. In terms of the project beneficiaries, the case focuses on the Alibangbangan Multipurpose Farmers Co-operative, Inc. (AMFCI) and the Integrated Jalajala Federation of Co-operatives (INJAFEDCO) of which AMFCI is a member. The AMFCI has been one of the nine co-operatives in Jalajala, Rizal, Philippines that has benefited from IJRDP funding derived from both the Japanese and Philippine governments.

The nature of interaction and linkages among the key players in the case study are assessed based on the indicators discussed in chapters 1 and 6. The technology transfer approach employed in the case study is analysed and presented towards the end of the chapter.

This case study illustrates the organisational, institutional and technical issues and challenges surrounding a multi-sectoral and foreign-funded rural development project. The project had two components, namely infrastructure development, such as construction of rice processing complex, farm-to-market roads and irrigation facilities; and institutional development, including local institution building and technology transfer. The Japan International Cooperation Agency (JICA) funded the infrastructure development component, which was 99 percent of the total project cost. JICA awarded the construction work mainly to Japanese companies. The Department of Agrarian Reform (DAR) provided funds and coordinating mechanism for the institutional development component of the project. It contracted the services of two non-government agencies for the implementation of institutional development activities, namely the Southeast Asian Ministers of Education Organisation Regional Center for Graduate Study and Research in Agriculture (SEARCA)

for the technology transfer aspect, and the National Confederation of Co-operatives (NATCCO) for the co-operative development part. The beneficiaries of the project were the members of the co-operatives under INJAFEDCO.

The linkage between the infrastructure and institutional development components was demonstrably weak. The institutional development component was not included in the original project package. When finally considered in the project, its implementation lagged behind the infrastructure construction. There was lack of integration between the activities of the two components because, in the first instance, they were not planned together. There was evidence to show that the infrastructure outputs, identified and constructed mainly by the JICA-contracted companies, were not consistent with the capacities and resources of the beneficiaries for learning, repair and maintenance. The Japanese companies did the engineering plans and construction with little input from and participation by their local counterparts and the rural community.

The case study shows that the tripartite linkage among the institutional development implementers did not develop among the members of INJAFEDCO co-operatives a sense of appreciation, ownership and accountability of the project outputs especially of the rice processing complex. This linkage facilitated the flow of information from project implementers to officers of the co-operatives and the federation. However, it failed to reach and facilitate capability building of the majority of project beneficiaries. The field activities of SEARCA and NATCCO were not synchronised and were not well coordinated. The co-operative development activities of NATCCO were delayed and were not in tandem with SEARCA's attempts at transferring technical and management skills to the project beneficiaries. On the positive side, the linkages outlined here provided the co-operatives with access to market, irrigation facilities, rice processing plant and new production technologies. Overall, this case study argues that a complex rural development project such as the one featured here requires a strong coordinating agency that can adequately orchestrate the project activities of various agencies with different biases and work practices.

The technology transfer approach in this case study is generally top-down from planning, packaging, to implementation except in the aspect of transfer of production technologies. Similar to Case 1, the strategies of local capability building and technology

training were used. However, these strategies were properly phased-in in Case 1 and less coordinated in Case 3.

9.1.1 Integrated Jalajala Rural Development Project (IJRDP)

In 1988, the municipality of Jalajala was chosen by the Department of Agrarian Reform (DAR) as a model area for the promotion of the Comprehensive Agrarian Reform Program (CARP).[1] The CARP involved two major components: land tenure improvement through land acquisition and distribution; and CARP beneficiaries' development through strengthening of the agrarian reform beneficiaries' organisations and co-operatives, enterprise development, and physical infrastructure support.

The DAR is the lead agency in implementing CARP. In 1988, it started to negotiate with the Japanese government through the Japan International Cooperation Agency (JICA) for the funding of a model CARP development project. The project known as Integrated Jalajala Rural Development Project (IJRDP) was thus conceived. The IJRDP model was envisioned to develop an 'organised self-reliant and productive community' that shared resources and applied technology in a commercial environment for their collective benefit.[2] The IJRDP was a comprehensive package of physical and social support services for the agrarian reform beneficiaries in Jalajala, Rizal. It involved infrastructure development with US$18.5 million[3] grant coming from the government of Japan. This infrastructure development component included road networks, irrigation and drainage facilities, potable water supply, power supply system and a rice processing complex with drying and milling facilities, warehouse and transporting facilities.[4]

The other component of the project was institutional development with a budget of almost US$225,777. This component was funded by the Philippine government as its counterpart or equity to the project. The institutional development component was not originally part of the project proposal. However, it was included before the project documents were finalised. The reason for its inclusion was the realisation by both the DAR and JICA that local capability building of the beneficiaries was important to sustain the physical infrastructure component of IJRDP.

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[1] Refer to chapter 3 for more details about CARP.

[2] Integrated Jalajala Rural Development Project Documents, DAR.

[3] Conversion rate—US$1.00 = 27 Pesos

[4] Conversion of power supply from single phase to three phase system.

Under the institutional development component of the project, the DAR engaged the services of two non-government organisations (NGOs): SEAMEO-Regional Center for Graduate Study and Research in Agriculture (SEARCA); and the National Confederation of Co-operatives (NATCCO). SEARCA was tapped to establish an integrated rice production, processing and marketing program for the project beneficiaries. On the other hand, NATCCO was assigned to handle the organising and strengthening of co-operatives. The objectives of the institutional development component of IJRDP were as follows:

- to establish and strengthen co-operative organisations that would be responsible together with the partner agencies for implementing IJRDP and would eventually be independently responsible for the operation and maintenance of facilities constructed through the project;
- to establish a program for operating the rice processing complex as a commercial enterprise that would integrate rice production with the processing and marketing of milled rice; and
- to prepare the basis for an agro-commercial development of commodities in the municipality of Jalajala.

During the initial stage of IJRDP conceptualisation, between the period September 1989 to September 1990, the DAR assigned a team to conduct a project feasibility study in Jalajala. The farmers' associations, irrigators' association and other people's organisations existing in the project site before the IJRDP were consulted as to what their most pressing problems were. Some of the problems expressed by these groups were absence of good road network, inadequate irrigation facilities, lack of electricity service, low farm production output, and need for potable water.

The feasibility study was submitted by the team to DAR in December 1990. After making some revisions and refinements, the DAR submitted the IJRDP proposal to JICA because irrigation and rice processing were included in JICA's priority areas for assistance. JICA sent a 'Basic Design Team' to Jalajala from October to November 1991 for field investigation and to confer with the project proponents. Upon recommendation of JICA's Basic Design Team, the infrastructure sub-components were identified as follows: four communal pump irrigation and drainage facilities capable of irrigating 430 hectares of agricultural land; 18.1 kilometres concrete trunk road and 14 kilometres gravel-metalling feeder road; 16 units of manual operated water pumps and 2 units communal faucet and

distribution pipeline (electrical power driven); power supply system;[5] and 2.5 ton per hour capacity rice processing complex.

The formal signing of agreement or 'Exchange of Notes' between the governments of the Philippines and Japan was done on 23 October 1992. Detailed engineering plans and designs for the project components were prepared in Japan by engineers and consultants from Nippon Koei Co., Ltd.[6] after they underwent survey work in Jalajala from 19 October to 21 November 1992. With these engineering designs ready, bidding for the project ensued. It was done in Tokyo, Japan in December 1992. Signing of the civil contract between DAR and the winning bidder, Taisei Corporation,[7] was done in February 1993. Afterwards, construction of the physical infrastructure started.

The land area of about 359 hectares as site for the rice processing complex was negotiated by DAR with Meralco Foundation[8] for donation to the project beneficiaries. The DAR also negotiated with the local people for donation of land as 'right of way' for the road network component. It had a difficult time convincing farmers to donate lands for roads and irrigation. The farmers or project beneficiaries were not informed beforehand of the extent of the construction work that would be done and the damage to crops and properties expected from it, hence the initial resistance to cooperate. For the electrification component of the project, a Memorandum of Agreement (MOA) between DAR and Manila Electric Company was signed in November 1991.

The IJRDP infrastructure component was contracted mainly to Japanese companies. This meant that materials and parts used in the physical infrastructure were mostly made in Japan and therefore had implications on the maintenance of the facilities by the local people. The Japanese firms subcontracted some of the infrastructure work to Filipino companies. However, the local companies were under the close supervision of the Japanese firms. The DAR provincial engineers were involved in the project only to monitor the

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[5] Required to convert power supply from single phase to three phase system to run the rice processing complex, water supply system and irrigation facilities. The power supply system improvement was financed by the Philippine government through the Manila Electric Company.

[6] The company whose engineers made the detailed engineering design of the physical infrastructure and supervised the technical aspects of the construction. Their field office was located at the project site in Jalajala.

[7] The contractor in-charge of the construction work in accordance with the technical specifications of the infrastructure. It had the same field office as Nippon Koei Co., Ltd.

[8] Meralco Foundation, Inc. is a non-government organisation established in 1973 to serve the need for capability building of Filipinos (especially the disadvantaged) in the areas of technical education and training, entrepreneurial development, values education, agricultural and aquatic training and community development.

work-in-progress. JICA did not allow any change in the engineering plans although there were suggestions to do so during the construction work. Construction work was carried out between March 1993 to April 1995, as scheduled. The completed infrastructures were turned over to local organisations that would be responsible for their operation and maintenance as follows: irrigation facilities to the farmer associations or co-operatives in the barangays involved; roads and potable water systems to the local government of Jalajala, and rice processing complex to INJAFEDCO.

With regards the institutional development component, as soon as it was agreed to be included in the proposal, the DAR through the Bureau of Agrarian Reform Beneficiaries Development (BARBD) met with the local leaders of Jalajala in November 1991. An assessment of the various farmer organisations, irrigators association and co-operatives was made on February 1992. Soon, the institutional development framework was developed by DAR-BARBD. On the basis of this framework, NGOs were invited to submit proposals for institutional development activities. SEARCA and NATCCO were selected on the basis of the following criteria: involvement in rural development projects; track record in co-operative organising and strengthening; expertise in integrated rice production, processing and marketing; previous or current linkage with government organisations; and financial resources to implement the project activities in case there was delayed release of funds. The MOA among the DAR, SEARCA and NATCCO was signed on 16 August 1993.

Overall, the IJRDP was a project of almost 99 percent physical infrastructure component. The institutional development part was included only after the issue of sustainability of the infrastructure was realised. It was a project conceptualised from the top with little participation of the local community or intended beneficiaries during the planning stage.

9.1.2 Project Site

The municipality of Jalajala was chosen as the project site because it was classified as one of the most economically depressed areas in the Philippines. Almost 80% of its total land area was under CARP coverage and around 74% of farm households were agrarian reform beneficiaries.[9] Jalajala is one of the 15 municipalities in the province of Rizal,

[9] Leticia Damole, Institutional development to sustain a rice processing complex: The case of the Integrated Jalajala Rural Development Project, Philippines, a thesis submitted in partial fulfilment of the

Region IV **(Figure 9.1)**. It is located 75 kilometres southeast of Metro Manila and lies along Laguna Lake.[10] It consists of eleven barangays and had a total population of 20,255 people or 3,886 households as of 1997.

The total land area of Jalajala is 4,930 hectares with 30% or 1,440 hectares classified as agricultural land and 63% upland areas. The climate in Jalajala is hot and dry from December to April and rainy from May to November. The place is accessible by a concrete paved national road that leads to Metro Manila. Land transportation includes light buses or jeepney from Jalajala to another town of Rizal called Tanay, and bus service from Tanay to Metro Manila. Water transportation system is available for travels across Laguna Lake from Jalajala area to other towns of Laguna and Rizal provinces. Before IJRDP, there were 40 kilometres barangay roads but these were unpaved and unpassable during rainy season.[11] After the IJRDP, the road network within Jalajala has significantly improved with some thirty kilometres trunk and feeder roads constructed.

Before the project, there were 15 communal irrigation systems constructed by the National Irrigation Administration (NIA). Irrigators associations were organised by NIA to systematise the operation and maintenance of these irrigation facilities. The major economic activity in the municipality is agricultural, with rice, maize, rootcrops, vegetables and fruits as major products. The other sources of livelihood in Jalajala are fishing, duck egg production, cattle fattening and garments making.

9.1.3 The Integrated Jalajala Federation of Co-operatives (INJAFEDCO)

INJAFEDCO is a secondary agricultural co-operative composed of ten primary co-operatives **(Appendix 9.1)** from various barangays of the municipality of Jalajala. It was organised on 16 September 1994 and was officially acknowledged by the Co-operative Development Authority (CDA) on 22 June 1995. Before its incorporation, an *ad hoc* committee composed of two representatives from each of the primary co-operative's Board of Directors drew up the Federation's Article of Cooperation and By-laws in consultation with their respective co-operative members.

Before IJRDP and INJAFEDCO, most of the primary co-operative members pre-existed in different forms. They were either any of the following: Samahang Nayons (SNs)

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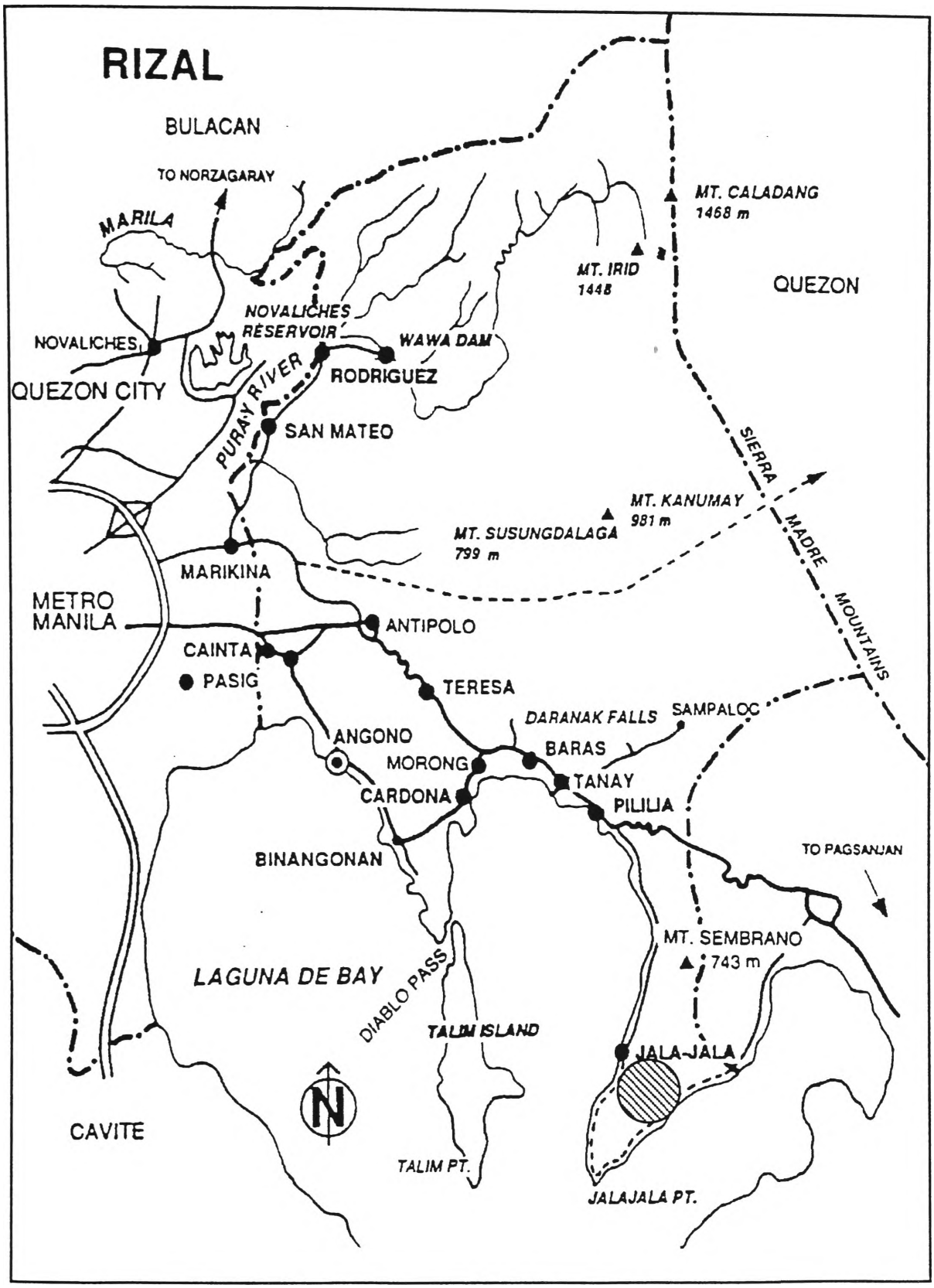
requirements for the degree of Master of Science, Asian Institute of Technology, Bangkok, Thailand, August 1995, p. 127.

[10] Laguna lake is the largest and the shallowest lake in Southeast Asia.

[11] L. Damole, *op. cit.*, p. 36.



Legend: INJAFEDCO site: Jalajala, Rizal Province, Philippines

Figure 9.1 Location map of INJAFEDCO (Case 3)

Source: Conrado Lancion, *Fast Facts About Philippine Provinces*, Tahanan Books, Manila, 1995, p. 135.

organised under the land reform program of the Martial Law regime;[12] credit co-operatives assisted by the Land Bank of the Philippines (LandBank); multipurpose co-operatives initiated by a private foundation called Meralco Foundation; or irrigators associations formed by the NIA. Only one of the ten co-operatives has been newly created during the IJRDP implementation.

The formation of INJAFEDCO was one of the objectives of the IJRDP institutional development component. INJAFEDCO was intended to take over the management of the rice processing complex (RPC) built through the project. Mr. de Guzman, chairman of INJAFEDCO, claimed however that there was an initial interest to form a federation even before IJRDP and its creation was facilitated by the project.

The management of RPC was officially turned over to INJAFEDCO by SEARCA in August 1996. The Department of Agrarian Reform granted the federation a loan of US$185,000 at six percent interest rate per annum to operate RPC. Ownership of RPC will be transferred to the federation as soon as the federation has paid the loan to DAR. The federation will start amortising the loan in year 1998.

Mr. de Guzman told the federation members that it was proper to recognise the help of the DAR but they should not allow it to dictate the federation. He cited one instance whereby the federation was not happy with the DAR's action. The JICA donated vehicles (truck and land cruiser) for use in the operation of RPC. However, the DAR pulled out the land cruiser from RPC for use by DAR Central Office officials. Mr. de Guzman felt that this was not fair.

In a survey conducted by Damole, *et al.*[13] in February 1995, they note that the federation was still lacking in basic organisational capability, such as in planning, facilitating meetings, record keeping and financial management. They observe that during that time, the basic finance and records management systems had not been in place. In the same survey made by Damole, *et al.*,[14] they note that five of the member-co-operatives of INJAFEDCO were not fully operational and were debt-ridden, thus affecting the federation's viability. The survey also reveals that the federation was highly supported by its committed and well-informed officers. However, the majority of members were not

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[12] See chapter 5 for details.

[13] L. Damole, C Austria, and Ma. S. Peralta, Initial findings of the INJAFEDCO survey conducted on 9-16 February 1995. This formed part of Damole's masteral thesis entitled, Tripartite institution-building to sustain a rice processing complex-evidence from the Integrated Jalajala Rural Development Project.

[14] *Ibid.*

supportive because they were not fully aware of the federation's existence or operations. The members' commitment and support for the federation have implications on the operation of the RPC. The RPC has been operating below its maximum capacity because not many farmer-members have been patronising it in terms of bringing their palay produce to RPC for milling and marketing.

According to a SEARCA official, there was an attempt on the part of the federation to assume the responsibility of managing RPC one year before the management contract between SEARCA and DAR expired. This was triggered by 'personality problems' between the federation and some of the people hired by SEARCA to manage RPC. However, this early takeover did not happen because, according to Damole, *et al.*,[15] the federation was not yet ready in terms of organisational capability. Furthermore, the federation staff members were expected to have completed their hands-on management training under SEARCA, covering wet-season 1995 and dry-season 1996, before the turnover of RPC management responsibility to INJAFEDCO.

In terms of the profile of INJAFEDCO's officers and members,[16] Damole *et al.*'s survey shows that most officers and members were between the ages of 41 to 50 and that no officer or member was below 20 years old. The same survey indicates that there were many female members (58%) but very few female officers (16%). In terms of educational attainment, most of the officers were either college graduates or had reached college level (39%), 25% were elementary graduates, and 23% were high school graduates. The members, on the other hand had mostly reached elementary level or were elementary graduates (42%), 26% high school level or graduates, and 29% had reached college level. In terms of occupation, most of the officers and members were engaged in farming and some 25% members and 13% officers were government or private employees.[17]

In terms of local community participation, the INJAFEDCO's member-co-operatives rallied behind the incumbent mayor of Jalajala during the 1994 election because they believed that he could advance their cause. The incumbent mayor used to be the Chairman of one of the member-co-operatives. The mayor would usually consult

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[15] *Ibid.*

[16] INJAFEDCO's members were the members of the primary co-operatives. For purpose of survey, Damole *et al.* used purposive sampling in the case of the federation officers and sampling for the members.

[17] Damole, *et al.*, *op. cit.*

representatives from INJAFEDCO when there were laws or regulations pertaining to co-operatives that need to be discussed or settled.

The INJAFEDCO was still in the process of planning its activities in support of the member-co-operatives during the time when the survey was made. The services of INJAFEDCO, during that time, were as follows: market outlet for farmers' produce, through RPC; and retail rice trading, in which the federation encouraged the member co-operatives to get rice from RPC and sell them by retail in their locality. The federation has intended to support rice production needs of the members by providing them production loans. It has also planned to develop other income generating projects for the members. However, this could not be implemented because of limited funding. The US$185,000 loan from DAR could not be used for this purpose because it was meant to be RPC's source of operating capital.

9.1.4 The Rice Processing Complex (RPC)

The RPC has been managed by INJAFEDCO starting August 1996. The policy making function of RPC is vested on the federation's Board of Directors. The day to day operation is supervised by a General Manager. The RPC has five sections, namely administrative and finance, credit and collection, procurement and marketing, traffic and warehouse, and processing and maintenance.

The full-load capacity of RPC is 1,920 tons of clean and dry palay (unshelled rice) per season. However, based on the experience of SEARCA, its rated capacity is only 1,200 tons of palay per season. It has the following specific performance capabilities: two 4-ton trucks; four parallel units of dryer with batch capacity of 5 tons each (each unit had a drying rate capacity of 0.5 to 1.0% moisture reduction per hour); sun drying pavement with 30.0 tons per day capacity; one-line rice milling plant with a palay husking rated capacity of 2.5 tons per hour; 400-ton palay warehouse; and 100-ton milled rice warehouse. **Figure 9.2** presents some pictures of the RPC.

The RPC has sourced palay from the members of the primary co-operatives, with the co-operatives serving as buying stations. The RPC has encouraged non-INJAFEDCO farmers' associations in Jalajala to sell their produce through the buying stations in their locality. Palay procurement has extended to the nearby towns of Jalajala and nearby provinces of Rizal to maximise the use of RPC's capacity.

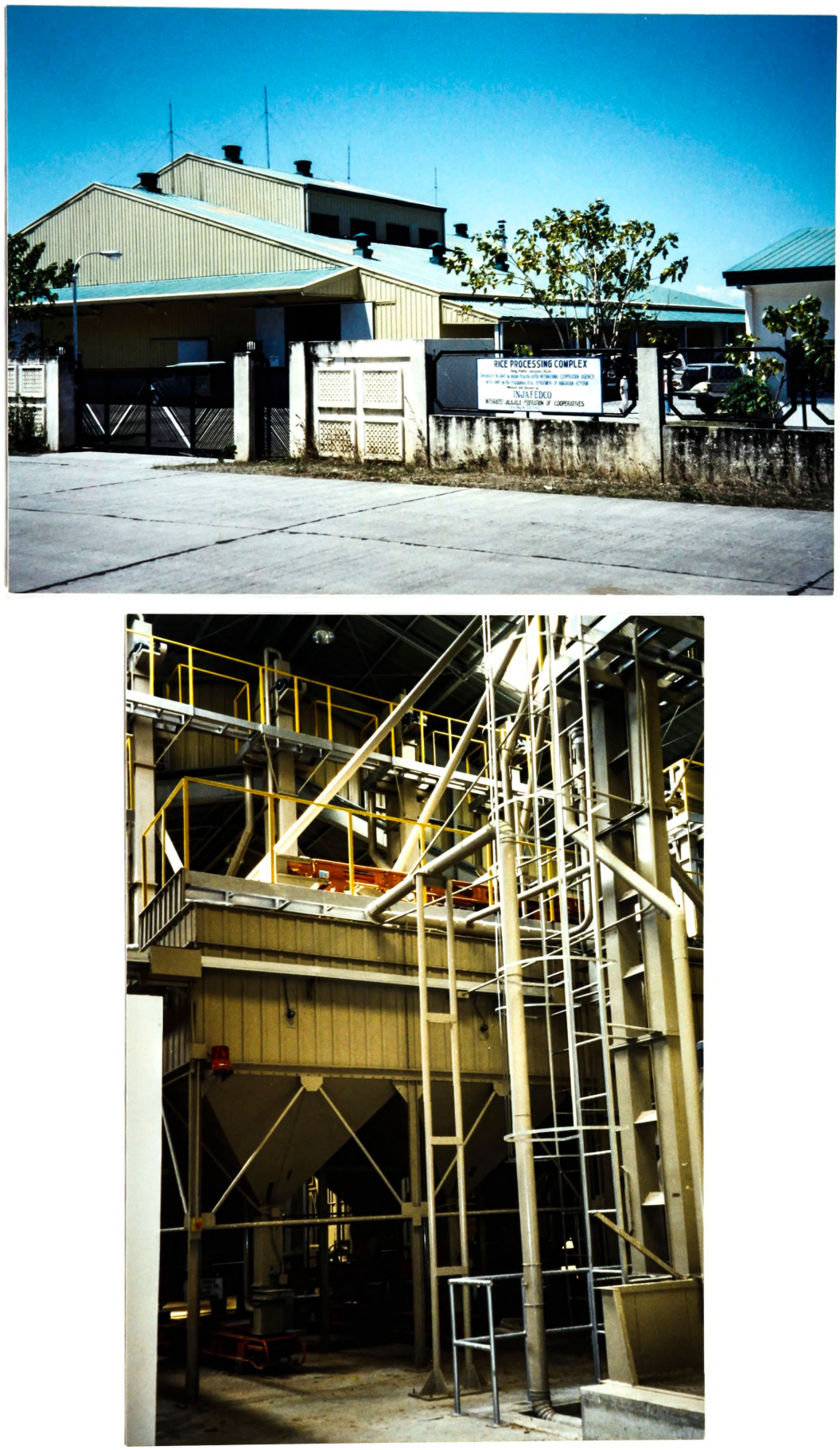

Figure 9.2 The rice processing complex: INJAFEDCO

9.1.5 Alibangbangan Multipurpose Farmer Co-operative, Inc. (AMFCI)

The AMFCI started as an association under the Free Farmers Federation in August 1973 in connection with Presidential Decree no. 27 or the land reform law of the Marcos government. It was then called Palaypalay Samahang Nayon, Inc. The farmers in Jalajala have been one of the earliest beneficiaries of this land reform program. The association was reorganised into a co-operative in April 1990 when the DAR under the Aquino administration encouraged agrarian reform beneficiaries to form themselves into co-operatives. The AMFCI members have been amortising payment for their lands to LandBank. They have been given thirty years to complete the payment. Some members are fully paid already.

AMFCI is located in Barangay Palay-palay of the municipality of Jalajala. The co-operative has a seven-member Board of Directors and three working committees. The committees cover the areas of education and training, finance and development, and audit and inventory. The co-operative has 58 members as of 1997, 12 of whom were women, mostly widows who have assumed their husbands' membership. All members of the co-operative are farmers and agrarian reform beneficiaries. AMFCI members have been cultivating a total of 140 hectares of rice farmlands. The farm size of members ranges from 0.5 to 3.0 hectares. Some of the members are also fishermen, their location being near the Laguna Lake. In terms of level of education, 10 members are high school graduates and the rest have reached elementary level. One member is a barangay captain and another one is a member of the Barangay Council. The co-operative has no office space but has kept their records in the houses of their treasurer and secretary. The co-operative members have built a resting shed, that they have used as site of their informal meetings. They have also used the barangay hall as a meeting place.

The co-operative chairman, Mr. Julian Balakit, has been a farmer leader since 1965. Mr. Balakit has been highly regarded by the co-operative members who described him as hardworking and self-confident. The members have admired him for his ability to talk to and negotiate with high officials from both the government and private sector regarding their concerns.

The following instances give an indication of the leadership and management style of Mr. Balakit. He did not sign right away in the MOA between DAR and AMFCI effecting the turnover of irrigation facilities to the co-operative. The MOA stipulates that if

in three years the co-operative will not be capable of managing the irrigation facilities, the DAR will take over. The co-operative would like to avoid the situation whereby DAR would dictate to them specific policies with regard to their irrigation fees. The policy of the co-operative pertaining to irrigation fees was that each member would pay 14 cavans[18] during the dry season and 12 cavans during the wet season to defray the co-operative's electric bill for use of the irrigation facilities.

Mr. Balakit wanted to try the capabilities of the co-operative members to work together in managing the irrigation facilities before signing the MOA. In addition, the co-operative was not happy with the work done by the company that constructed the irrigation canals. The company could not be fully paid for their work until the co-operative signed the MOA. However, the co-operative did not want to sign the MOA until the company removed the rocks it piled up in their farms during the construction work.

Mr. Balakit also strictly enforced among co-operative members the policy of selling palay produce to RPC. The penalty for not complying with the policy was non-supply of irrigation water. He also instructed RPC not to accept palay of a member who made a deal outside RPC but for some reason did not pursue it and instead offered them to RPC. This was done to teach such members a lesson. The usual reason of members for not selling their produce to RPC was that they could get a better price outside.

The following examples illustrate the extent of local participation of AMFCI. During a meeting among the Cabinet Members of the Philippine government held in the province of Rizal, Mr. Balakit was able to express the co-operative's concern about electricity problem to the Secretary of DAR. Mr. Balakit has been negotiating with authorities (i.e Department of Energy, DAR) since 1994 for the conversion of the electricity rate from commercial to agricultural rate, because so much electricity is required to operate the irrigation facilities. The problem in the Philippines is that, there are only two classifications of electricity rate: commercial and residential.

The AMFCI articulated their concerns and problems to the local government (up to the provincial level), through the membership in the co-operative of two local officials, and through the leadership of Mr. Balakit, to the extent that they could influence local policies. For example, in the municipality of Jalajala, there used to be a law about stray animals that 'whoever owned the farms were expected to put a fence on their properties' but they

[18] One cavan is equivalent to 50 kilograms of palay (unmilled rice)

requested for a change in the law that 'whoever owned the animals were expected to restrain or leash them'. Most of the barangays in Jalajala changed their ordinance in favour of this suggestion.

On electricity problem, another issue is that the co-operative could not pay the electric bill on due dates because these dates did not reconcile with the harvesting season. The co-operative, through Mr. Balakit and other members who were also local officials, requested the help of the Municipal Council[19] to negotiate with the electric company for delayed payment of the electric bill.

The result of this initiative was that the Governor prepared a resolution addressed to the Head of the electric company. The Head agreed to their request. But there was a change in the management of the electric company due to the privatisation program of government. The previous agreement on delayed payment of electric bill was no longer honoured. With a written endorsement from the former Head of the electric company, the co-operative through Mr. Balakit negotiated with the new management to allow them to give down payment first then the full payment later during the harvest season. With some hesitation, the new management finally agreed to this temporary arrangement. Mr. Balakit advanced money for down payment of electric bill from the RPC to be returned later when the members have paid their irrigation fees.

9.2 Linkages and Networking

9.2.1 Japan International Cooperation Agency (JICA)

JICA, upon the request of the Philippine government through the DAR, provided funding for the infrastructure development component of the Integrated Jalajala Rural Development Project (IJRDP). To understand the nature of JICA assisted projects like IJRDP, **Appendix 9.2** presents an analysis of Japan's official development assistance.

The IJRDP was packaged on the basis of the request-based system of the Japanese aid program described in Appendix 9.2. The critics of Japanese aid claim that this system provides the opportunity for Japanese firms to influence, in their favour, the recipient country's requests. The project was apparently 'tied' in the sense that Japanese firms won the bids and that facilities and equipment used for the project were generally procured from

[19] Legislative body of the municipality. It enacts ordinances, approve resolutions and appropriate funds for the general welfare of the municipality.

Japan. With the IJRDP case, the contract for the conduct of field survey and preparation of the detailed engineering design of the infrastructure component of the project (such as irrigation facilities, road network, rice processing facilities) was awarded by JICA to a Japanese firm. Upon completion of the engineering designs, bidding for the construction work was held in Japan. A Japanese firm won the bid and sub-contracted some of the work to Filipino companies. However, the local companies were closely supervised by the Japanese firm with assistance of the DAR provincial engineers. The RPC contractor trained the local people or representatives from the primary co-operatives to operate RPC before it was turned over to SEARCA for management. However, the project beneficiaries had very little control over the design and construction of the facilities put up by JICA.

Although the municipality of Jalajala has benefited from the basic infrastructure put up by JICA,[20] the system outlined above has implications for the operation and maintenance of the project outputs. There have been early signs of difficulty in maintaining project facilities. Since supplies and materials used in building the infrastructure were made in and procured from Japan, spare parts are not easily available in the Philippines. For instance, all water pumps and their parts were made in Japan. Most of the potable water units were out of order because the design of the pumps was such that it used a 'sapatilla' (rubber stopper) which was not durable and to maintain it, a replacement was needed every three months. Motors have low efficiency, which according to the local power company's computation is only 70%.

There was also dissatisfaction on the design of the RPC constructed by the Japanese firm. The local expert hired by SEARCA to initially manage the RPC noticed the defect on the designs. For instance, the expert observed that the machines and equipment were installed in such a way that the whole process of storing, drying, milling and bagging was circuitous. In the opinion of one DAR staff member I interviewed, there are more motors installed than necessary and this has contributed to unnecessary power consumption. The rice whitener machine is also observed to be inefficient since there is a need to pass the grains into the machine twice to meet the market demand for white rice. The RPC staff members have also observed cases of grain breakage.

[20] i.e. Roads that facilitated marketing of the farmers' produce, potable water supply that provided the local people safe drinking water, and irrigation that allowed farmers to increase their rice production.

9.2.2 Department of Agrarian Reform (DAR)

The DAR leads eleven other government line agencies in the implementation of the CARP. It is mandated to improve land tenure through more equitable distribution of land and to promote the welfare of the agrarian reform beneficiaries. The DAR consists of the Central or Head Office, staff offices, five staff bureaus located at the Central Office, and 12 regional, 75 provincial and 1,500 municipal agrarian reform offices all over the country.[21]

The Integrated Jalajala Rural Development Project (IJRDP) was conceptualised by the DAR to make it a model project of CARP. On behalf of the Philippine government, the DAR made arrangements with JICA for the funding of IJRDP-infrastructure component. The DAR also negotiated with the proper authorities and the local people for the donation of lands necessary for the construction of road network, irrigation facilities, and RPC. It signed a MOA with the Manila Electric Company for the conversion of power supply from single phase to three phase system. This electricity conversion was necessary to be able to run the irrigation facilities that were put up in Jalajala.

For the implementation of IJRDP, the DAR created a Project Management Office (PMO) based in the Municipal Agrarian Reform Office (MARO)[22] of Jalajala. The PMO involved staff members of DAR Regional Office for Region IV (Southern Tagalog Region),[23] DAR Provincial Office[24] and MARO. There were two divisions under PMO: Physical Infrastructure and Social Infrastructure Divisions. It had the following functions: formulate operating and management systems; initiate and coordinate project execution activities; periodically monitor and validate project performance; recommend policies and strategies on the overall project implementation; and supervise implementation of the institutional development component. The DAR Regional Director was designated as the Project Manager of IJRDP and leader of PMO. Based on the study made by Damole, *et al.*,[25] the PMO existed as an office but the personnel (for example Project Manager, engineers, Institutional Development Officer) who were assigned to perform the PMO's

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[21] Damole, *et al.*, *op. cit.*, p. 130.

[22] The Municipal Agrarian Reform Office (MARO) for the municipality of Jalajala was responsible for directly implementing agrarian reform programs at the municipal level. The MARO development facilitators (DFs) were the direct link between the agrarian reform beneficiaries and the DAR. They monitored the implementation of CARP at the farmers' level.

[23] The DAR-Region IV supervised the implementation of laws, policies and programs, projects, rules and regulations of the DAR in Region IV, Southern Tagalog Region which was composed of 11 provinces.

[24] The Provincial Agrarian Reform Office (PARO) for Rizal Province directed and coordinated the operations and activities of the Municipal Agrarian Reform Offices (MARO) in the province of Rizal.

[25] Damole, *et al. op. cit.*

functions were holding office either in the DAR Region IV Office or in PARO not in the project site.

The Bureau of Agrarian Reform Beneficiaries Development (BARBD), one of DAR's staff bureaus, provided technical assistance to the field implementers of IJRDP-institutional development component. The DAR realised its limitations in terms of institutional development capability. Therefore, it engaged the services of two NGOs that have the experience of working with rural communities, namely SEARCA and NATCCO. In effect, there was tripartite relationship among the DAR, SEARCA and NATCCO in the implementation of IJRDP-IDC.

This strategy was consistent with the DAR's objective of establishing partnership programs with government, NGOs, people's organisations and agribusiness organisations to facilitate the development of viable agrarian reform communities. The National Irrigation Administration (NIA) was also involved to provide technical and organisational development assistance in areas covered by the pump irrigation systems. It coordinated with SEARCA as regards farm production and with NATCCO on organisational strengthening.

With different agencies of different backgrounds participating in the project, coordinating mechanisms to ensure the smooth implementation of IJRDP-IDC were put in place by DAR. These were as follows:

- Management Committee (ManCom) composed of DAR Region IV Director as Project Manager of IJRDP, DAR Provincial Agrarian Reform Officer (PARO) of Rizal, Municipal Agrarian Reform Officer (MARO) of Jalajala, BARBD Director, NATCCO General Manager, and SEARCA Team Leader. The ManCom was responsible for overseeing the implementation of the IJRDP. It had a regular meeting of once every two months to assess the progress of the project and to settle issues and constraints in project implementation. The ManCom was chaired by the DAR Region IV Director and BARBD served as the secretariat.
- Implementers' Meeting held once a month at the project site and attended by all field implementers to assess and synchronise project activities and settle any related issues and concerns. During the meetings, representatives from other government agencies and the local government unit in the municipality were invited as the need arose. The

Implementers' Meeting was headed by the Municipal Agrarian Reform Officer of Jalajala with the Project Management Office (PMO) serving as the secretariat.

- RPC-ManCom was also formed to oversee the operational management of RPC as a business. It was composed of representatives from INJAFEDCO, DAR Central Office, DAR-PMO, NATCCO and SEARCA. It was chaired by the Director of SEARCA and the meeting was scheduled once every two months.

These coordinative mechanisms were operational until the completion of the IJRDP-IDC activities as planned and until RPC management was turned over to INJAFEDCO and the irrigation facilities to the co-operatives concerned. With the project finished, the MARO, through the help of DAR Region IV, was directed by DAR Central Office to continuously assist and identify the needs of the IJRDP beneficiaries including the AMFCI. The MARO's development facilitators (DFs) would carry on this monitoring function as part of their regular activity under the CARP Beneficiary Development Program. The objective of the program was to strengthen agrarian reform beneficiaries and develop them into co-operatives. The DFs were the ones in direct contact with the agrarian reform beneficiaries. They were provided motorcycles for mobility purposes. Sometimes, the DFs received complaints from farmers because of the many surveys that the DFs were conducting.

During the implementation of the IJRDP-IDC, the DAR was found to be lacking in its efforts to monitor field activities undertaken by SEARCA and NATCCO. This monitoring activity should have been the responsibility of the DAR-PMO. However, it gave more focus on the physical infrastructure and less attention on the progress of activities undertaken by SEARCA and NATCCO in the field level. The Project Manager and Head of the PMO, being the Regional Director of DAR Region IV, had little time to personally check the details of the IDC activities.

The DAR-BARBD, on the other hand, did not have enough personnel to assume the responsibilities of the PMO. With the DAR-PMO not controlling the direction of the IDC activities as it should, it failed to alert NATCCO when there were delays in co-operative strengthening activities[26] and when the frequent turnover of NATCCO's project personnel affected its field performance.[27]

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[26] For example, delayed registration of federation, delayed submission of reports.

[27] Damole, *op, cit.*, p. 91.

9.2.3 National Confederation of Co-operatives (NATCCO)

NATCCO started as an education and training centre for co-operatives of the Southern Philippines in 1966. The concept of a training centre for co-operatives expanded in the Visayas and Luzon between 1970 and 1976. It became a national organisation called the National Association of Training Centers for Co-operatives, Inc. in 1977. Renamed later as National Confederation of Co-operatives (NATCCO), its programs and services cover not only education and training but other areas such as research and publications, audit, extension work, women in development, co-operative insurance promotion, inter-coop trade and linkage building. As of 1990, NATCCO has affiliated 918 primary municipal-based co-operatives in various categories (credit, multi-purpose, consumers, marketing and producers' co-operatives) and has a total membership of 550,800.[28]

As far as the IJRDP-IDC is concerned, NATCCO's major responsibilities were strengthening of primary co-operatives in Jalajala and organising of a secondary co-operative in the form of a federation which was INJAFEDCO. Specifically, its activities were as follows:

- training co-operative leaders and members in the aspect of team building and leadership, basic co-operative management, accounting, audit and financial management, and credit management;
- installing financial and management systems and procedures for various operations of the co-operatives;
- facilitating the establishment of linkages with other co-operatives, government agencies and NGOs; and
- establishing a monitoring and evaluation system that would identify and assess beneficiaries' responses, perceptions and needs.[29]

By end of the project, NATCCO had assisted nine primary co-operatives in Jalajala in terms of providing them various organisational and management related training. It facilitated the review of existing co-operative by-laws, and the development and incorporation of irrigation policies to the by-laws of the three co-operatives who were beneficiaries of communal irrigation pumps. It installed financial and management systems and procedures and introduced strategies on how to generate capital build-up. NATCCO

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[28] Damole, *op. cit.*, p. 128.

[29] IJRDP documents, DAR.

conducted a consumer survey for the water systems in two barangays of Jalajala, and facilitated the conduct of orientation on the operation and management of the water system facilities in these two barangays.

NATCCO also assisted in the formation and registration of INJAFEDCO; helped in the formulation of the federation's vision-mission-goal statements through a planning workshop; conducted management training for INJAFEDCO officers and members; and evaluated the federation's viability as an organisation.

After the completion of IJRDP, the co-operative-beneficiaries of the project, including the AMFCI, have coordinated with the Tagalog Co-operative Development (TAGCODEC),[30] for their organisational training needs. However, the linkage with TAGCODEC has been on a co-operative to co-operative basis. For instance, invitation for training was directed by TAGCODEC to member-primary co-operatives and not to INJAFEDCO.

The NATCCO experienced some delays in the conduct of its activities. One of the reasons cited for these delays was the poor foundation or base of most of the existing co-operatives before IJRDP. They were formed hastily to be able to avail themselves of the LandBank's credit program in the 1970's. NATCCO's performance and credibility with the local people were also affected by the frequent turnover of its area coordinator and community organisers, and the lack of proper orientation of the new personnel. This problem reflected on the fact that many co-operative members were not aware of the IJRDP activities and were lacking in commitment to the federation. The community organisers were in close contact with the federation and co-operative officers but not the co-operative members.

9.2.4 Southeast Asian Ministers of Education Organisation (SEAMEO) Regional Center for Graduate Study and Research In Agriculture (SEARCA)

The SEARCA is the oldest of the twelve SEAMEO regional centers that have been established to promote regional cooperation through education, science and culture among nine countries, namely Brunei Darussalam, Cambodia, Indonesia, Laos, Malaysia, Philippines, Singapore, Thailand and Vietnam. SEARCA began operating in 1967 and became a permanent centre of SEAMEO in 1969. Serving the agricultural and rural

[30] A secondary organisation of NATCCO in charge with Region IV co-operatives.

development needs of the nine SEAMEO member states, the SEARCA manages one hundred scholarships each year, conducts research, and disseminates information through training and publications. It also provides advisory, consultancy and project implementation services to government agencies and NGOs in the region to promote technology dissemination. The centre is hosted by the Philippine government and located in the University of the Philippines Los Banos (UPLB) campus.

SEARCA's expertise was sought by the DAR in the implementation of IJRDP-IDC. Its major responsibility in relation to the project was to establish an integrated rice production, processing and marketing program centred on a rice processing complex operating as a commercial business. It was tasked to transfer the technical operation and business management capability of RPC to INJAFEDCO; to train the project beneficiaries in the application of appropriate production and post-production technologies; to integrate farm production with value-added processing and marketing activities; and to develop an agro-commercial farming system to meet the livelihood needs of the beneficiaries. To carry out these tasks, three groups were organised under the SEARCA component as follows: Rice Production Group;Rice Processing Group; and Rice Marketing Group.

Before the IJRDP-technical component was started, SEARCA conducted a benchmark survey of Jalajala. They were not supposed to do this because the feasibility study sub-contracted by JICA included some basic data about Jalajala. However, this information were not detailed and comprehensive enough for SEARCA's purpose. In terms of accomplishments during the project, SEARCA had prepared a feasibility study including a market study on the commercial operation of RPC. It established systems and procedures in operating and managing the rice mill. It trained the INJAFEDCO and its ten member-co-operatives on rice farming and on RPC's business and technical operations and management. SEARCA prepared all the necessary manuals for the federation's guidance.

The SEARCA's link or contact with the farmers was through their Rice Production Group composed of agriculturists and extension workers. The Rice Processing Group on the other hand involved agricultural engineers and rice processing experts. The production group coordinated with the processing group and the Rice Marketing Group in the aspect of what rice varieties to recommend to the farmers for planting. It was important to control the variety of rice that entered the rice processing complex for milling. It was not efficient to accept many different rice varieties. For instance, during the first procurement attempt of

the RPC, 23 varieties were procured. This led to the underutilisation of capacity because it was not feasible to process them at the same time. Otherwise, the final product would be milled rice with uneven thickness. There were adjustments to be made in the machines for every variety of rice that was processed. Therefore, the Rice Production Group had to recommend to the farmers two to three rice varieties for planting based on the results of the market research.

The following production technologies were introduced to the project beneficiaries: high yielding and good eating quality rice varieties; integrated pest management; utilisation of organic with inorganic fertilisers; and cultural management practices such as straight planting, use of rotary weeder, seed production and purification. These technologies were chosen based on the assessment by SEARCA's Rice Production Group (RPG) of farmers' existing practices during a focussed group discussion involving key informants. **Appendix 9.3** shows the common rice production practices of farmers in Jalajala and the corresponding technologies recommended by the RPG. SEARCA directed their rice production efforts to the four barangays in Jalajala with irrigation systems.

Vega and Asirot[31] studied the factors that hinder or facilitate adoption of the technologies introduced by SEARCA-RPG to irrigated rice farmers in Jalajala. Some of these factors were identified as follows:

- The common notion among male farmers and extension workers that farming was a man's world influenced the selection of participants in the training, demonstration and other activities conducted by SEARCA and farmer leaders.
- Absentee landowners and part-time farmers lack the motivation to improve farm productivity because they did not have full control of the management of their farm.
- Purified seeds were more expensive than the traditional practice of farmers in Jalajala.
- The availability of irrigation water affected seed production and purification and the adoption of new rice varieties.
- Farmer field school training, demonstrations and farmer-to-farmer method of technology transfer significantly influenced the adoption of technologies.
- Farmers' knowledge, participation in their organisation, and degree of interaction with the SEARCA extension staff significantly influenced adoption of technologies.

[31] R. Vega and J. Asirot, 'Study on the adoption of sustainable rice production technologies in irrigated lowland rice of Jalajala', SEARCA-IJRDP in collaboration with the Farming Systems and Soil Resources Institute, University of the Philippines Los Banos, n.d.

- Non-adopters of technologies were mostly unaware of the technologies and non-members or inactive members of farmer organisations.
- More non-adopters did not know the positive and negative effects of the technologies.

On RPC personnel, SEARCA hired them based on the co-operatives' recommendation. During the time that the Japanese were managing the plant, the hiring of personnel was political in nature such as hiring those whom the mayor had recommended. When SEARCA's contract was over and RPC became INJAFEDCO's responsibility, the same local people operated the plant. Therefore, there was continuity of people directly involved in the physical operation of the plant.

After completion of IJRDP, SEARCA has renewed its commitment to support the project beneficiaries. It has initiated the drawing up and signing, in March 1997, of a MOA among the DAR, INJAFEDCO, and the local government of Jalajala, Rizal. The MOA stipulates that SEARCA and the other signatory organisations will cooperate in identifying areas for future collaboration in applied research and agribusiness entrepreneurship in Jalajala. The Parties have agreed to work together in the identification and development and fund sourcing of mutually agreed agro-industrial projects that will sustain the benefits derived from IJRDP. The local government of Jalajala are expected to spearhead the formulation of an agricultural development plan for the municipality. The DAR, on the other hand, will be actively involved in this agreement through their development facilitators.

Initially, SEARCA deployed an Agro-industrial Community Development Assistant (AICDA) in Jalajala to undertake the following activities: document the co-operative enterprise experience of IJRDP; conduct a survey among the project beneficiaries (Federation and Primary Co-operative levels) on their views about problems, issues and concerns related to IJRDP implementation; provide extension services on the continued application of farming systems technologies introduced by SEARCA's Rice Production Group; assist in identifying suitable crops with large market potential; and coordinate with the local government, Municipal Agrarian Reform Officer, Municipal Agriculture Officer, and INJAFEDCO and other agencies in identifying potential village-level production and processing systems. INJAFEDCO has committed to provide office space for SEARCA's AICDA.

Some of the problems encountered by SEARCA during the IJRDP implementation were:

- The technical consultants hired by SEARCA to manage RPC were very businesslike in the way that they dealt with the project beneficiaries. They alienated the local people because they were technical in the true sense and lacking in the human side factor. However, there was no similar problem in the case of the Rice Production Group who were well liked by the people because they were extension workers trained to deal with farmers.
- The JICA specified that changes could not be made on the design and layout of the plant. Therefore, the SEARCA consultants could not make any changes as they saw fit and were obliged to operate the plant based on these specifications.

9.2.5 National Irrigation Administration (NIA)

The National Irrigation Administration (NIA) is a government agency under the Department of Agriculture. It was created on 22 June 1963 to oversee the irrigation development and management in the Philippines. Its major objectives are to develop irrigation systems in support of the national food production program; provide adequate level of irrigation service; and provide technical assistance to local government units in the development of their irrigation systems. The NIA has 14 field offices located in the different regions of the Philippines.

The NIA supported IJRDP in terms of providing technical and organisational development assistance in areas covered by the pump irrigation systems in Jalajala. It modified its usual program for communal irrigation systems to suit the objectives of IJRDP. Instead of organising separate Irrigators' Associations, the NIA complemented the organisational development activities of NATCCO. It conducted training on water management, irrigation system organisation, and the like. The NIA assigned a Coordinator and three Institutional Development Officers in the barangays where the irrigation facilities were installed.

9.3 Strengths and Weaknesses of AMFCI

9.3.1 Strengths

The following observations were noted by the Development Facilitator of the AMFCI: the co-operative had good leadership; there was, in general, good rapport and

unity among members; and they had respect for their leader. The co-operative members were described by the board members of AMFCI as generally responsible. For instance, most of the members would pay the irrigation fees without being reminded during harvest season. Their voluntary help could easily be sought when the need for collective effort arose like when they had to clean the pumphouse of big volume of sand. Nobody went home until the job was finished.

9.3.2 Weaknesses

There was a general perception among the members that RPC was a responsibility (i.e. it was an obligation to sell their harvest to RPC) rather than having a sense of ownership over it (i.e. that RPC belonged or would eventually belong to them). This was observed during the interview with the co-operative members. There was also misconception among the members (not only from AMFCI) that RPC and INJAFEDCO were one and the same. The co-operative members were perceived by the SEARCA representative I interviewed as being used to being told what to do.

Most of the members of AMFCI practised rice monocropping and only a few engaged in other economic activities like fishing. However, the fish supply in Laguna de Bay lake had been dwindling. Despite the increase in rice cropping season due to irrigation facilities, the farmers in Barangay Palay-palay still lived in subsistence level farming. This meant that after paying all their debts, including loan for production inputs and irrigation fee, any surplus would just be enough for their food consumption for about three months.[32] There was little or none left to buy other necessities and to fund their children's education.

The co-operative did not have a good record keeping system such that in one instance they could not find the list of members who owed the co-operative. The records of the co-operative were kept by the secretary and the treasurer in their respective houses because it did not have an office space yet. However, one member of the co-operative offered to donate part of his land for the office and the co-operative needed to put up the money for building construction cost. In the report of Bueza[33] on the results of his one-month immersion in Jalajala, he observed that the co-operative lacked group planning skills. They tended to be more reactive in terms of dealing with their problems and the

[32] E. Bueza, Output of the one-month immersion or interaction with the INJAFEDCO and farmers in Jalajala, Report submitted to SEARCA Agro-Industrial Development Program, 17 March 1997.

[33] *Ibid.*

board of directors did not often meet to make plans for the co-operative. The chairman of the co-operative was also concerned that there seemed to be nobody among the members who could replace him as a leader. According to the Development Facilitator of MARO, the co-operative's working committees were lacking in the necessary organisational and management training. The Chairman of INJAFEDCO was concerned that the AMFCI members had limited education and that they needed to be given guidance in that respect.

9.4 Problems and Constraints of the AMFCI

The major problem of the co-operative was the very high cost of operating their irrigation facilities because the electricity rate was classified as commercial and not agricultural. This was aggravated by the billing schedule of the electric company. It did not synchronise with the harvest season, the time when farmers would be able to pay the irrigation fees. Another problem of the members was the lack of capital to buy the necessary farm inputs. Some of them resorted to borrowing from informal money lenders and would commit their harvest at a pre-set price. Normally, the farmers would be disadvantaged in terms of pricing. This kind of arrangement was not good for RPC's business because they were having problems with palay sourcing. INJAFEDCO was planning to provide production loans to its members as soon as it would obtain financial assistance to implement this plan.

According to Mr. Balakit, the co-operative's chairman, playing politics was very pervasive in Jalajala. In some occasions, they had become victims of politics, examples of which are as follows:

- The co-operative was supposed to be given seed fund in the form of loan without interest in the amount of US$22,000 by DAR to operate and maintain their irrigation facilities. The amount would be used to pay for electricity consumption and salaries of the water tenders and pump operators. The two other co-operatives in Jalajala with irrigation were previously granted by DAR with seed fund of US$18,518 each from its Direct Lending Scheme. The release of funds was facilitated since construction of the irrigation facilities of the two co-operatives were finished earlier during the time when JICA was still present. Construction of irrigation facilities in Barangay Palay-palay was completed much later. When AMFCI requested for the release of their seed fund, the provincial office of DAR promised the co-operative that fund release would be arranged with the office of the Congressman. The DAR-PARO was expecting a portion of the

Countryside Development Fund (CDF) of the Congressman to be allocated for AMFCI. Then Mr. Balakit went to see the Congressman to follow up their request but the Congressman asked him if he won in Barangay Palay-palay during the last election to which Mr. Balakit honestly answered 'no'. Later on, AMFCI was told that there was no more funds for their request.

- During one seminar conducted by NATCCO, the policy was for two representatives from each of the nine co-operative-members to attend. However, it turned out that other co-operatives sent four to six people. Mr. Balakit claimed that there was 'palakasan' system (meaning some were more favoured than the others).
- The Australian government funded the construction of barangay centres for farmers in Jalajala barangays with existing farmers' association. When the money was released for Palay-palay, the barangay captain had a hall built instead of a centre meant for the farmers' association in the barangay.

Another potential problem of the co-operative was the maintenance of the irrigation pump in terms of spare parts, although JICA left some supplies. In one instance, the water gauge broke down and it was not fixed immediately because a replacement had to be bought from Japan.

In terms of technical problems, Mr. Balakit has claimed that he is an 'expert-by-experience' himself. The co-operative members sought out his help on how to deal with crop infestation. Mr. Balakit referred to his book and recommended solutions like what chemicals to use for spraying. There was the perception among some of the co-operative members that the government was not doing enough to help them in terms of their technological problems. For instance, they cited the occasion when they approached the Department of Agriculture (DA) and referred their problem on infestation but the answer they got from the DA technician was—'there was no available chemicals because the mayor's office used them for other projects'. The co-operative members said that the DA technician could have visited the farm and have given suggestions instead of immediately giving a comment like that. Despite having this negative view of government offices, Mr. Balakit wanted the co-operative members to understand that there were government offices that provided them technical training and that it was up for the co-operative members to make an effort to use them.

9.5 Lessons Learned and General Observations

For rural development projects like IJRDP, the local people or beneficiaries should have been involved from the time of project planning to implementation, monitoring, and evaluation. Participation of the community in every phase of the project is necessary to develop among the local people a sense of ownership and appreciation of the project activities and outputs. In one of the early meetings of the IJRDP-IDC implementers, they expressed their observation that the IJRDP's design was based on JICA's perception of the local situation.

The project was heavily biased toward physical infrastructure and originally overlooked the local institution-building component. Institution-building or building the capability of the local people and institutions to manage their own affairs and mobilise their own resources must be an integral part of a rural development project. It must be carefully planned vis-a-vis other project components. As it turned out, the institution-building component was included later in project packaging and eventually lagged behind the infrastructure construction. The lack of sense of ownership of RPC among the members of the co-operatives in Jalajala was a clear indication that the institutional development efforts through the IJRDP-IDC had not yet seeped in among the co-operative members.

The JICA was surprised that despite all their physical infrastructure support, the local people did not patronise the RPC. What it failed to realise was that appreciation of the project activities and outputs and cooperation from the beneficiaries were not automatic responses, rather these must be cultivated through institutional development activities.

The farmers in Jalajala could easily recognise the benefits of roads, irrigation facilities and potable water system constructed through IJRDP as these had direct impact on them. However, they had difficulty identifying with or supporting RPC. Understandably, the farmers' primary concern was their immediate survival. Therefore, there was strong desire to get better prices for their produce. Most of the time, RPC's buying price was lower than those offered by other traders. In other cases, the farmers had pre-contracted their produce in exchange for informal production loan at the expense of RPC.

The Chairman of INJAFEDCO realised the importance of being aware of their rights and responsibilities as federation so as not to become victim of ambitious people who had their own self-interest in the IJRDP resources.

The members of AMFCI realised the need to diversify their products and look for alternative sources of livelihood since the income they derived from rice production was not enough for their daily needs.

9.6 Analysis of Interrelationships

The interrelationships among the major stakeholders in this case study are represented by **Figure 9.3.** Numbers 1 to 6 refer to roles of major interveners with respect to INJAFEDCO and its member-co-operatives including AMFCI. Letters A, B, C, D, E, and F refer to the nature of interrelationships among the different entities involved in the case study.

9.6.1 Roles

#1 JICA

- Provide financial assistance for the physical infrastructure component of the IJRDP
- Conduct field investigation (in Jalajala) to identify specific infrastructure to be funded
- Contract to Japanese firms the preparation of engineering plans and designs, and the construction work of infrastructure
- Turnover the physical infrastructure upon their completion to the local community through the DAR

#2 Japanese Firms

Nippon Koei Co., Ltd.

- Prepare detailed engineering designs of the physical infrastructure
- Supervise the technical aspects of the construction
- Maintain office in Jalajala during construction of infrastructure

Taisei Corporation

- Undertake construction work of the infrastructure in accordance with the technical specifications made by Nippon Koei Co., Ltd.
- Maintain office in Jalajala during construction work

#3 DAR

- Overall coordinator of the IJRDP (supervision, evaluation and monitoring of IJRDP)

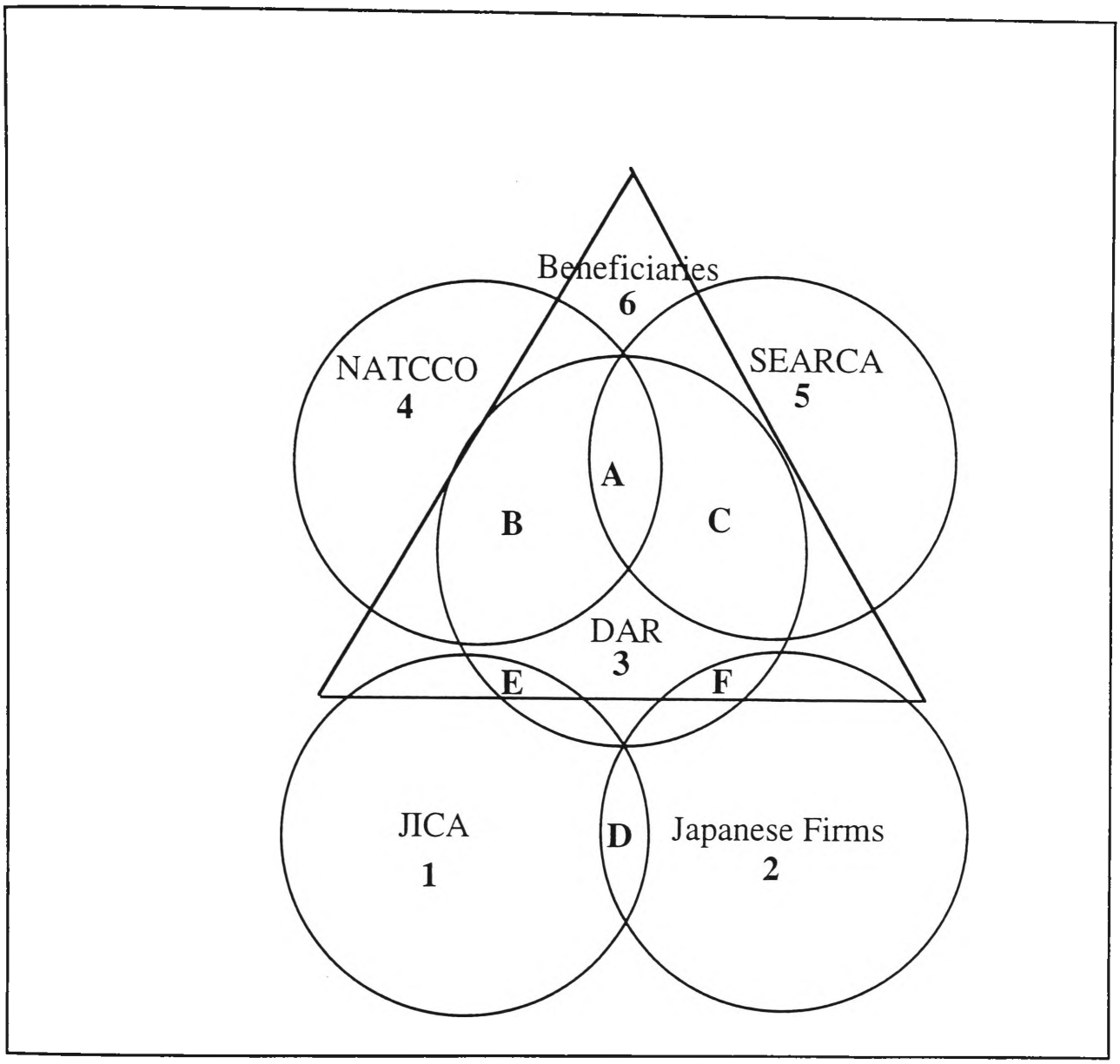

Figure 9.3 Interrelationship among the key players of IJRDP-INJAFEDCO case

-Create project management office (PMO) to supervise project implementation

-Institute coordinative mechanisms involving the project implementers for smooth implementation of the project

- Provide financial assistance for the Institution Development Component of IJRDP; release funds to SEARCA and NATCCO over a period of three years
- Provide technical assistance to the field implementers through its BARBD

#4 NATCCO

- Establish and strengthen co-operatives in Jalajala
- Assist the co-operatives in:
  - formulating their articles of cooperation and by-laws
  - institutionalising a capital build-up system among the co-operative members
  - establishing linkages with other government and NGOs
  - developing and installing financial and management systems and procedures
- Facilitate creation of secondary co-operative in the form of a federation—INJAFEDCO
- Develop a core group of local leaders

#5 SEARCA

- Operate rice processing complex as an enterprise and integrate with paddy production and rice marketing system
- Prepare systems and procedures for technical and financial operation of RPC
- Train the project beneficiaries in the application of rice production and post-production technologies
- Integrate farm production with value-added processing and marketing activities
- Develop an agro-commercial farming system to meet the livelihood needs of the beneficiaries

#6 Project Beneficiaries (INJAFEDCO and member co-operatives including AMFCI)

INJAFEDCO

- Manage and operate the RPC
- Coordinate and facilitate the activities of member-co-operatives
- Generate funds and extend credit to the members for productive and provident purposes
- Provide goods and services and other requirements to the members

- Develop expertise and skills among its members
- Establish, own, lease or operate co-operative wholesale and retail complexes, insurance and agricultural or industrial processing enterprises and public markets
- Enter into joint ventures with other regional, national or international federation of co-operatives in the manufacture and sale of products and/or service in the Philippines or abroad

Note: the last five roles had not been operationalised as of case study period because INJAFEDCO had been newly established then.

AMFCI

- Operate and manage the irrigation facilities put up by JICA in Barangay Palay-palay
- Support INJAFEDCO's activities
- Market their produce to or through the Federation
- Capital build-up formation
- Co-operative management

9.6.2 Interrelationships

A - Among DAR, NATCCO, SEARCA and Project Beneficiaries

The DAR, NATCCO, and SEARCA executed one MOA in connection with the implementation of the IJRDP-institutional development component. Their roles and responsibilities, as indicated above, were clearly laid out in the MOA. The project beneficiaries, specifically INJAFEDCO and its member-co-operatives including AMFCI, were not part of the MOA signing. INJAFEDCO was not yet organised that time and co-operatives for strengthening were not yet identified.

The way in which the DAR, SEARCA and NATCCO related and coordinated among each other beyond what were spelled out in the MOA and the extent with which they had integrated their activities for institutional development affected the activities of the project beneficiaries. Based on the in-depth study made by Damole[34] on the tripartite nature of implementation of the IJRDP-IDC focussing on major IDC activities, these three institutions had clear role definitions. They performed their functions and activities at the field level according to what were stated in the MOA. This was facilitated by the fact that

[34] Damole, *op. cit.*, p. 91.

the tasks and responsibilities associated with the roles were also clearly defined for each agency. The coordinative mechanisms at the supervisors' and implementers' levels involving the DAR, NATCCO and SEARCA (for example management committee, regular implementers' meeting, and RPC management committee) were well in place. They were effective in ensuring that the roles as stated in the MOA were adhered to by the different implementing agencies.

However, there was lack of direct communication between NATCCO and SEARCA at the implementers' level. The activities of NATCCO and SEARCA at the project beneficiaries' or field level were not synchronised and integrated. Their activities were highly compartmentalised. NATCCO's progress in building the capability of the co-operatives and the federation had great implications on SEARCA's attempt to transfer technical and business skills to project beneficiaries. For instance, the failure of NATCCO's community organisers to coordinate with and involve the co-operative members in its activities had influenced the operation of the RPC.

Most co-operative members were not supportive of RPC and the federation. They did not bring their produce to RPC for processing and marketing. The DAR had its shortcomings as well in terms of not providing detailed monitoring work on the activities of SEARCA and NATCCO. It could have extended its coordinative role to ensure that activities of SEARCA and NATCCO in the project beneficiaries' level were in harmony with each other and that they were undertaken on schedule. As explained earlier in this section, the activities of NATCCO lagged behind the other activities of the project. The DAR could have exercised its prerogative and disciplined NATCCO in this regard.

The linkage among the DAR, SEARCA and NATCCO facilitated the flow of information among the project implementers through the coordinative mechanisms established. However, since there was very little direct interaction among them at the project beneficiaries' level, their linkage was responsive only to the needs of the co-operative and federation officers. It did not facilitate capability building of and flow of information to the majority of project beneficiaries or the co-operative members.

The official tripartite linkage among the DAR, NATCCO and SEARCA in relation to assisting the IJRDP beneficiaries ended with the completion of the project. However, the whole idea of the institutional development component was to build the capability of the beneficiaries to manage their own affairs and sustain the infrastructure built through the

project. The federation or INJAFEDCO was organised through the project to manage the RPC and coordinate the activities of the primary co-operatives. The responsibility of managing the irrigation facilities was transferred to the primary co-operatives in the barangays concerned. The linkage of the beneficiaries with the DAR, NATCCO and SEARCA provided them access to the rice processing centre, new production technologies, market for their produce, and connection with other government and other NGOs.

B - Among the DAR, NATCCO and Project Beneficiaries

The DAR, NATCCO and project beneficiaries had linkage in addition to what was described in **'A'**. The DAR-BARBD provided technical assistance to NATCCO's field implementers. After completion of the IJRDP, the development facilitators of the DAR-MARO would continue to assist the project beneficiaries as part of their regular job responsibilities. While NATCCO's assistance to the project beneficiaries within the boundary of the IJRDP was finished, it committed to provide help when their expertise would be needed by the local people. However, since there was the Tagalog Co-operative Development (TAGCODEC) that served the needs of co-operatives in the region from where Jajajala was located, the co-operatives in Jalajala would seek out their help first before NATCCO.

C - Among the DAR, SEARCA and Project Beneficiaries

After completion of IJRDP, the operation of RPC was turned over by SEARCA to the federation. The DAR in turn provided the federation a loan without interest to support the RPC operations. It would fully turn over the RPC to the federation and its member co-operatives as soon as the federation could settle its loan with the DAR. In terms of sustainability of linkage among these entities, the SEARCA initiated the signing of a new MOA among the DAR provincial and municipal offices, SEARCA, INJAFEDCO and the local government of Jalajala. The purpose of this new linkage was to sustain the gains of IJRDP by jointly identifying, developing, fund-sourcing for, and implementing agro-industrial projects for the municipality of Jalajala.

D - Between JICA and Japanese Firms

JICA's relationship with the two Japanese firms, one that made the engineering designs of the IJRDP infrastructure and the other that constructed the infrastructure, was purely on a contractor-work provider basis.

E - Among the DAR, JICA and Project Beneficiaries

The DAR and JICA represented the Philippine and Japanese governments, respectively as far as the IJRDP was concerned. The JICA turned over all the completed infrastructure to the project beneficiaries and the local government of Jalajala through the DAR. Although the DAR initiated the project packaging, it was JICA that finalised the infrastructure components and took charge of the detailed engineering designs of the infrastructure with very little consultation with the local people.

F - Among the DAR, Japanese Firms and Project Beneficiaries

The DAR made the necessary arrangements with the local people for the donation of lands as right of way for roads and irrigation facilities so that construction of infrastructure would proceed. The DAR and the construction company signed a 'civil contract' soon after the company was selected through bidding in Japan. The DAR-PMO's Physical Infrastructure Division, together with the engineers of the Japanese company that prepared the engineering designs for the project, periodically monitored and validated the progress of infrastructure work of the construction company.

The IJRDP case illustrates the complexity of interrelationships among agencies from various sectors, such as government organisations (DAR), non-government organisations (SEARCA and NATCCO), people's organisations (INJAFEDCO and member-co-operatives), and a foreign donor in implementing a big rural development project like IJDRP. This multi-sector project demonstrates the need for a strong coordinating agency that can orchestrate the project activities of the various agencies with different biases and different work practices and culture towards the attainment of project goals. The interrelationships among these institutions must be guided by different coordinative mechanisms at all levels—top, implementers, and project beneficiaries' levels.

The different agencies involved in this case study have benefited from the linkages described above. Since IJRDP is meant to be a model comprehensive agrarian reform project, the DAR can draw valuable lessons from their experience for the packaging and implementation of similar projects in other CARP areas in the Philippines. For SEARCA, this IJRDP experience gives it an opportunity to transfer technologies and technical knowledge from the state colleges and universities to the local community. It also provides SEARCA's Agro-Industrialisation Program (AIP) a good case for 'enterprise modelling'

study,[35] a non-traditional approach that SEARCA-AIP has intended to specialise in. For NATCCO and SEARCA, both NGOs, they can draw lessons from the IJRDP experience in terms of how best to work with government institutions, other NGOs and people's organisations in the implementation of an integrated area development project. The AMFCI or the co-operative's direct benefits from the IJRDP are the irrigation facilities that have made it possible to produce rice for two cropping seasons per year; roads that have increased their access to market and source of production inputs; rice processing centre; potable water supply; and electricity to run their irrigation facilities. However, given the co-operative's problem with the electricity rate, the operation of irrigation facilities appear to be non-viable.

9.7 Technology Transfer Approach

In terms of the IJRDP-physical infrastructure component, there was virtually no technology transfer from the Japanese construction firms to the local community. Only the skills of physically operating the equipment in the rice processing complex were transferred by the Japanese engineers to representatives from the co-operatives. The feasibility of operating the irrigation facilities given the local conditions was not fully established. This was an oversight on the part of the project planners and engineers. This was an indication of lack of involvement of the local people during the planning stage of the project. Had they been consulted on the irrigation designs before the construction, the farmers could have expressed the need for simple irrigation technologies that did not require too much input considering their resources and farming conditions.

Technology transfer was supposed to have taken place under the institutional development component of the project. The approach for technology transfer in this case is a combination of two major strategies: building the capability of project beneficiaries by strengthening and/or forming local institutions such as co-operatives and federation of co-operatives; and training them in the technical aspect of rice production, processing and marketing. This approach was carried out through a tripartite linkage among one government agency—DAR, as fund provider and overall project coordinator—and two

[35] SEARCA-AIP defines enterprise modelling as deducing the success factors and reasons for failure in alternative enterprises in alternative set-ups. These enterprise models can provide a general framework or guideline for potential entrepreneurs, economic managers, and other institutions to have an idea as to what structures and processes will suit a specific enterprise given a specific scenario and what pitfalls to avoid.

non-government agencies—NATCCO and SEARCA—responsible for implementing the first and second strategies, respectively. The activities of these institutions were supposed to be synchronised and complementing one another to be able to develop a community that would collectively manage its own resources and apply technologies in a commercial environment.

. Since the rice processing centre as a technology was 'given', the design of which was made by Japanese engineers, SEARCA's responsibility was limited to the formulation of systems and procedures for the technical and financial operation of the RPC. It demonstrated to representatives of INJAFEDCO how to operate the RPC as a business and trained them on the technical aspect of rice processing, procurement, and marketing. The problem in this regard was that the delay in the federation formation and strengthening of member-co-operatives by NATCCO presented an unfavourable setting within which SEARCA could effectively transfer the RPC business management skills to INJAFEDCO. This situation was compounded by the fact that SEARCA's technical experts assigned in RPC were not very popular among the local people.

The problem of lack of support and commitment by co-operative members to the RPC affected the operation of the centre. Many farmers did not bring their produce to RPC for processing and marketing because of reasons explained earlier in this section. Therefore, the RPC's hands-on training of INJAFEDCO by SEARCA happened not under the best of circumstances.

SEARCA's technology transfer efforts in the aspect of rice production were more successful. It developed rice farming systems in four barangays covered by the irrigation systems and established on-farm trials and demonstration plots of varietal trial, fertiliser and integrated pest management. It was successful as far as encouraging the farmers to plant two high yielding, good eating quality rice varieties was concerned. Limiting the varieties that the farmers would plant was important to the operation of RPC. The RPC could not efficiently process rice of different varieties.

Among the technology transfer methods employed by SEARCA, farmer field school training, farm demonstrations and farmer-to-farmer methods were observed to have significant influence on the adoption of technologies introduced by SEARCA. Technology transfer in this aspect was done by SEARCA through the co-operatives or farmer organisations. The co-operative leaders and active members were the first recipients of

training, field demonstration, and other activities of SEARCA. It appears that the status of participation of members, whether active or inactive, in farmer organisations affected adoption of technologies. Where farmers were inactive in their co-operatives, they were not aware of and therefore did not adopt technologies recommended by SEARCA. The inactiveness of many farmer members implies that the co-operatives had not been fully harnessed and strengthened through the institutional development component activities.

Overall, there was little technology transfer that transpired in this case study **(Figure 9.4).** It was generally top-down in approach from project planning to packaging and implementation. There was limited participation and knowledge of the local people on the project. Those who benefited the most from technology transfer in the institutional development component of the project were farmers who were either officers or active members in their respective co-operatives. Except for the rice production aspect, what were mainly transferred were the skills in operating and managing the rice processing complex. The combined strategies of co-operative strengthening or federation formation and technical training as an approach to technology transfer failed to achieve the desired integrated rice production, processing and marketing results among the project beneficiaries because of non-synchronisation of activities within the two strategies. Considering that the project was conceived and implemented on a top-down manner, technology transfer was difficult and limited because it was located within that 'top-down' environment.

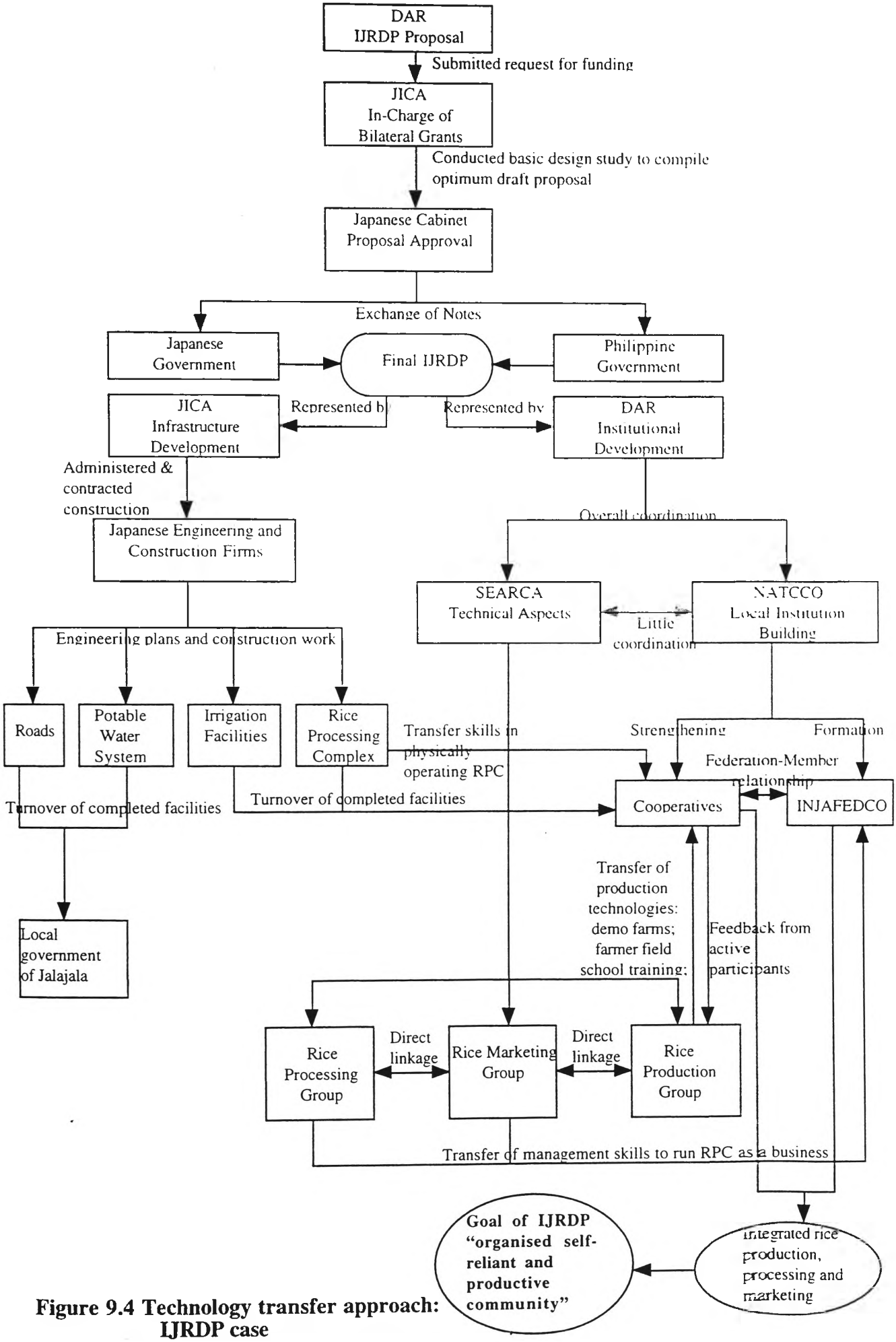

Figure 9.4 Technology transfer approach: IJRDP case

CHAPTER 10

DISCUSSION AND CONCLUSIONS

10.1 Introduction

In this chapter, I pull together the key insights and lessons gained from the different levels of analysis done in the thesis. These insights provide the basis for rethinking the process of technology transfer. In section 10.2.1, I summarise the manner in which the analytical framework, based on Benson's interorganisational theory, is applied in earlier chapters of the thesis. In section 10.2.2, I link the technology transfer approaches of the agricultural research and extension (R&E) system in the Philippines to the theories and models discussed in chapter 2. In sections 10.2.3 to 10.2.6, I outline the major findings from chapters 3 to 9 and discuss their implications for the agriculture sector and the agricultural R&E system. I conclude the chapter with suggestions for improving the technology transfer strategies of the agricultural R&E system in the Philippines.

10.2 Discussion

10.2.1 Interorganisational Theory as Analytical Framework

In this thesis, the interorganisational theory of Benson provides a useful framework for analysing technology transfer as a social and political process. To recap, Benson's analytical framework consists of three levels, namely the administrative structures and policy paradigms that determine the resource-dependent relations within a particular public policy sector, the interest-power relations within the sector, and the rules of structure formation that limit the actions of the sector. The public policy sector examined in this thesis is the agricultural R&E system, which is the immediate setting of the technology transfer process.

Chapter 3 deals with the larger context within which the agriculture sector and the agricultural R&E system operate. It demonstrates how the sector and the R&E system are shaped by the dynamics of the local and global political economy. Chapter 4 describes the administrative arrangements, the division of labour, the policy directions and the various interest groups within the agricultural R&E system in the Philippines. Chapter 5 examines the political economy of one of the demand groups of technology transfer, which is the

agricultural co-operatives. Chapters 6 to 9 demonstrate specific interrelationships and resource dependencies between and among the different actors involved in the three agricultural co-operatives studied in the Philippines.

10.2.2 Theory and Practice: Agricultural Technology Transfer

The traditional models or concepts of innovation and diffusion are useful descriptions of the early history of agricultural R&E system in the Philippines. The training and visit (T&V) approach was influenced by the 'technology-push' model, in which centralism and linear progression in technology generation and transfer are the basic guiding concepts. Research and extension in this approach were highly dichotomised, with the subject matter specialist providing the linkage between the two.

The basic assumption in this approach is that technologies generated by the research sector and identified for transfer to the clientele are almost always relevant to these clientele. The T&V extension approach was an attempt to duplicate the success of diffusion strategies experienced during the height of the green revolution. The diffusion strategy in T&V is represented by the epidemics model, which underscores adoption rather than research-extension linkage, and use of contact farmer leaders as extension agents. In this context, success was judged on the basis of how many farmers were contacted, how many farm demonstrations were held, and how many contact leaders trained. As such, the strategy ascribed to the use of 'generalised or fixed technological packages' for ease of information delivery to as many clientele as possible. This strategy was applicable to areas where farmers operated in more favourable and homogeneous agroecological conditions. However, as discussed in chapter 4, the major weakness of the T&V extension approach was that the generalised package of technology was not applicable to a majority of the farmers in the Philippines. Filipino farmers are generally poor, have limited access to resources, and have diverse and complex farming conditions. Based on my analysis of the agricultural R&E system in chapter 4 and the study of the agricultural co-operative in Case 3 (described in chapter 9), this top-down approach to agricultural development was demonstrably inappropriate and unsuccessful.

The government agencies concerned, having realised the shortcomings of the T&V extension methodology, adopted the farming systems research (FSR) approach in their R&D programs. The objective here was to strengthen linkages between the R&D community and the farmers to ensure that research outputs are more relevant to the needs

of the farmers. The FSR approach is associated with the 'user perspective theory' as a model for agricultural research and technology transfer. It departs from the static assumptions of the traditional innovation theories and brings 'farmers' knowledge' to bear in technology development and transfer. It introduces the concept of technology development continuum—technology generation, technology adaptation, technology verification, technology dissemination (TG-TA-TV-TD)—that defines the participation of researchers, extensionists and farmers at each stage of technology development. The influence of FSR approach over the R&E system was so pervasive that it effected some major institutional changes especially in the organisational set-up of the Department of Agriculture (DA). It also resulted in the development of a new research discipline called 'farm resources and systems'.

In actual FSR practice, however, the extent of farmers' participation in technology development is still limited, mostly focusing on 'fine-tuning' of technologies generated in research stations.

New technology transfer initiatives such as the Rural-based Enterprise Development (RED), Development Support Communication (DSC), Farmer-Scientist Bureau, and Farmers' Information and Technology Service (FITS) have tried to address the weaknesses of the traditional diffusion and FSR approaches. They adhere to the 'participation paradigm', with the role of farmers viewed as more dynamic, and the role of outsiders more in terms of facilitation. However, these programs have only been recently introduced in selected areas of the country. Their implementation requires financial resources that institutions within the R&E system are lacking, and structural changes that they may not be ready to undertake.

The approaches to rural development of the non-government organisations (NGOs) are generally associated with this 'participation model', with people empowerment as an important goal. The NGO approach usually involves strengthening of local organisations such as co-operatives. It upholds the principle that technological change, if it is to be sustainable, must be supported by appropriate institutional change.

10.2.3 Political Economy Perspective

This section presents a historical summary of the major characteristics of the domestic and global political economy that have influenced or have had implications for the agriculture sector and the agricultural R&E system.

Colonial Period

The long history of colonialism in the Philippines shaped the past and even the present structure of the agriculture sector. Both the Spanish and American colonial policies promoted the cultivation of commercial crops, such as sugar, hemp, tobacco and coconut for export to wealthier countries. Since then, sugar and other export crops have become major sources of economic and political powers for landowning oligarchy, who up to the present time have influenced agricultural policies in the Philippines because of their strong presence in the country's political system.

During the US occupation, foreign firms started to invest in agriculture and extractive industries in the Philippines. There was little foreign and local investment in processing technologies (e.g. sugar mills, coconut refineries) because profits were already obtained from the production of raw materials and from trade. In particular, the sugar industry did not develop into an efficient, productive and competitive sector. It became complacent in terms of technological change because of the assured market from the colonial trade, and the preferential trade and quota system of the US long after the Philippines had gained its independence.

1950s and 1960s

The Philippine government shifted to the import substitution industrialisation (ISI) policy during the 1950s and the 1960s. The agriculture sector suffered immensely during these periods because earnings from traditional exports were used to develop the ISI industries. Public investments in agricultural R&D, rural education, agriculture-related infrastructure and forest management were drastically reduced. Many agricultural inputs such as fertiliser, seed and farm machinery were covered by high tariff and import ban policies.

Martial Law Period

The principal government policy during this period was the export-oriented industrialisation program (EOI). EOI-friendly policies such as the prohibition of labour strike, force reduction of wage levels and incentives for new foreign investments were implemented.

To ensure the availability of cheap food and to keep wages at low levels, the Marcos government introduced a massive rice and corn production program using the

green revolution package of technology (POT). The World Bank provided a large loan to the Philippine government to support the subsidised credit scheme that accompanied the rice and corn production program. Subsidised credit was extended to farmers for the purchase of high yielding variety (HYV) seeds and other production inputs specified in the POT. The World Bank loan promoted the T&V approach that disseminated the green revolution POT nationwide. It enabled the DA to restructure the whole agricultural service bureaucracy to fit the requirements of the T&V delivery mechanism. The same loan contributed heavily to the foreign debt problem of the Philippines that started in the late 1970s.

The agrarian reform law during the Marcos regime was carried out in tandem with the co-operative development program, in which farmer participation in co-operatives was imposed. Membership in co-operatives became one of the prerequisites for land ownership. Agricultural co-operatives were used merely as channels for credit delivery to ensure that agrarian reform beneficiaries would pay land amortisation. They were not given the opportunity to decide on how the credit package would be managed and loaned to their members. As a consequence, the co-operative members could not identify themselves with their organisations. They became loan-oriented with their participation dependent on the availability of loan funds.

The martial-law government directly participated in the agriculture sector by creating trade monopolies in sugar, coconut, rice, corn and meat industries. These monopolies amassed resources and capital for the government at the expense of small farmers. For instance, the government agency established to look after the coconut industry collected a levy from coconut farmers supposedly for a replanting program, R&D, extension service and other development projects. However, the levy was channelled to an organisation of big landlords who used much of the money for their private use.

The Philippine agriculture sector became a large market for the agricultural products of multinational corporations (MNCs) because of the wide promotion of the green revolution POT. Since then, the MNCs have controlled the supply of HYV seed, fertiliser, pesticides and agricultural machinery. They have also participated directly in agricultural production, particularly in the fruit industry. The banana and pineapple plantation operations of MNCs have displaced many small farmers and indigenous people, especially in the southern part of the country. With assistance from the Marcos government, the

MNCs acquired vast tracts of land and expanded their plantation areas. During the early years of the banana and pineapple industries, they were purely controlled by the MNCs. Through time, some local big landowning growers and agricultural co-operatives have adopted the MNC technologies and have developed their own banana plantations.

Trade Liberalisation Phase (1986 to present)

In recent years, there have been five major features of the Philippine political economy that have implications for the agriculture sector and the agricultural R&E system. These include agrarian reform law (or the lack of it), the huge foreign debt, the Local Government Code (LGC), the World Trade Agreement (WTA), and freedom of association.

If the Comprehensive Agrarian Reform Program (CARP) is eventually successful, the future of the Philippine agriculture sector will consist of more smaller farms. On the other hand, the inherent flaws of the agrarian reform law may increase the number of landless peasants. As pointed out in chapter 3, CARP is loaded with provisions that the big landowners and agribusiness corporations can use to maintain control over or to expand their landholdings. Smaller land units could mean diseconomies of scale and disincentives to innovate. On the other hand, because of the loopholes in CARP, more cases of land conversion and landgrabbing, could mean further shrinking of land resource base, more landless farmers and decreasing food supply.

Philippine governments, especially the Marcos administration, accumulated huge foreign debt from the World Bank, the International Monetary Fund and other international financial institutions in the 1970s and the 1980s. These governments were forced to implement structural adjustment measures in compliance with the World Bank's conditions for extending structural adjustment loans. These measures included the reduction in government spending for basic agricultural support services and infrastructure, including R&D and extension service.

Foreign loans and grants have been used to implement commodity (e.g. rice and corn) and rural development programs. Most of these financial assistance measures are tied-aid in nature. This means that funding is given on the condition that the money will be used to buy items from the companies of the donor country. This also means that foreign consultants are hired through the program to prepare the feasibility studies and design the

general proposal. Chapter 9 and section 10.2.6 (see below) illustrate the complexities of a rural development project funded by a foreign donor.

The LGC mandates the decentralisation of the extension service from the DA to the local government units. Now that the responsibilities for research and extension are completely separate, the R&E linkage problem has become more complicated. This issue is discussed further in section 10.2.4. Decentralisation, in principle, is a mechanism to accelerate the provision of timely technologies and other services relevant to the needs of specific localities. However, initial studies on decentralisation reveal some serious problems that affected the effective delivery of extension service. Some of these problems include differences in priorities and orientation between the national agencies and the local government units, and low morale of extension workers because aside from being poorly paid they received little recognition and skills upgrading or training.

As signatory to the WTA, through the General Agreement on Tariffs and Trade Uruguay Round (GATT-UR), the Philippine government binds itself to liberalise agricultural industries. However, the agriculture sector is faced with the problem of declining competitiveness. The economic policy bias against the sector—an insufficient allocation of investment in agricultural productivity and social reform-enhancing projects, and high interest rates of financing programs—has depressed initiatives and innovation in the rural sector. Although some degree of success has been attained by rural development programs in the past, these have not been sustained to a level where global competitiveness could be achieved. With increasing globalisation and liberalisation of agriculture, the sector must be technologically, financially and institutionally equipped for domestic and foreign competition.

In compliance with the WTA, the Philippine government is bound to change some of the major agriculture-related policies that are considered inconsistent with the provisions of the Agreement. For example, some aspects of the Magna Carta for Small Farmers viewed as subsidy-related, such as price support system and subsidised credit, are required to be amended. There are other laws and House Bills related to the agriculture sector and the farmers that the Philippine government is obligated to repeal or modify in observance of the WTA conditions. While the lifting of agricultural subsidies is detrimental to the agriculture sector at this stage, there could be some positive outcome in the sense that it

can change the dole-out mentality and stimulate self-reliance among the local community and the private sector.

The WTA is supposed to stimulate innovation and technology transfer because of the Trade Related Intellectual Property Rights (TRIPS) Agreement. TRIPS also provides for member countries to develop IPR protection policy for plant varieties. This provision can be viewed optimistically or negatively for the agriculture sector. On one hand, plant variety protection is anticipated to motivate agricultural researchers and scientists to become more productive and creative. On the other hand, granting plant variety patent or breeders' rights is viewed as perpetuating the monopolistic activities of the MNCs over agricultural seeds and biotechnology products. The challenge for the agencies concerned is to be able to ensure that benefits from innovations and technology transfer are maximised in favour of the majority of the rural population.

The liberalisation program of the government has also promoted the establishment of growth areas to attract more foreign investments. This has contributed to the problem of increasing rate of land conversion from agricultural to commercial uses. Greater liberalisation can also intensify the activities of the MNCs in the Philippines. In response to the demands of the WTA and the threat of CARP or to avoid land issues, the MNCs and local agribusiness corporations have started to enter into alternative production arrangements with agricultural co-operatives, such as joint ventures and new forms of contract growing.

The post-Marcos political environment sanctions freedom of association and expression. This could mean that farmer organisations have more incentive to develop and operate economic activities. NGOs have been given more avenues to participate in the government policy-making process.

10.2.4 National System for Agricultural R&E: Some Inferences

Top-down Orientation of Technology Transfer

My analysis of the agricultural R&E system in the Philippines confirms the dominance of the top-down approaches to agricultural innovation and technology transfer. This is the case despite the gradual shift by some government agencies to an R&E framework that aims for greater farmer participation in research and extension. The bureaucratic set-up of the agricultural R&E system favours the implementation of the top-

down technology-delivery mechanisms. The decentralisation policy is a clear attempt to reduce the bureaucratic red-tape in the delivery of agricultural information and technologies to the farmers. It has the potential for a more relevant rural service because the local government units (LGUs) are directly in contact with the local communities. This could mean that extension will become more responsive to local needs and may provide the impetus for more innovative technology transfer mechanisms to proceed.

In recent years, the government agencies concerned have experimented with and introduced bottom-up or participatory approaches to agricultural research and extension. Some of these approaches, such as RED and Farmer-Scientist Bureau (FSB), provide clear mechanisms and a deliberate space for farmer participation. However, other attempts at participatory approaches have been generally limited to analysis, diagnosis and pilot testing. In most cases, proponents of the bottom-up approaches lacked the authority and funding to effect wide implementation of their activities. Other bottom-up strategies are just support mechanisms for the extension activities in the rural areas and are not expected to assume the overall thrusts of extension.

Weak Linkages Within the System

The analysis of the agricultural R&E system reveals weak linkages at various points within the system, more seriously between research and extension groups. This linkage problem can be attributed to the following limitations in the system. Research and extension functions are institutionally and administratively separate. As discussed in chapter 4, the mandates for both research and extension used to be under the responsibility of the DA. But even then, research and extension were lodged under different units and coordination between the two was problematic. The devolution of extension service from the DA to the local government units has aggravated the research and extension linkage because they are now completely separate. However, there are indications that the decentralisation policy has facilitated linkage between the extension group and the farmers.

The weak linkage between research and extension units can also be related to the incentive system for research and extension workers. This incentive system is not conducive for establishing meaningful linkages. For instance, the agricultural researchers and extension workers in the Philippines receive low salary rates compared to their counterparts in other countries. There is a wide gap in salary and training opportunities between the researchers and extension workers resulting in the low morale level of the

extension group. The merit system for agricultural researchers is based mainly on scientific publications.

Other Observations

The introduction of information technology-based support systems such as the Farmers' Information and Technology Service (FITS) has a big potential for speeding up the process of technology transfer. These information systems can link together the key actors within the agricultural R&E system.

International donor and research agencies will continue to play a major role in agricultural R&D and extension due to the limited government budget. The lesson here for the government agencies concerned is to make the most of the available international funding and linkages. However, careful assessment of these arrangements should be made to ensure that they are not lop-sided and are not disadvantageous to small farmers and their environment.

Lessons can be drawn from the experiences of the private sector in agricultural R&D and extension. The private sector's strategies are focused on products to sell, target-market and profit-maximising activities. These elements can be useful areas to consider in developing rural-based enterprises. The private sector's involvement of farmer co-operatives in their new production schemes can be beneficial to small farmers only if the terms of these arrangements are clearly non-exploitative of the farmers.

10.2.5 Potential of Farmer Organisations and Non-government Organisations

There has been a long tradition and distinctive development of NGOs in various forms in the Philippines. Likewise, there exists widespread co-operation in the rural areas in the form of farmer organisations such as co-operatives and people's organisations. Despite some problems within the NGO and agricultural co-operative movements, as mentioned in chapters 4 and 5, they play important roles in agricultural development. The strength of NGOs is in community building. Their potential in providing extension support and training on value orientation for farmers and farmer organisations are areas worth further exploring in government rural programs. Agricultural co-operatives, on the other hand, have the potential for stimulating growth of rural enterprises. Their entrepreneurial capabilities may still be lacking, but given proper mentoring and training, they can become the hub of agricultural economic activities in the rural areas.

10.2.6 Observations and Themes from Case Studies

A number of lessons and common themes identified in the case studies are discussed in this section.

Balance Between Top-down and Bottom-up Approaches

Case 1 demonstrates the successful combination of top-down and bottom-up approaches to agricultural research and technology transfer (refer to Figure 7.4). In this case, the co-operative was involved in one of the projects under the National Program on Bamboo and Rattan. The general areas for R&D and technology transfer were identified at the national level by the national commodity team for bamboo and rattan. However, the specific design and activities of the projects were jointly developed by the implementing agencies and the communities involved in the project areas. This arrangement was beneficial to all concerned—national R&D planning agencies, the R&D institutions and the farmers. It facilitated the flow of information from the R&D agencies to the farmers and vice versa. The co-operative members in Case 1 had direct access to the technologies of its main intervening agency which is the Department of Environment and Natural Resources Region 6 (DENR-VI). In addition, through DENR-VI, the co-operative gained access to information and technologies from other DENR regional offices and other research agencies participating in the national program. The technology on giant bamboo propagation and nursery operations of the co-operative was a mixture of technologies of DENR Regions 6 and 10 and the indigenous knowledge of the co-operative members. The co-operative learned from the experiences of other co-operatives in other parts of the Philippines that were involved in the program. The national agencies, on the other hand, received feedback from the co-operatives about problem areas encountered in the field that need to be considered in the national R&D program.

Complexities of a Foreign Funded Project

Case 3 illustrates the complexities of a rural development project which was subjected to foreign intervention. The beneficiaries in Case 3 gained from the basic infrastructure such as roads, irrigation facilities and rice processing complex put up through the project funded by the Japan International Co-operation Agency (JICA). However, contracts for the preparation of the detailed engineering plan and construction of the infrastructure were awarded by JICA to Japanese firms. There was very little

participation of the project beneficiaries in project planning and implementation. As a consequence, the federation and co-operative-members experienced problems in maintaining facilities designed and constructed by Japanese firms. The federation encountered difficulties with the design and operation of the rice processing complex.

The original project plan emphasised the infrastructure component. It overlooked the need to prepare and develop the local institutions that were expected to make productive use of and maintain the infrastructure once it was in place. The institution-building component was added into the project later on through Philippine government funding. However, its implementation lagged behind the infrastructure component.

Institution Building and Farmer Participation

Cases 1 and 3 were both project-type in nature. The degree to which co-operative members developed a sense of project ownership was affected by their level of participation in various aspects of project planning, packaging and implementation. In Case 1, extensive participation of target farmers improved their sense of project ownership. Conversely, limited participation of project beneficiaries in Case 3 meant they did not develop a sense of appreciation of the project activities and outputs. In Case 1, the deliberate incorporation of farmers' indigenous practices into the co-operative's production activities enhanced the process of technology transfer and improved the sense of identification by the farmers with the techno-based enterprises developed through the project.

The importance of implementing social preparation or social conditioning activities before the introduction of an intervention and during project implementation was demonstrated in Cases 1 and 3. In Case 1, the interfacing of local capability building and technology transfer activities was carefully planned and administered. Activities were concentrated on the institution-building component during the initial stage of the project. Technology transfer activities were gradually introduced until they became the major component of the project. The co-operative members gradually assumed increasing responsibility over the project activities. These strategies contributed to the success of the co-operative's enterprise. In Case 3, the institutional-development component, which was not originally part of the project, lagged behind the other project components including technology transfer. This resulted in the co-operative's lack of readiness and commitment for the responsibility over the rice processing enterprise.

Linkages

Linkages were observed to be strong when actors derived mutual benefits from the relationship, and when the beneficiaries were fully aware and knowledgeable of the benefits that could be derived from the linkages. In the first two cases, the co-operatives benefited from the direct linkage with the source of technology. The dominant interveners of these co-operatives undertook R&D work on areas which were significant to the development of the co-operatives' enterprises. This type of linkage facilitated the process of technology transfer. The strong linkage of the co-operative with the local government unit in Case 1 assured the sustainability of the enterprise in terms of land as production input.

Economic Activities

Cases 1 and 2 were built around short-, medium-, and long-term technology-based economic activities. Both cases were characterised by strong business and commercial orientation and clear identification of products to sell. These strategies have contributed to the strong interest and involvement of the co-operative members. This was not the situation in the third case since the focus was only on the processing and production of rice, although there was a plan to look into other livelihood opportunities.

Farmer-to-Farmer Method of Technology Transfer

The farmer-to-farmer method of technology transfer—the strategy of farmers themselves training other farmers—was observed to be effective in all the three cases. This strategy benefits both the giver and receiver of technology training. It increases the confidence of the ones sharing their experiences and expertise. It also facilitates the understanding and absorption of new skills and knowledge by those being trained.

Entrepreneurial Capability

The successful operation of co-operative enterprises, especially after the project life ends, depends largely on continuing or new linkages with providers of support services and technologies, constant pursuit for business and social advancement opportunities, and human resource development. These activities necessitate specific management and entrepreneurial skills that the co-operatives in Case 3 were still lacking after completion of the project. In Case 1, although the co-operative was not fully capable of managing the co-operative after the project, a contingency plan was prepared in which the co-operative, out

of its income, would hire a management consultant. In Case 2, the co-operative was well experienced in terms of organisation and management, and fully capable of handling its own linkages.

Bureaucracy Problem

Bureaucracy associated with government projects, as in Cases 1 and 3, delayed the release of funds and implementation of project activities. In Case 1, delays due to bureaucratic problems were minimised because the intervener organised contingency measures.

Because the cases presented in this thesis are outcomes of their particular context, care must be taken in making generalisations. However, the findings in the case studies are probably robust enough to shed light on the process of technology transfer in the rural sector in the Philippines.

10.3 Conclusions

The thesis demonstrates the complexities involved in the agricultural R&E system and the usefulness of an analytical framework that deals with these actualities. The conceptual framework used in this thesis considers the specificity of the local and national conditions of the technology transfer process but at the same time grounds the process in a wider organisational structure.

The thesis confirms the fact that the actions of the different agencies/entities within the agricultural R&E system are influenced by the nature of their interrelationships and the policy directions within the system. It observes that such actions are limited by the need to support the economic development programs of the Philippine governments, which in recent years have been export-oriented and foreign investment-led.

The complexities outlined here suggest that a single or universal approach to technology transfer may not be appropriate for all types of conditions in the rural areas. However, the theoretical and empirical analyses undertaken in this thesis provide a better understanding of the technology transfer system so that a general framework aimed at accelerating technology commercialisation in the rural areas can be proposed.

I argue that technology transfer mechanisms can best help to achieve broad-based and sustained rural development when they embody the following elements.

a) Target beneficiaries should actively and genuinely participate in all aspects of the technology transfer process.

The case studies show how important participation of target beneficiaries was to ensure the appropriateness and sustainability of technology transfer outputs. The analyses made on the agricultural technology transfer system in the Philippines and the literature on theories related to agricultural technology transfer reveal the inadequacy of the top-down approach and the growing awareness within the system of the benefits of participatory development.

b) Ways should be found to facilitate access of beneficiaries to production inputs, including information, technology and critical support services such as market, credit, and post-harvest facilities, extension, training, and enterprise management support.

Information, technology and support services will enhance the decision-making and problem solving capability of farmers. Access to these services will enable the farmers to translate both indigenous and introduced knowledge or technologies into productive enterprises. The setting-up of computer-based information systems such as FITS in the rural areas is a step in the right direction.

c) A clearly identified group of beneficiaries such as agricultural co-operatives should be the focus of intervention.

Co-operatives are one way of overcoming the smallness of farms and helping farmers be more competitive in terms of the following:

- cost of production, e.g. buying of production inputs in bulk for members;
- processing, e.g. communal processing infrastructure;
- marketing, e.g. co-operatives will more likely meet the volume and regularity of produce required by the market;
- credit, e.g. banks would rather deal with groups of farmers to minimise transaction costs; and
- training and extension, e.g. service delivery costs by interveners are less if directed towards groups of farmers.

The farmers' costs of forming and managing co-operatives will likely be compensated by the benefits described here and by the opportunity to increase their bargaining power and influence policy.

d) Technology-based enterprises with business or commercial orientation should be the centre of economic activity of the beneficiaries.

Agricultural enterprises have the potential to create rural savings that can be reinvested in other productive activities. They have the potential to create jobs especially for other rural workers, most of whom are landless. It is worth considering some of the private sector strategies (e.g. focus on products to sell) when developing rural-based enterprises.

The participatory or bottom-up framework outlined above adheres to the principles of the bottom-up approaches to technology transfer. Although experiences with these approaches are still limited and fragmented, some of the new initiatives have great potential in terms of substance and relevance. For example, initial experiences with the rural based-enterprise development (RED) project showed that the bottom-up approach to technology transfer can lead to the identification and operation of viable agricultural enterprises. The RED strategy, unlike most participatory approaches, does not merely offer a concept. It provides mechanisms that go beyond diagnosis.

As discussed in chapter 4, some of the technology transfer approaches can complement each other. In areas where the Development Support Communication (DSC) program has been implemented, and where the FSB and FITS have been established, the chances that the RED approach will succeed will be greater. RED projects will benefit from the easy access to information and technologies provided by FITS, from the community building efforts of DSC, and from the indigenous knowledge tested in FSBs.

To enhance the prospects for bottom-up approaches such as those outlined above, the following measures are desirable.

i) The agricultural development capability of LGUs should be strengthened. The support of the LGUs is central to an effective technology transfer system. The powers vested in LGUs through decentralisation will eventually influence all rural development programs. However, it is not enough to give LGUs the authority and power over local decision making and service delivery. It is important for the national government to provide the LGUs the necessary technical, infrastructural and financial assistance so that their potential and appreciation for agricultural development will be developed. It is also recommended that the national government act on the issues identified from initial studies of the impact of the decentralisation policy on the delivery of agricultural support services.

ii) The intermediaries and facilitators of linkages must be mobilised and their skills must be harnessed. The decentralisation policy resulted in the further separation of research and extension. This calls for a more active role of intermediaries and facilitators of linkages or avenues by which linkages are possible, such as the regional R&D consortia, agricultural technology training groups, the NGOs, regional applied communication groups, and other such mechanisms or groups. These facilitators, along with the researchers and extension workers, must be trained in skills appropriate for the promotion of participatory approaches in technology transfer.

iii) There is a need to change the incentive system within the research community. These incentives must encourage researchers to generate technologies more relevant to farmers' needs and make an effort to see that these are utilised or commercialised. This incentive can be in the form of promotion or awards based on the number of research outputs utilised by the target clientele, in addition to the regular award system based on scientific publications. Incentives for the extension workers, including among others their salaries, continuing education and training, must be improved to increase their morale and their capability to deliver the agricultural extension service.

iv) Inter co-operative linkages are necessary to take advantage of new economic opportunities. By organising themselves into federations, agricultural co-operative can become more efficient and competitive and achieve greater bargaining power. Agricultural co-operatives or federations may benefit from partnerships with agribusiness corporations including MNCs through joint ventures or new forms of contract growing. However, the co-operatives/federations and agencies assisting them must ensure that arrangements with the corporations are not lop-sided and will not lead to the exploitation of the co-operative members and their environment. The federations/co-operatives and their intervening agencies must seriously consider lessons learned from past experiences in contract growing and other partnership schemes with the corporations. The co-operative members need to be informed of these experiences and the behaviour (mostly exploitative) of the agribusiness corporations. This way, they will be in a better position to negotiate for more equitable terms and conditions.

v) The promotion of technology-based enterprises through co-operatives requires the expertise of interveners from various disciplines. Most agricultural co-operatives, although experienced in their own production systems, are not yet skilful in planning, operating and

managing business enterprises. Interdisciplinary and interagency teams from the research community, LGUs/extension group, applied communicators, agricultural technology trainers, and NGOs must be organised and/or mobilised. They need to improve their mentoring skills. They must be trained in how to assist farmer organisations in enterprise development and management along the principles of the bottom-up approach to technology transfer. Within the limitations of existing structures, their formation is envisioned to be initially *ad hoc* and can be based in the regional R&D consortia or the LGUs, but funds should be specifically allocated by the national and local governments for this purpose. The team members must be given incentives to participate in the teams and be relieved from their regular work when the teams need to convene and support co-operatives.

vi) On a more general note, the national government must aim for policy consistency to avoid confusion within the agriculture sector. It must correct its bias against the agriculture sector in its economic policies to improve market competitiveness of farmers and their organisations.

The framework suggested here becomes more relevant in the light of the recent changes in the Philippine political economy. It has the potential to deal with the opportunities and limitations posed by these political economic factors. The Local Government Code (LGC) aims to increase the relevance and improve the responsiveness of agricultural services to the needs of the rural sector. Participatory service delivery mechanisms are consistent with the objectives of the LGC. The agrarian reform law, if successful, could mean more smaller and fragmented farms, but the loopholes in the law could also mean more landless peasants. In either case, the problem of smallness of farms or landlessness is something that requires the collective and organised actions of the peasants. Grassroots approaches to agricultural R&E can support farmer groups by providing appropriate technology and training that will enhance farmers' skills, knowledge and their bargaining power. The participatory approaches are appropriate especially with the advent of the WTA, whereby agricultural subsidies are no longer encouraged and the agricultural sector is expected to be more competitive domestically and globally. This situation dictates the need for greater farmer participation and commitment, actions that can be stimulated by the participatory R&E approaches. The 1987 Philippine Constitution provides the legal basis for the participation of NGOs and agricultural co-operatives.

Ideally, this will create a more favourable environment for the implementation of bottom-up approaches that will promote farmer participation.

It is not practical to assume that the whole agricultural bureaucracy can be reoriented to generate and transfer need-based technologies through bottom-up approaches. As shown in Case 1, it is possible to strike a balance between top-down and bottom-up approaches to technology transfer and achieve satisfactory results. It is still necessary to maintain strong national direction especially in areas where national security is at stake. Furthermore, the grassroots or bottom-up approaches may not be appropriate for the promotion of some technologies and may not be applicable to other clientele groups serviced by the agricultural R&E system.

Because of the complexity of existing structures, major policy changes towards participatory agricultural development will most likely entail a very high cost, both financial and organisational. Therefore, most of the changes suggested in this thesis are those that can be realistically achieved within the limitations of the existing bureaucratic set-up.

Bottom-up technology transfer programs in the Philippines have been implemented only recently, so an in-depth assessment is not possible. The impact of these approaches on rural development can be the subject of future research. For instance, it will be interesting to study the factors affecting the success and failure of enterprises developed through the RED process and the impact of these enterprises on farmers' lives and rural income.

To gain a wider international perspective on technology transfer, another area for further research is cross-country analysis of agricultural technology transfer systems. It will be worthwhile to compare and contrast the technology transfer experiences and practices of the Philippines with those of selected countries that are also agriculture-based.

To conclude, all the discussion points in this chapter are linked by the following central themes. Technology transfer mechanisms must consider the intricacies of the larger environment within which the agricultural R&E system operates inasmuch as they focus on what is happening within the system. Technology transfer programs—whether initiated and/or funded by a government agency, the private sector or a foreign donor—will have better chances of being successful when they focus on strengthening rural organisations inasmuch as they focus on R&D, technology and support services. Agricultural competitiveness can be enhanced if the development of technology-based rural enterprises

through rural organisations such as co-operatives is encouraged. Their development must not be imposed but should be allowed to spring from the farmers themselves through the skilled facilitation and intervention of government agencies and NGOs. Rural institutions are the ones that will carry on agricultural development activities long after any government or other introduced programs and projects are finished.

Appendix 1.1

Longlist of Co-operatives for Case Studies

CO-OPERATIVE/ ENTERPRISE/Site	CRITERIA			
	Accessibility	**Ease of Info Getting**	**S&T Priority**	**Dominant Intervener**
1. Tabarga Multi-purpose Co-operative/**Bamboo/** Integrated forest nursery, swine, duck, poultry & goat production, sericulture, fish production/ **Dueñas, Iloilo**	3	5	Export winner	DOST-PCARRD/ DENR-VI
2. Iloilo Furniture Manufacturing Association/**Bamboo** processing and technology training center/IFMA, **Iloilo City**	3	4	Export winner	DOST-TAPI
3. BIDANI/**Nueva Ecija**	4	4		CLSU
4. Tribal group in Northern Luzon/**Food Processing (forest fruits)/ Imugan, Nueva Viscaya**	3	4		Kalahan Educational Fdn.
5. DAHON/Cutflower production/**San Pablo City**	5	4	Export winner	DOST-IV
6. KAISA Farm Workers Co-operative/ **Mango production/ Candelaria Zambales**	4	4	Export winner	PCARRD-DOST
7. Bangad Irrigators Association/Certified **rice seed production/ Milagros, Masbate**	3	3	Basic domestic needs (BDN)	Bicol University/ DOST-TAPI
8. Bayombong Workers Co-operative/Hollow block prod'n. from rice hull ash/**Bayombong. Pangasinan**	4	4	BDN	Pangasinan State Univ.
9. Lutucan Multi-purpose Coop./**Coco-coir processing/ Sariaya, Quezon**	5	4	yes	Private individual (inventor)
10. Guimaras Small Coconut Farmers Multi-purpose Coop/ **Integrated coconut oil mill/Concordia, Nueva Valencia, Guimaras**	3	4	yes	DOST-TAPI venture financing
11. Polangi-Somoge Small Farmers Co-operative/ **Coco-husk decorticating plant/ Bgy. Somoge, Catarman, Northern Samar**	3	3	yes	DOST-TAPI venture financing

12. Caluya Coconut Farmers' Multi-purpose Coop./**Coco-oil production/ Caluya Antique**	3		yes	UPLB Foundation c/o Ernie Lozada
13. Farmers coco-oil processing Multi-purpose Coop/**Coco-oil production/Anahawan, Southern Leyte**	3		yes	UPLB Foundation c/o Ernie Lozada
14. Christian Farmers Kilusang Bayan for Credit & Allied Services, Inc./**Rice production-processing-marketing, onion, garlic/ Homestead II, Talaverra, N. Ecija**	4	4	BDN	PBSP institution-building & mechani-sation(trac-tors); LandBank credit
15. MASIPAG Project/ **Rice breeding**			BDN	UPLB
16. Bad-ayon Buguias Development Coop, Inc. (BABUDCO)/**Vegetables and rootcrops/ Bad-ayon, Buguias, Benguet**	3 (5 hours from Baguio by bus)	4	BDN	PBSP
17. Cavite Vegetables and Fruit Growers Development Co-operative/**Compost-dryer/Tanza, Cavite**	5	uncertain	BDN	UPLB Foundation
18. United Sugar Planters Co-operative/**Cattle** production, fertiliser importation/ **Digos, Davao**	2	uncertain	BDN	LandBank
19. Rubber-based United Workers Agrarian Reform Beneficiaries Coop/**Rubber/ Isabela, Basilan**	1	uncertain	yes	LandBank
20. Integrated Jalajala Federation of Co-operatives, **Rice Processing Complex/Jalajala, Rizal**	5	4	BDN	**JICA** SEARCA DAR NATTCO

Note: *Accessibility - Scale of 1 to 5 with 1 as least and 5 as most accessible*
Ease of getting information - Scale of 1 to 5 with 1 as least easy and 5 easiest

No. 20 added to the list at the later stage of fieldwork.

Refer to the list of acronyms for the abbreviated names of organisations.

Appendix 1.2

Shortlist of Co-operatives for Case Studies

CO-OPERATIVE/ ENTERPRISE/Site	CRITERIA		
	Accessibility/ Ease of info getting	**Dominant Intervener**	**Type of Beneficiaries**
1. Tabarga Multi-purpose Co-operative/ **Bamboo**/Integrated forest nursery, swine, duck, poultry & goat production, sericulture, fish production/ **Dueñas, Iloilo**	3/5	DOST-PCARRD/ DENR-VI	Upland farmers
2. BIDANI/**Nueva Ecija**	4/4	CLSU	Rural women
3. Tribal group in Northern Luzon/**Food Processing (forest fruits)/ Imugan, Nueva Viscaya**	3/4	Kalahan Educational Fdn.	Tribal group
4. DAHON/Cutflower production/**San Pablo City**	5/4	DOST-IV	Professionals
5. KAISA Farm Workers Co-operative/ **Mango production/ Candelaria Zambales**	4/4	PCARRD-DOST	Mango growers
6. Bayombong Workers Co-operative/Hollow block prod'n. from rice hull ash/ **Bayombong. Pangasinan**	4/4	Pangasinan State Univ.	
7. Lutucan Multi-purpose Coop./ **Coco-coir processing/ Sariaya, Quezon**	5/4	Private individual (inventor)	Coconut producers
8. Guimaras Small Coconut Farmers Multi-purpose Coop/ **Integrated coconut oil mill/Concordia, Nueva Valencia, Guimaras**	3/3	DOST-TAPI venture financing	Coconut producers
9. Caluya Coconut Farmers' Multi-purpose Coop./**Coco-oil production/ Caluya Antique**	3	UPLB Foundation c/o Ernie Lozada	Coconut producers
10. Farmers coco-oil processing Multi-purpose Coop/**Coco-oil production/ Anahawan, Southern Leyte**	3	UPLB Foundation c/o Ernie Lozada	Coconut producers
11. Christian Farmers Kilusang Bayan for Credit & Allied Services, Inc./**Rice production-processing-marketing, onion, garlic/Homestead II, Talaverra, N. Ecija**	4/4	PBSP institution-building & mechanisation(tractors); LandBank credit	Rice farmers
12. MASIPAG Project/**Rice breeding**		UPLB	Rice farmers
13. Integrated Jalajala Federation of Co-operatives, **Rice Processing Complex/Jalajala, Rizal**	5/4	JICA SEARCA DAR	Rice farmers

Note: Accessibility-Scale of 1 to 5 with 1 as least and 5 as most accessible
Ease of getting information-Scale of 1 to 5 with 1 as least easy and 5 easiest

Appendix 1.3

Names of Persons and Organisations Interviewed

Case 1 TABARGA MPC

Abonador, Ver, Member Sangguniang Bayan, Office of the Mayor, Dueñas, Iloilo
Adio, Eduardo, Chairman TABARGA Multipurpose Co-operative (MPC)
Agreda, Alfeo, Northern Iloilo Polytechnic State College
Asuatigue, Rodolfo, TABARGA MPC
Binoya, Francisco, Chief, Technology Transfer Division, Department of Environment and Natural Resources Region 6 (DENR-VI)
Conejar, Rolando, TABARGA MPC
Encanto, Velma, Regional Applied Communication Office Coordinator, Western Visayas Agriculture and Resources R&D Consortium (WESVARRDEC)
Eradio, Gilbert, Fiber Industry Development Authority Region 6 (FIDA-VI)
Esmediana, Aurelio, Jr., Dingle Agricultural and Technical College
Gigare, Niel, DENR-VI
Lamery, Generoso, TABARGA MPC
Lames, Reynaldo, TABARGA MPC
Lamsin, Avelino, TABARGA MPC
Legario, Leonorico, Jr. ,TABARGA MPC
Licera, Ramon, TABARGA MPC
Monoso, Rudy, Bamboo tiles entrepreneur
Parcon-Teruel, Zinnia, Regional Director, Department of Science
and Technology Region 6
Pedregosa, Michael, TABARGA MPC
Porras, Godofredo, TABARGA MPC
Repospolo, Arturo, TABARGA Project Staff
Siapno, Adeluisa, Regional Technical Director, DENR-VI
Sotomil, Apolinario, Provincial Agriculturist, Office of the Governor, Iloilo
Sucaldito, Soledad, Provincial Environment and Natural Resources Officer, Office of the Governor, Iloilo
Sunio, Remy, DOST-VI
Talabero, Val, DENR-VI
Violeta, Rosiben, FIDA-VI

Case 2 Lutucan MPC

Aklan, Ben, Plant Leadman, Lutucan MPC Decorticating Plant
Atienza, Higinio, Jr., Executive Director, Lutucan MPC
Cervantes, Luis, Provincial S&T Center Officer, DOST-IV
Constantino, Lani, Department of Trade and Industry, Province of Quezon
de Vera, Norayda, Lutucan MPC
Gucilatar, Jun, United Coconut Planters Bank Foundation, Inc.
Macarangal, Nerrie, Land Bank of the Philippines, Lucena
Montalbo, Jim, Lutucan MPC
Paloma, Enrico, Regional Manager, Philippine Coconut Authority Region 4
Perilla, Antonio, Jr., Provincial Planning and Development Office, Quezon Province
Quincina, Anna, Department of Trade and Industry, Province of Quezon
Mr. and Mrs. Mariano Sazon, Manufacturer of Coconut Processing Equipment

Case 3 INJAFEDCO

Alfredo, Boyet, Alibangbangan MPC
Bagoyo, Jun, Development Facilitator, Municipal Agrarian Reform Office, JalaJala, Rizal
Balakit, Fortunato, Alibangbangan MPC
Balakit, Julian, Alibangbangan MPC
Barria, Andres, Alibangbangan MPC
Bilog, Rexon, Development Facilitator, Municipal Agrarian Reform Office, JalaJala, Rizal
de Guzman, Bar, Chairman, INJAFEDCO
Engito, Eliseo, Alibangbangan MPC
Gaseta, Ernesto, Alibangbangan MPC
Gaseta, Liza, Alibangbangan MPC
Laraya, Jaime, Alibangbangan MPC
Manalansang, Beatriz, SEARCA
Miranda, Jesus, Alibangbangan MPC
Pascual, Mario, Manager, Rice Processing Complex, INJAFEDCO
Reyes, Cenon, Alibangbangan MPC
San Juan, Ricardo, Chairman, Alibangbangan MPC

Appendix 1.4

List of Lead Questions and Basic Information Collected from Co-operatives

1. Background Information about the Co-operative

a) Co-operative constitution and by-laws

b) When, why and how was the co-operative created?

c) What are the mission and objectives of the co-operative? What is the organisational structure of the co-operative? How often does the co-operative meet? Does the co-operative have an office or meeting place?

d) Total number of members; profile of members (e.g. How many are men and women; level of education: how many of members are engaged in co-operative's major economic activities)

e) Assets of co-operative.

f) What are the different activities and projects of the co-operative? How were these projects selected?

2. Production System

a) Technologies used and their sources (availability, affordability, and accessibility), inputs and materials, labor and capital, indigenous technologies

b) Agencies or entities approached in terms of technical problems?

3. Organisation and Management

a) Task assignment

b) Capability to manage co-operative

c) Training/cross visits attended

4. Linkages and Networking

a) What are the different agencies/entities providing intervention? How did you come to know of these agencies?

b) In what manner do they intervene?

c) How do they help achieve your goals? What are your obligations towards them?

d) Are there instances when two or more of these agencies have jointly packaged and delivered an assistance project?

e) In your observation, are there any conflicts among the objectives of these interveners? How do these conflicts affect your performance?

f) In your own judgement, are these agencies strong, weak, average? Why?

g). Which agencies are supporting you in terms of credit, post-harvest service, extension, market, infrastructure support.

6. Socio-political Environment

a) Do you participate in the local decision-making process? In what way? If not, why? How is your relations with the local government units? What is your opinion of the local government code?

b) What are your views about the following government policies and programs—e.g. Comprehensive Agrarian Reform, S&T programs, agricultural input policies.

c) In your own judgement, how do these programs affect your performance?

d) How better off are farmer-members now than before interventions? (family income, housing, nutrition and health, increased capacity for self-sustained development)

7. Others

a) In your own perception, what are your strengths and weaknesses? Why?

b) What are your problems in managing co-operative and members? What are your production and post-production problems?

Appendix 1.5

List of Lead Questions and Basic Information Collected from Intervening Agencies

Agency _____

1. How did you come to know of the co-operative?
2. What kinds of assistance (e.g. technical, credit, market matching, extension) do you provide to the co-operative? What are the general features of these assistance?
3. What specific programs/projects of your agency is the assistance associated/related with? What are the objectives of the programs/projects?
4. What agency resources, in terms of manpower, facilities, information materials, and others, are utilised to implement and accomplish your assistance to the co-operative?
5. What are the responsibilities of the co-operative as far as these resources are concerned (e.g. service charge, reports)
6. How does your agency administer or deliver the assistance in terms of: a) criteria used for selecting the beneficiary (ies); and b) monitoring and evaluation mechanisms?
7. What were the problems encountered in the delivery of assistance to the co-operative, if any? How did you overcome or solve these problems?
8. 1) What agencies/entities do you cooperate with in the identification and delivery of this assistance? What are their roles? What were the problems encountered in these cooperations? What were the lessons learned in these cooperations or linkages?
9. In your own opinion, what are the positive and negative qualities of the co-operative?
10. What are your suggestions to improve

a) your agency's performance in the delivery of assistance

b) the performance of the co-operative

Appendix 3.1

Typology of Bureaucracies in the Philippines

According to Major Branch of Government	According to Level of Government	According to Functional Categories or Sectoral Concerns	As Provided for in the Constitution
Executive	National	Health	Commission on Elections
Legislative	Regional	Education, Culture and Sports	Civil Service Commission
Judiciary	Local: -Provincial -City/Municipal -Barangay	Agriculture	Commission on Audit
		Agrarian Reform	
		Trade and Industry	
		Tourism	
		Power and Energy	
		Social Welfare	
		Justice	
		Foreign Affairs	
		Finance	
		National Defence	
		Environment and Natural Resources	
		Public Works and Highways	
		Transportation	
		Labour and Employment	
		Interior and Local Government	
		Science and Technology	

Source: R. de Guzman, *et al.*, 'The bureaucracy', in R. de Guzman and M. Reforma (eds), *Government and Politics of the Philippines*, p. 186.

Appendix 3.2

CARP Provisions in Favour of Big Landowners and Investors

Section 8, paragraph b and c - these provisions allow the indeterminate continuity of lease and management contracts executed with MNCs over lands already distributed to farmer-beneficiaries.

Section 11 - this provision defers, for ten years, the implementation of land distribution as to private agricultural lands devoted to commercial livestock, poultry and swine raising, aquaculture such as saltbeds, fishponds and prawn ponds, fruit farms, and cacao, coffee, and rubber plantations.

Section 29 - in cases where it is not economically feasible to divide the land, this provision imposes upon collectivised agrarian reform beneficiaries the obligation to honour existing agreements/contracts covering the land.

Section 31 - this provision allows landowners and agribusiness corporations to substitute stock dispersal to their agricultural workers in lieu of actual land distribution.

Source: Sentro Para sa Tunay na Repormang Agraryo (SENTRA), 'Market-oriented CARP: A recipe for failure', *Agrarian Trends*, Special Issue, SENTRA, Philippines, September 1997, pp. 10-11.

Appendix 3.3

New World Trading Pact under WTA or GATT-UR

1. Increased Access to Markets

Import tariffs by industrial economies will fall by more than 30%; more than 40% of imports will be duty-free; lower prices for consumers.

2. Opening Up of Farm Trade

Non-tariff barriers on farm imports will be converted to tariffs; tariffs will be cut by 36% over a 6-year period for developed countries, 24% over 10 years for less developed countries; poorest nations will be exempted; countries with closed markets will be required to import 3 % of their local needs, rising to at least 5% after six years; value of agricultural export subsidies will be cut by 25% over a period of 6 years; volume of subsidised farm exports will be cut by 21%; more leeway for developing countries.

3. Liberalisation of Textiles and Clothing Trade

Current system of quotas under the 1974 Munich Multi-Fiber Agreement (MFA) will be abolished over 10 years; GATT rates will apply after that period; importers will be allowed special safeguards against import surtax that threaten local textile industries.

4. Protection of Intellectual Property Rights

Copyrights, patents, trademarks, labels of origin, rights of performers and producers of sound recordings will be protected; poorest countries will enjoy a 10-year waiting period before having to comply with GATT's new intellectual property rights rules.

5. Liberalisation of Foreign Investment Codes

Foreign investment will not be subjected to restrictions that are not applicable to domestic firms; existing restrictions will be eliminated, ranging from two to seven years for the poorest countries.

6. Strengthening of Anti-Dumping Laws

Tougher limitations against dumping will be enforced so that countries will find it more difficult to use anti-dumping measures to restrict imports, while offenders will find it harder to evade anti-dumping laws.

7. Efficient Settlement of Disputes

Trade disputes will be settled more speedily with tight deadlines and single countries being prevented from blocking decisions.

8. Creation of a New WTO

With a status equal to that of the International Monetary Fund and the World Bank, the World Trade Organisation will have stronger powers to police world trade and settle disputes.

Source: Business World, 20 December 1993, p. 7, quoted in IBON Philippines, 'Aint GATT what it takes', *IBON People's Policy and Advocacy Studies Special Release.*

Appendix 3.4

Summary of the negative consequences of GATT on agriculture and corresponding response/action of the Philippine Government as of 1995.

Negative Consequences	Government's Response/Action
1. Small farmers' produce will be pitted against cheaper, more competitive imports. Farmers will soon be wiped out from the economy in favour of big businessmen, exporters, processors and industrialists.	Dislocation of agricultural producers will be minimised by minimum tariff quotas and special safeguard provisions. Safety nets worth P28 billion (US$ 1.2 billion) for 1995 will cushion impact.
2. Production of local foodcrops will be compromised in favour of high value commercial crops.	The government, through its existing program called 'Key Production Areas Approach' intends to achieve both food self-sufficiency and export crops production by concentrating rice and corn production to areas whose agro-climatic and market conditions are favourable for producing, processing and marketing such products. With this strategy, government support is focused from 5.0 M hectares to only 1.9 M hectares (but production is intensified) thus freeing some 3.1 million hectares for livestock and commercial crop areas. A House Bill on High Value Crops proposes that farmers may be allowed to adopt the cooperative system in putting up economically-sized farms for high value crop farming.
3. Long-term food security is threatened by dropping all production and marketing subsidies.	Support services (e.g. R&D, pest and disease control programs, training and extension, inspection services, marketing and promotion services and infrastructure like irrigation) not directly paid to agricultural producers are still allowed under GATT.
4. The GATT provision on intellectual property rights will increase cost of production in agriculture due to additional patent rights and royalties on the price of agricultural inputs.	With more alternative agricultural input products coming in, farmers and entrepreneurs could make better choices and will have better access to more efficient and effective technologies. This could lead to improved productivity that could outweigh the increased cost of production.

Appendix 3.5

Provisions in the WTA (GATT-UR) Pertinent to the Environment

1. Article XII or 'General Exceptions' of the GATT which states that:

'Subject to requirement that such measures are not applied in a manner which would constitute a means of arbitrary or unjustifiable discrimination between countries where the same conditions prevail, or a disguised restriction on international trade, nothing in this Agreement shall be construed the adoption or enforcement by any contracting party of measures necessary to protect human, animal or plant life or health, and relating to the conservation of exhaustible natural resources if such measures are made effective in conjunction with restrictions on domestic production or consumption.'

2. Preamble of the Agreement on Technical Barriers to Trade which provides that:

'No country should be prevented from taking measures necessary to ensure the quality of its exports, or for the protection of human, animal or plant life or health of the environment, or for the prevention of deceptive practices, at the levels it considers appropriate, subject to the requirement that they are not applied in a manner which would constitute a means of arbitrary or unjustifiable discrimination between the countries where the same conditions prevail or a disguised restriction on international trade, and are otherwise in accordance with the provisions of this Agreement'.

3. Preamble of the Agreement on the Application of Sanitary and Phytosanitary Measures which provides that:

'No Member should be prevented from adopting or enforcing measures necessary to protect human, animal, or plant life or health, subject to the requirement that these measures are not applied in a manner which would constitute a means of arbitrary or unjustifiable discrimination between Members where the same conditions prevail or a disguised restriction on international trade. The same Preamble also provides for the desire to further the use of harmonised sanitary and phytosanitary measures between Members, on the basis of international standards, guidelines and recommendations developed by the relevant international organisations, including the Codex Alimentarius Commission, the International Office of Epizootics and the relevant international and regional organisations operating within the framework of the International Plant Protection Convention, without requiring Members to change their appropriate level of protection of human, animal or plant life or health.'

4. The Decision on Trade in Services and the Environment that provides that:

'The Council for Trade in Services would request the Committee on Trade and Environment to examine and report, with recommendations if any, on the relationship between services trade and the environment in order to determine whether any modification of Article XIV of the General Agreement on Trade in Services is required. The same Decision provides, that the Committee on Trade and Environment shall also examine the relevance of inter-governmental agreements on the environment and their relationship to the General Agreement on Trade in Services.

Source: Ricardo Umali, Brief on GATT-UR in relation to environment, paper presented during the DENR National Management Conference, Davao Insular Hotel, Davao City, Philippines, 25 August 1994, pp. 3-5.

Appendix 3.6

Examples/Cases of Environmental Damages Associated with Free Trade/Industrialisation

1. Promotion of Export Agriculture

The export-oriented banana industry that developed rapidly in the 1970s in Mindanao, Philippines converted some 25,000 hectares of land into banana plantation reducing some of the settlers and members of indigenous ethnic communities into either plantation wage earners or landless rural workers. The industry is a major user of agricultural chemicals, endangering health and safety of the workers and families living in the plantation. In 1976, it spent about US$30 per hectare on pesticides.

2. Fishery Modernisation

The modernisation and commercialisation of the fisheries industry resulted in the marginalisation of small-scale fishery found all over the Philippines' coastlines. The big commercial fishing boats are dominating the wide fishing areas, pushing the smaller operators to the coastal areas where over-fishing is prevalent. Some Japanese and Filipino commercial fishing boats are engaged in the highly destructive trawling and purse seine fishing.

3. Kawasaki Sintering Project, (Misamis Oriental, Philippines)

The sintering of iron ore is an energy-intensive, pollution-causing process. From the beginning of its construction in 1974 up to the present, the sintering plant has been strongly opposed by environmentalists in the Philippines and abroad. Kawasaki has been accused of 'poisoning' Cagayan de Oro, Mindanao with clear indications of water and air pollution around the 144 hectare sintering site.

4. PASAR's Copper Smelting and Refining Project

The Philippine Associated Smelting and Refining Corporation (PASAR) was constructed in 1980-83 in Isabel, Leyte, Philippines. It processes most of the copper concentrates produced in the country. A survey made by a science professor from Nagoya University in 1990 revealed that the sea water around PASAR is strongly polluted with acid, with pH value of 2.8 similar to that of Vinegar. It is likewise polluted with heavy metals especially zinc, copper and arsenic. The mud of 18,100 ppm of copper would be useable again as ore material.

5. Van Melle Phils, Inc.-Confectionary Factory

This firm has been discharging untreated waste water with unacceptable levels of pollutants into the Laguna de Bay, Philippines. The Laguna Lake Development Authority has discovered that it was not meeting pollution standards set for factories which dump their waste water.

6. Coca-Cola Plant in San Fernando Pampanga, Philippines

Coca Cola does not have a treatment facility for their waste disposal. The plant has been inspected on 3 occasions from 1973-1987.

7. Dole Philippines

Dole Phils. is a large pineapple and banana TNC controlling vast tracts of Mindanao's arable land. Dole used bulldozers to eject B'laan families, a tribal community from their homes at the foot of Mount Matutum in South Cotabato. Original creeks were bulldozed to flatten the area and diverted into big creeks and then into rivers. When heavy rain comes the rivers rush enormous force into the sea, bringing huge amounts of eroded soil with them.

8. The Philippine Forests

During the 1980s, out of total exports of US$57.064 billion, a cumulative average of 61.2% was accounted for by resource-based exports mainly forest products, wood manufactures and furniture and fixtures and mineral products. From the period 1972 to 1988, the Philippine logging industry earned US$42.85 billion by levelling 8.57 million hectares of forest. In 1991, the Department of Environment and Natural Resources (DENR) issued in order banning logging in the remaining virgin forests of the Philippines. Recently, the DENR has banned the exportation of lumber and logs.

Sources:

R. Ofreneo, 'Japan and the environmental degradation of the Philippines', in M. Howard (ed.), *Asia's Environmental Crisis*, Westview Press, 1993, pp. 211-216; C. Aldana-Benitez and C. Posadas, *TNCs: In the Thick of Everything*, IBON TNC Book Series, IBON Philippines Databank and Research Center, 1994, pp. 80-87; R. Broad with J. Cavanagh, *Plundering Paradise: The Struggle for the Environment in the Philippines*, University of California Press, Berkeley, 1993, pp. 35-36; J. Teehankee, 'The state, illegal logging, and environmental NGOs in the Philippines', *Kasarinlan: Philippine Environmental Politics*, vol. 9, no. 1, Third World Studies Center, University of the Philippines, Q3 1993, pp. 21, 31-32.

Appendix 4.1

The Research and Development Consortia in the Philippines

BICARRD - Bicol Consortium for Agriculture and Resources Research and Development

CCARRD - Caraga Consortium for Agriculture and Resources Research and Development

CEMARRDEC - Central Mindanao Agriculture and Resources Research and Development Consortium

CLARRDEC - Central Luzon Agriculture and Resources Research and Development Consortium

CVARRD - Cagayan Valley Agriculture and Resources Research and Development

CV-CIRRD - Central Visayas Consortium for Integrated Resources Research and Development

HARRDEC - Highland Agriculture and Resources Research and Development Consortium

NOMCARRD - Northern Mindanao Consortium for Agriculture and Resources Research and Development

SMARRDEC - Southern Mindanao Agriculture and Resources Research and Development Consortium

STARRDEC - Southern Tagalog Agriculture and Resources Research and Development Consortium

WESMARRDEC - Western Mindanao Agriculture and Resources Research and Development Consortium

WESVARRDEC - Western Visayas Agriculture and Resources Research and Development Consortium

Source: William Dar, *The Philippine National Agricultural Research System: A Catalyst for Economic Growth and Sustainable Development*, PCARRD-DOST, Los Banos, Laguna, Philippines, 1997.

Appendix 4.2

Evolution of the Agricultural Extension System in The Philippines

17th Century - Spanish missionaries introduced changes in the cropping patterns in the country through the establishment of 'Granjas Modelos' or model farms (e.g. Negros Occidental for sugarcane, Pampanga for rice, Isabela for tobacco). These model farms became Farm Schools or demonstration centres for farmers.
1902 - Formal extension service was first introduced with the creation of the Bureau of Agriculture by the Americans.
1910 - A demonstration and extension division was created within the Bureau.
1929 - Bureau of Plant Industry (BPI) and Bureau of Animal Industry (BAI) were organised; agricultural extension was placed under BPI.
1936 - Provincial Agricultural Extension Service were established.
1952 - Bureau of Agricultural Extension (BAEx) was created upon the recommendation of the United States Economic Survey Mission.
1963 - BAEx was renamed Agricultural Productivity Commission (APC) and placed under Office of the Philippine President. APC was tasked to support the agricultural reform program and intensified the promotion and development of Agricultural Co-operatives.
1967 - Decentralisation Act authorised the local government to provide agricultural extension service alongside centralised extension service.
1972 - APC was reverted back to BAEx.
1978 - Ministry of Agriculture was reorganised converting the line bureaus (BPI, BAI, Bureau of Soils, and BAEx) into staff bureaus.
1980 - Agricultural extension service was directed to transfer appropriate technologies using the farming systems research and extension approach and tasked to accelerate institutional and human resource development.
1987 - Ministry of Agriculture and Food regionalised and reorganised into Department of Agriculture (DA) and BAEx transformed into the Agricultural Training Institute. Some important aspects of the reorganisation included the following: the DA will provide comprehensive extension service and training to farmers and other agricultural entrepreneurs; ATI will be responsible for the multi-level training of agricultural extension workers and their clientele with emphasis on technology transfer techniques.
1992 - The Local Government Code (LDC) has devolved major functions and powers from national central agencies to local government units (LGUs). Agricultural extension and on-site research services and facilities were among those transferred to the LGUs' responsibility. Specifically, examples of these services include the following: distribution of planting materials, demonstration farms, prevention and control of plant and animal pests and diseases, operation of animal breeding stations and artificial insemination centres, assistance of farmer co-operatives, and others.

Sources: ATI, Managing Municipal Agricultural Extension in the Philippines Manual, pp. 8-9; S. Obien, Some observations on the acquisition and transfer of agricultural technology, paper presented during the 6th Philippine Productivity Movement Conference, 1987, pp. 3-5; E. Brown and A. Librero, Agricultural and rural sector: agricultural extension and training system (Philippines), Country report during the Training Course on Agricultural Extension Methodologies, Jakarta, Indonesia, 1991, pp. 2-3.

Appendix 4.3

Basic Features of The Farming Systems Research Approach

1. *The problem-solving approach.* This component of the FSR seeks to identify priority problems and needs of the target clientele through exploratory survey or rapid resource appraisal (RRA).
2. *Inter-disciplinary approach.* Implementation of FSR seeks to involve an inter-disciplinary collaboration among researchers or implementors. This will enable them to look at the systems interaction of the FSR issues under consideration.
3. *On-farm research or establishment of adaptation/verification trials in farmers' field.* Technology adaptation or verification trials or on-farm research makes possible the identification of appropriate location-specific technologies. It tests if a technology for dissemination in a given location is better than the existing farmers' practices.
4. *Participatory approach.* All FSR-related projects promote farmers' participation. Farmers give feedback on proposed new technology and help plan on-farm trials. They themselves implement cropping pattern trials under the supervision of site staff.
5. *Strengthen linkages and interfacing among farmers, extension workers, and researchers.* In FSR, the farmer contributes his knowledge about his farming system. The researcher and extension worker provide economic and technical knowledge that may supplement or explain the process involved in the farming system. Together they decide on what activities need to be done, need testing or more research work.
6. *Feedback mechanism.* This is enhanced through farmers' involvement in the field trials and other FSR-related activities. Feedbacks are relayed to on-station and on-farm researchers for improving or modifying alternative technology options more suitable to location-specific conditions.
7. *Holistic.* Most FSR advocates the holistic approach to farming system. However, CIMMYT approach argues that the restricted form is more applicable because farmers find it difficult to adopt a number of technologies at the same time.

Source: B. del Rosario, B. Burgos, L. Oliva, and N. Llemit, 1994.

Appendix 4.4

DSC Case in Barangay Tacunan, Davao, Philippines

Based on the DSC process flow, the following activities were undertaken in Tacunan:

Needs assessment

Rapid rural appraisal (RRA) and Key Informant Panel (KIP) were conducted by the DSC staff and RACO in Southern Mindanao. These activities initially determined the picture of the community.

Development/project objectives

People in the community identified and articulated their problems through the problem tree analysis. Three maps were made by the community: topography, hydrology, and social/enterprise maps. The problem tree exhibited the community's own analysis of their situation and provided cues on what development project should be focused on.

Situation Analysis

Communication resources in Tacunan and media access and preferences of the people were analysed.

Target Audience Analysis

The DSC staff together with RACO conducted the baseline knowledge, attitude, practices survey. To further get informal data from the community, focus group interviews were conducted. Three technologies needing development support communication were identified, namely 'bunchy top' control in Banana, soil sampling technique, and Rhinoceros beetle control.

Objective Setting, Preparation and Pre-testing of Prototype Materials

DSC communication campaign objectives were set; communication approaches, messages, media materials were identified in consultation with local leaders.

For communication strategy, a community audiotower system or CATS was put up in Tacunan accompanying trainings on script writing, broadcasting, and operating CATS. Community leaders were identified representing six sectors, namely farmers, women, youth, barangay health workers, barangay council, and co-operative.

The community leaders bound themselves into the Radyo Tacunan organisation. The organisation mobilised the community to co-share in terms of labour and construction materials in putting up the radio station to house CATS equipment. Radyo Tacunan became the nucleus for which all community development activities are channelled. Along with CATS are the use of demonstration farm on banana seedling bank, printed materials production, and video/personal interaction of DSC staff with farmers. The use of field trips and educational tours enhanced cohesiveness of the community.

Source: B. del Rosario, B. Burgos, L. Oliva and N. Llemit, 1994.

Appendix 4.5

Tools Employed in the RED Process

1. *Quick Resource Appraisal (QRA)* is a quick and systematic method for evaluating technologies of their potential to support or improve enterprises. The QRA guides the RED team in identifying and evaluating the gaps which may hinder the establishment of an enterprise, in terms of R&D, technology packaging, production system, organisation and management, and linkages. QRA uses a specific rating system that requires the consensus of RED team members. Ratings based on team's consensus are determined and justified based on first hand information from the farmers. The process of deliberation, justification, and consensus on the ratings lead to the identification of gaps and the extent to which they prove limiting.

2. *Risk Management Process (RMP)* is employed to determine the risks associated with gaps identified in QRA. RMP determines whether these risks are manageable (pure) or uncontrollable (speculative). A risk is said to be pure if this is predetermined and therefore can be managed with known interventions. A risk is classified as speculative if it is indeterminate and if at certain point in time, there is no known intervention for it or one does not have the capability to intervene. On this basis, an enterprise is judged as a viable proposition if most if not all of the risks identified are pure and if most if not all speculative risks can be made into pure risks. RMP provides the basis for pinpointing interventions, for intelligently making a choice to where interventions will be sourced, and finally for determining whether there is an enterprise or none. It gives the go signal to proceed with the bigger tasks of business plan or feasibility preparation.

3. *Backward Resource Inventory System (BRIS).* The choices of potential enterprises may be narrowed down or focused through QRA and RMP. Thereafter, BRIS becomes a useful tool for systematically identifying the basic assumptions that will be considered in the business plan preparation. It is a reverse type of analysis considering the resource inventory of the clientele relevant to the production of specific products.

QRA, RMP and BRIS are established based on first hand information from the clientele themselves, through ocular inspection and complemented by secondary data about the target co-operative and community where it is located. The conduct of QRA and RMP in the field is guided by the rules of 'no role playing (letting go of official designations)'; no note taking; cross-checking information; creativity; and teamwork. These rules encourage effective listening and spontaneity of discussion that result to more meaningful information for QRA and RMP. Biases (if any) are avoided if QRA and RMP results are validated with the target co-operatives by a RED team different from the first who conducted them.

Sources: D. Gorrez, J. Baltazar, and B. Burgos, The rural-based enterprise development (RED) process in support to Philippines 2000, paper presented during the PHILARM's National Forum on 'Contributing to Philippines 2000 through Research Utilisation', IRRI, Los Banos, Laguna, 26-27 May 1994; A. Aquino and B. Burgos, Development-oriented research in agriculture and natural resources in the Philippines, working paper for the International Course on Development-oriented Research in Agriculture', ICRA, Wageningen, The Netherlands, 10 January-28 July, 1994.

Appendix 4.6

RED Case: Wood-based Integrated Development Of Integrated Social Forestry (ISF) Areas in Bukidnon and Misamis Oriental, Philippines

The business plan for the project was packaged by RED teams of Northern Mindanao using the RED process and methodologies. It was submitted to and funded by USAID. Through the 'seed fund concept', the amount granted to the project will be paid without interest and shall be put under a trust fund. The amount recovered will be used to create and fund new enterprises. The business project involves the production and processing of an endemic species known as Mamalis, an important source of woodworks in Bukidnon, Northern Mindanao. It brings together in partnership a private sector engaged in the manufacture of wood-waste products; farmers' co-operative involved in the production of Mamalis and other fast-growing tree species to provide raw material supply (twigs and branches) of the private sector; and RED teams to provide localised project management and interventions. The private sector is now producing fashion accessories, home office decors, and toys for export (80%) and local market (20%). While waiting for the farmers' trees to grow to their harvestable stage, wood supply for the processing plant comes from existing natural stands. The private sector intends to provide a more equitable profit sharing scheme with the farmers through the introduction of a first-line wood processing technologies right in the upland area to produce more value-added products.

Source: B. del Rosario, B. Burgos, L. Oliva, and N. Llemit, 1994.

Appendix 4.7

Foreign Funded Agricultural Development Programs

1. *Agricultural Support Services Project* (ASSP) was funded by the World Bank (through the International Bank for Reconstruction and Development) from 1981 to 1991 with total support of US$19.9 million, during which period the concept of farming systems research was popularised in the Philippines. ASSP was aimed at improving support services in the agricultural sector to raise agricultural productivity and improve nutrition. The project originally provided funding for agricultural research, crop, and livestock regulatory services and agricultural planning and management through 24 components. The project redesigns added new components, namely agricultural extension and soil services (first re-design) and later eight more components—sugar R&D, ramie R&D, construction of additional regional research centre, tribal agriculture, and support for the National Post-Harvest Institute for Research and Extension and three headquarters units of the DA (second redesign).[1]

2. *Rainfed Resources Development Project* (RRDP) was jointly implemented by DA, DENR, and PCARRD. Funding for the project amounting to US$7.1 million was sourced from USAID and counterpart funds from the Philippine government. Its main objectives were to develop institutional capacities and policy frameworks to support community-based approach to land and water resources management in the settled upland forest, rainfed agricultural areas and coastal zone.[2] Through the RRDP project, huge investments were poured into the NARS to build up its R&D capability.

3. *Accelerated Agricultural Productivity Project (AAPP)* a USAID funded project, aimed at restoring and accelerating agricultural growth and increase rural investments, income and employment through strengthening of agricultural planning, economic and policy analysis, and market information systems, and the improvement of irrigation and marketing services. The project's estimated cost was US$27.0 million and implemented by DA in collaboration with the NARS.[3]

4. *Integrated Social Forestry Program of the Philippines (ISFP)* was implemented by DENR and supported jointly by USAID and the Philippine government. ISFP was a people-focused forestry

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[1] Operations Evaluation Department, WB, *op. cit.*, p. 8.
[2] *Ibid.*, p. 103.
[3] *Ibid.*

development program which is premised on the assumption that forest occupants are an integral part of the forest ecosystem and therefore must be properly considered. It encouraged active participation of the forest occupants in project planning, implementation, monitoring and evaluation.[4]

5. *Natural Resources Management Program (NRMP)-Technology Development and Transfer (TDT).* The NRMP is a result of a bilateral agreement between the governments of USA and the Philippines. NRMP has five components of which TDT is tasked with technology commercialisation, product research, directed research and training. With DENR as the lead agency, NRMP is implemented in focal regions of country where residual forests remain intact. The major concept of TDT is the integration of the production sector with the processing sector to manufacture products or good for an identified market. The production sector are upland dwellers in Integrated Social Forestry (ISF) and CARP areas who produce raw materials from local sources for processing while at the same time conserving and even expanding the forest base. The interim enterprises are meant to address the immediate needs of the upland dwellers for viable sources of income, while the growing of tree species is for sustainable utilisation of the resources on a long term economic rotation basis. The private sector provides the processing capabilities for wood or non-wood-based products, with the added value being equitably shared with the upland sector. The NRMP-TDT applies the RED strategy, a concept/model developed and pilot tested by local experts. Major innovations introduced into the program include the RED tools and the provision of seed fund, localised PMO, and S&T networking system.[5]

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[4] *Ibid.*, p. 104.

[5] David Gorrez, *op. cit.*, pp. 67-69.

Appendix 5.1

Co-operative Principles

1st Principle: Voluntary and Open Membership

Co-operatives are voluntary organisations, open to all persons able to use their services and willing to accept the responsibilities of membership, without gender, social, racial, political or religious discrimination.

2nd Principle: Democratic Member Control

Co-operatives are democratic organisations controlled by their members, who actively participate in setting their policies and making decisions. Men and women serving as elected representatives are accountable to the membership.

3rd Principle: Member Economic Participation

Members contribute equitably to, and democratically control, the capital of their co-operative. At least part of that capital is usually the common property of the co-operative. They usually receive limited compensation, if any, on capital subscribed as a condition of membership. Members allocate surpluses for any or all of the following purposes: developing the co-operative, possibly by setting up reserves, part of which at least would be indivisible; benefiting members in proportion to their transactions with the co-operative; and supporting other activities approved by the membership.

4th Principle: Autonomy and Independence

Co-operatives are autonomous, self-help organisations controlled by their members. If they enter into agreements with other organisations, including governments, or raise capital from external sources, they do so on terms that ensure democratic control by their members and maintain their co-operative autonomy.

5th Principle: Education, Training and Information

Co-operatives provide education and training for their members, elected representatives, managers, and employees so they can contribute effectively to the development of their co-operatives. They inform the general public--particularly young people and opinion leaders--about the nature and benefits of co-operation.

6th Principle: Co-operation Among Co-operatives

Co-operatives serve their members most effectively and strengthen the co-operative movement by working together through local, national, regional and international structures.

7th Principle: Concern For Community

While focusing on member needs, co-operatives work for the sustainable development of their communities through policies accepted by their members.

Source: ICA, 8 January 1996

Appendix 5.2

Summary of Important Factors Contributing to Co-operative Success or Failure

a) Orientation factors (within the co-operative)

Leadership - the ability to articulate, motivate and stimulate others.

Sound management - the ability to deploy resources in such a way as to serve needs and create more resources.

Training - learning skills required to operate an organisation.

Education - the continual flow of information to develop members' capacities to participate effectively in decision-making.

Linkages - the need for relationships with other institutions and co-operatives.

Variety - the adaptation of the 'co-operative model' to the particular community context.

Individualised planning - the co-operative addressing situation specific needs in a phased manner.

b) Membership Characteristics

Participation - full and direct involvement in the planning of the co-operative's activities.

Open membership - membership open and voluntary.

c) Government Environment

Favourable climate - conditions that allow co-operatives to flourish.

Sensitisation - education of the co-operative logic by government officials and others.

Legal status - legal recognition through legislation which grants co-operatives the right to exist and to function.

Integrated development - co-operative development seen as a part of overall socio-economic development plans.

Harmonisation of objectives - co-operatives must work together for political or legislative ends.

Adequate time frame - new activities undertaken must not exceed the co-operatives' ability to absorb them.

Source: 'Why co-operatives succeed or fail: A compendium of views by International Co-operative Experts', Washington D.C., USAID, 1984, quoted in Craig, 1993.

Appendix 7.1

Local Government Units (LGUs) In The Philippines

There are four political subdivisions of local government units (LGUs) in the Philippines, namely:

The Barangay
The barangay is the smallest political unit of LGUs. Based on Presidential Decree No. 86-A issued on 5 January 1973, the barangay shall 'constitute the base for citizen participation in governmental affairs and the collective views of the people in the barangay shall be considered in the formulation of national policies and programs and whenever practicable shall be translated into concrete and specific decisions'. The barangay serves as the primary planning and implementing unit of government programs, projects and activities and the venue through which the government directly interacts with the people. It is only the barangay that has been expressly given the role of interest articulation, but the decisions of the people only serve as guides for action by the national government.

The Municipality
The municipality consists of a group of barangays and serves as a general-purpose government for the coordination and delivery of basic, regular and direct services within its jurisdiction. It delivers services which tend to be daily, direct and area specific such as environmental sanitation garbage collection, certain aspects of education, health services, markets, water, power, telephone facilities, etc.

The City
The city is like a municipality but it covers more urbanised and developed communities. It serves as a general-purpose government for the coordination and delivery of all basic, regular and direct services within its jurisdiction. The major differences between municipality and city are as follows: the latter delivers all basic services to its constituents, it concentrates all its resources on urban problems while the former on more rural outlying barangays. The city enjoys more autonomy from the supervision of the province.

The Province
The province is composed of a group of municipalities and component cities. It assumes area-wide, more specialised functions, roles and activities and serves as a mechanism for more efficient delivery of services for the development process. It is relatively a much larger area and more remote from the people.

Sources: Raul de Guzman and Mila Reforma. 'Local government: Organisation, powers, and functions, relationship with central government' in Perfecto Padilla (ed.) *Strengthening Local Government Administration and Accelerating Local Development.* Local Government Center, College of Public Administration, University of the Philippines, The Asia Foundation, Philippines, 1992; R. de Guzman and M. Reforma, 'Local government: Organisation, powers, and functions, relationship with central government', in Raul de Guzman and Mila Reforma, *Government and Politics of the Philippines*, Southeast Asian Studies Program, Oxford University Press, Singapore, 1988.

Appendix 7.2

Built-in Research of the Project 'Demonstration and Pilot Application of Technology Packages and Production Systems of Bamboo and Rattan'

1. Growth Performance of Outplanted Rattan (Palasan) Applied with Different Levels of Trichoderma Compost

The study was conducted to the newly outplanted rattan seedlings (0.50 ha.) within the ten-hectare project area to determine the effect of Trichoderma compost on the outplanted rattan. The Trichoderma (fungus that hastens the decomposition of farm-waste materials) compost was applied sidedressed 20 cm from the base of the outplanted rattan seedlings with different levels of application: A - control, B - 0.50 kg/hill, C - 1 kg/hill, D - 1.50 kg/hill, E - 2 kg/hill. The study had four treatments with four replications using Randomised Complete Block Design. The treatments have 16 experimental plants. Data gathering was conducted every two months starting January 1994 as a baseline data. After one year, the result was computed using the ANOVA set at 5%, at 1% level of significance. The results revealed that the outplanted rattan applied with various rates of Trichoderma compost was insignificant, meaning that with or without application of Trichoderma compost the growth performance of rattan was the same for treatments B to E. However, treatment A results showed the same effect to those with various levels of Trichoderma level application.

2. Rattan Plantation Establishment on Partially Shaded and Open Areas

The objective of this research was to demonstrate and test the suitability of rattan in open and partially shaded areas. The experiment was conducted within the ten-hectare project area. Potted rattan seedlings were planted at 2m x 2m planting distance with a total population of 200 seedlings (0.18 ha.). Acacia mangium were used as nurse trees for the rattan on partially shaded areas.

3. Pilot Plantation of 1 Hectare Giant Bamboo

A one-hectare giant bamboo plantation was established at 10m x 10m planting distance with a total of 100 seedlings. This was conducted to demonstrate and test the suitability of giant bamboo in Region VI and to have a supply of planting stock and bamboo poles for cottage industries and possible source of bamboo board for furniture industries. It was expected that after five years, the cooperative could supply the fisherfolks near the area of giant bamboo poles. There was a standby order of the first 200 poles at 100 pesos per pole. The cooperative also conducted research on 'single to double node branch cutting' as seed planting material.

Source: Terminal Report of the project entitled: 'Demonstration and Pilot Application of Technology Packages and Production Systems on Bamboo and Rattan', DENR-VI.

Appendix 7.3

Production Systems and Technology Packages on Bamboo and Rattan

1. Bamboo Related Systems and Packages

1.1 *Production Systems.* Bamboos can be established in plantations or planted with other crops. The monopodial type is more suitable in mix planting. Also, bamboo can be planted as boundary crops to mark boundaries of lands or as shelterbelts to protect crops on either side. These can be planted in backyards to provide an immediate source of foodstuffs and raw materials for household jobs. When established in plantation, bamboos are planted usually in strips or lines similar to traditional reforestation schemes. In mix planting the scheme can be designed to fit the requirements of the user. A few clumps of bamboos may be established in backyards. The species popularly used include: *Bambusa blumeana, B. vulgaris, Gigantochloa levis, G. atter, Dendrocalamus merrilianus,Schizostachyum lumampao, S. lima, Dendrocalamus aspera, Sphaerobambos philippinensis.*

A matboard production system developed in India is available for transfer to other countries. Provided the obtaining conditions in the Philippines are favourable, a collaborative technology transfer activity can be arranged between two countries.

1.2 *Adaptability.* The aforementioned bamboo species can grow in almost any type of soil which is not extremely acidic or alkaline. They grow best in well drained sandy loam to clay loam soil within a pH of 5.0 - 6.0 at an altitudinal range between sea level to about 1,500 m above sea level (asl). Some species of *Phyllostachys* grow well at 1,500 meters asl. Bamboo thrives in places with temperature ranging from 8.8 - 36 degrees Celcius. Bamboos grow bigger and taller in places of high humidity and fertile soil.

1.3 *Propagation.* Vegetative techniques which include offset, culm cutting, and branch-marcott culm cuttings are the more important ways of propagating bamboo. Offset is best for *S. lima* and *S. lumampao.* Culm and branch-marcott culm cutting techniques are suited for *Bambusa, Dendrocalamus, Sphaerombambos,* and *Gigantochloa..* Offset, culm and branch-marcott culm cutting propagules must come from 1-2 year old culms. Except for *G. levis* and *S. philippinensis* where the middle to top portion of the culm is the better source of culm cutting propagules the rest involve the butt to middle portion. Except and *S. philippinensis,* which must be planted upright or slanting, the rest must be planted horizontally or slanting. Collection of offset and branch-marcott culm cuttings must be done during the rainy season for best result.

A mixture of sand and ordinary garden soil is best for rooting culm cuttings. Culm propagules are ready for transplanting after two to three months in the nursery.

1.4. *Field Planting.* Planting holes must be big (between 30 x 30 cm and 50 x 50 cm) and deep enough to accommodate the planting stock. Spacing can be as close as 4 x 4 m (for *S. lima)* to as wide as 10 x 10 m (*B. blumeana*). Planting must be done early in the rainy season.

1.5. *Care and Maintenance.* Regular weeding of competing vegetation during the first two years is needed to enhance growth and survival of planted stocks. Fertilisation at a rate of 20-30 kg. of nitrogen, 10-15 kgs. each of phosphate and phosphorous, and 20-30 kg. of silica may be applied after one month of planting and repeated after three or four months may be done to improve vegetative growth.

1.6. *Harvesting.* Depending on the end-use harvesting may be done three to five years after establishment. Harvesting must be done during the dry season when the starch content is at minimum level and there are no emerging shoots. Overmature and defective culms must be cut. Selection cutting for mature culms must be practiced to sustain the productivity of the clump.

1.7. *Seasoning.* Seasoning of bamboo may be done by air-drying or kiln drying. The former may last for four weeks or more while the latter about nine days.

1.8. *Preservation.* Penetration of preservative is better when treating split bamboo. Water borne preservatives used include Talalith, Boliden, Wakman, Boraxboric, ZnCl, CuSO, ASCU and BHC. In the handicraft industry split culms are treated for one week in a solution of caustic soda and hydrogen peroxide. Unsplit culms are soaked for three to five months. For salt and water solution, culms are soaked for three days. In the fishing industry, preservative treatment is not advised due to the preservatives polluting effect. Besides, its prolonged immersion in water has preserving effects.

1.9. *Manufacturing.* In the handicraft industry, freshly cut bamboo is preferred as it affords easy and fine splitting. Keeping the culms under shade maintains the freshness of bamboo for a longer time. A patent on the production of bamboo parquet blocks for flooring and panelboards has been registered with the Philippine Patent Office since the early 1960s.

1.10. *Species Conservation.* Two living gardens for bamboo has been established at the Makiling Experimental Forest and at the Baguio City Experiment Station of the Department of Environment and Natural Resources (DENR)

2. Rattan Related Systems and Packages

2.1 *Production Systems.* Unlike bamboos, indigenous rattan species can be established only under nurse crops such as coconut and tree plantations and secondary & virgin forests because these species cannot tolerate fully open areas. These need shade to survive and develop but react negatively in heavily shaded areas.

Commercial species of rattan include: *Calamus merrilli, C. ornatus var. philippinensis, C. filispadix, C. caesius. C. microsphaerion, Daemonorops mollis, D. oligolepis, C. scipionum, C. dimorphacanthus,* and *C. siphonosphatum.* Alternate species include: *C. marginatus* and *C. grandiflorus* for *C. merrilli* and *C. ornatus var. philippinensis* and *C. lavensis* for *C. caesius.*

2.2 *Adaptability.* Rattan can be grown in areas of more than 2,000 m. above sea level (asl). Generally, most rattan species have a wide altitudinal range. However, some species are confined to specific soil and altitudinal ranges. Rattan generally grow faster in partially open/shaded than in heavily shaded areas. Extreme dryness can cause sucker mortality.

2.3 *Propagation*. Rattan can be propagated through asexual and sexual methods. Suckers are primarily used for the asexual or vegetative technique. These are sideshoots or plantlets growing out of the basal nodes of mature rattan plants. This technique is recommended only when seeds are not sufficient or available. Most rattan species seed profusely posing no problems in sexual propagation. Also, the phenology of most species have been fully established.

2.4 *Propagation of Planting Stocks*. Production of planting stocks is done best by raising seedlings. Removal of the hilar cover of individual seeds ensure speedy and high percentage of seed germination. Most recently, the use of germinants as planting stocks prove successful. Suckers may be raised in the nursery before outplanting.

2.5 *Field Planting*. Rattan are planted in rows or strips like in ordinary reforestation schemes. Ring weeding is usually done during the first two years of plantation establishment. Fertilisation may be done to provide booster and enhance the survival of the seedling.

2.6 *Harvesting*. Harvest only mature rattan canes. Falling off of leafsheaths indicates that the cane is already mature. As prophylactic control for stain, dip canes into solution of Dowicide 6 (1 kg. per 100 litres of water).

2.7 *Treatment and Seasoning*. Bleaching of heavily stained rattan can be done by dipping the material for two hours in hydrogen peroxide, sodium hydroxide, sodium silicate and tergitol solution heated at 50 degrees Celsius. Using a rattan pole dryer, canes can be dried down to 15 percent moisture content within 64 hours.

2.8 *Processing*. Different types of jigs have been designed to facilitate the preparation of rattan canes for manufacture. Scraping of rattan skin may be done using a scraping machine equipped with a spokeshave metal scraper. A drying tunnel can be used to facilitate the finishing of rattan furniture products.

2.9 *Species Conservation*. A living collection of Philippine rattan containing 493 samples representing 30 species and six varieties has been established to provide genetic materials both for propagation and species improvement purposes.

Source: PCARRD, Integrated R&D Project on Bamboo and Rattan (Phase III)

Appendix 7.4

Giant Bamboo Clonal Propagation and Production Technology

Introduction

Bamboo is considered as one of the most valuable forest and farm products in our country today. Because of its low price comparing it to lumber it is considered as a "poor man's lumber".

Bamboo is the worlds biggest and tallest grass and the biggest and tallest among the bamboo species is the Dendrocalamus asper known to us as the giant bamboo or the 'Apos' in Malaybalay, Bukidnon. It is an erect bamboo with thick walled culm and swollen nodes with aerial roots from the lower portion. Being so big in size it has a great advantage when it comes to uses compared to other bamboo- species.

Description and Distinguishing Features Of The Giant Bamboo (Dendrocalamus asper)

Culms are erect and spineless and grows up to 20 meters tall; internodes is 20-40 cm. long and 20-25 cm in diameter. The internode of the young culm is covered with brown hairs that becomes deciduous when the culm matures, the nodes are slightly raised and rooting at the lower ones. There are several branches at each node, and one is larger than the rest with basal bracts. The culm sheat are deciduous but the lower ones have persistent hairs and the inner surface shiny, glabrous, with reflexed blades.

Distribution

Giant Bamboo is cultivated in Impasugong, Malaybalay and its adjacent areas . It is also being cultivated in Los Baños, Laguna, Baguio City, Samar, Leyte and Taminla, Dueñas, lloilo (Tabarga MPC).

1. *Selection/Collection Of Planting Stock*

Select branches from a good mother clump of giant bamboo. The culm should be from 1 1/2 to 2 years old. Collect only those branches which are bigger and are found on the upper portion of the culm. Cut the branches carefully using a sharp saw or bolo.

2. *Transport of Collected Propagules*

Immediately after collection, planting materials, must be placed inside wet sack. If planting materials will be transported in far places they must be packed in boxes with wet saw dust and properly arrange to avoid dehydration which will cause low germination

3. *Planting Stock Preparation and Potting*

Prior to the collection of planting stock,see to it that all materials needed for propagation like plastic potting bags, potting medium, rooting hormones, clonal chamber, etc. are ready. Soak the bottom of the branches in the mixture of 5 - 10% rooting hormone for at least 3-5 minutes. Then plant it inside the potting bag with ordinary garden soil. Place the potted cuttings under shade with 50 - 60% sunlight or inside the clonal chamber.

4. *Clonal Propagation*

After propagules are potted they are placed inside the clonal chamber. The cuttings inside the clonal chamber must be reached by the sunlight at least 30-40%. The chamber is covered with plastic to maintain high relative humidity inside the chamber which will hasten the growth of the root system. The potted propagules should stay inside the chamber for at least one month

5. *Hardening*

After propagules have developed leaves and root systems the plants must be hardened off. Gradually remove the shade of the rearing shed until such time the plant could withstand the direct heat of the sun. Likewise, watering will also be controlled.

ó. *Outplanting*

After the plants have undergone hardening, they are ready for outplanting. Prepare the planting holes in advance, the size of hole is 1/2 meter cube. In digging, separate the top soil from sub-soil. Before planting place the top soil at the bottom of the hole then place the plant and cover it with the sub-soil . The surface of the soil in the planting hole should be lower than the natural ground. Planting distance of giant bamboo in pure stand is 10m X 10m or if used as a water embankment stabilisation, it is spaced at 5m - 7m between hills and rows using the zigzag double row.

7. *Maintenance and Protection*

The bamboo plants should be well maintained especially during the first two years. Ring weeding at 1-2 meters in diameter must be conducted and weeding frequency varies depending on the kind and population of the dominant weed species. Basal application of 50-100 grams of complete fertiliser (T 14) 15 cm. around the base of the plant should be conducted on newly planted bamboo, and every quarter thereafter for one year. Mulching must also be practiced in order to reduce water loss from the soil and also to supply certain amount of plant nutrients from organic mulch for the plant. In cases of bamboo plantation, firelines should be constructed, especially if the planting site is located in cogonal areas. The fireline should be constructed at the end of the rainy season. Watering is also important after outplanting, after one week without rain watering should be carried out. Fence must be installed to protect the plants from stray animals and bamboo shoot gatherers.

8. *Harvesting*

Harvesting is considered as one of the principal activities of bamboo production. Knowledge and information on the different aspects of harvesting operation of bamboo is of great importance because it is the culmination of all production efforts.

Some Considerations In Harvesting:

1. Culm age - the strength, durability and other physio mechanical properties of a bamboo culm is a function of its age. Harvesting age of giant bamboo for construction materials is between 3-5 years and for pulp yield the culm should be 3 years old.
2. Cutting time season - the best time to cut bamboo is during the dry season when the starch content of the bamboo culm is low.
3. Cutting height- Cutting of harvestable culm should be done as close as possible to the ground.

Compiled by Neil G. Gigare, Arturo M. Rerospolo, Francisco B. Binoya, Jr., Department of Environment and Natural Resources Region 6.

Sources: Piñol, Agustin, Nursery Techniques and plantation establishment, hand-outs on bamboo propagation and management, 17 April 1995; Umali, Paulino Jr., Identification of some important bamboos found in the Philippines, hand-outs on Bamboo propagation and management, 20 April 1993; Technology Transfer Series, Commercialised nodal propagation, DENR, vol. 3 no 3, May to June 1992.

Appendix 8.1

Coconut Fibre Production from Coconut Husk

Coconut husks are waste materials from *copra* production for coconut oil processing. *Copra* is dried coconut meat that produces coconut oil. Coconut husks are normally used as fuel or medium for plant propagation. However, husks can produce more value-added by-products such as fibre. Furniture making business uses coir fibre as filling material for mattresses or upholstered seats. Other uses of coco-coir fibre include brushes, ropes and twines yarn, carpets/rugs/doormats, plant pads/liners, insulation materials, and particle boards.

Coco coir fibre is extracted from coco husks through the process of decortication. The main component of the decorticating technology is the decorticating machine and its accessories. The machines procured by Lutucan MPC have 4BA1 type engine and operate on an 8-hour basis, consuming about 65 to 70 litres of diesel fuel. They use the water coolant system, where the water that circulated into the radiator is changed every two days to prevent overheating. The machine has a capacity of 13,000 pieces of husks daily, with two passing. The 13,000 pieces of coconut husks produce about 1.3 metric tons of fibre or 50 to 60 bales of fibre weighing 20 to 25 kilograms each. The main product of Lutucan coco-coir plant is coco-coir fibre. Coco fibre production, as applied by Lutucan MPC, involves the following steps:

1. *Soaking*. Soaking of husks is done for easy decortication. When the husks dry up, they become brittle and more difficult to decorticate. Husks are placed for a certain period of time in a soaking tank.
2. *First Pass*. After soaking, the husks are fed into the decorticating machine for the first stage of decortication. The first pass usually lasts for five hours before all the 13,000 pieces of husks are finished. Fibres produced during this stage are not yet fully decorticated. Dust are also produced during this operation.
3. *Second Pass*. Fibres produced from the *first pass* are fed again to the machine for the *second pass*, which is faster than the first one, lasting for about 3 hours. More dust are produced at this stage.

4. *Drying.* A cemented area at the plant site serves as the drying area for the coir fibres. When the sunshine is good, drying lasts for 4 hours. Drying operations stops during rainy days.

5. *Baling and Storing.* After drying, the coir fibres are baled for easy transport. The baling machine is alternately filled with fibre. Fibre is compacted with a presser. After the baling process, the baled fibres are weighed and stored or picked up by the buyer.

The coco coir plant operates 26 days a month but yearly operation is effectively 7 to 8 months only because of the rainy season.

Source: Based on interview of Lutucan MPC and S. Medina, E, Matienzo, C. Medina, D, Manalo, and E. Aguilar, *Documentation and Assessment of Successful Coconut Production, Provessing and Marketing Enterprises in Luzon*, PCARRD and Farming Systems and Soil Research Institute, Los Banos, Laguna, Philippines, 1997.

Appendix 9.1

Member-Co-operatives of the Integrated Jalajala Federation of Co-operatives (INJAFEDCO)

1. Sipsipin Multpurpose Co-operative (MPC) - started as a credit co-operative; involved farmer and non-farmer members; with the most complete records and with orderly systems and procedures.
2. Jalajala MPC - a full credit co-operative.
3. Jalajala Agrarian Reform Beneficiaries MPC - created due to Land Bank of the Philippines' credit program.
4. Llano Farmers MPC - almost all services were purely for farmers; subsumed the irrigators' association of Llano; managed and operated irrigation facilities provided by IJRDP in Barangay Bayugo.
5. Samahang Nagkakaisa ng Punta MPC - operated as a credit co-operative.
6. Punta MPC - created due to the LandBank's credit program; became inactive when LandBank support ended.
7. Alibangbangan Multipurpose Farmer Co-operative, Inc. - a full farmer-membership co-operative; the irrigators' association in Barangay Palaypalay merged with the co-operative ; managed and operated irrigation facilities put up by IJRDP in the barangay.
8. Pagkalinawan MPC - co-operative created under IJRDP's institutional development component; managed the irrigation facilities constructed in Barangay Pagkalinawan by IJRDP
9. Tanglaw sa Kaunlaran MPC - already a co-operative before IJRDP; initiated through Meralco Foundation's support; quite inactive co-operative.
10. Bagumbong MPC - supported by LandBank but could not meet financial obligations to the bank due to defective management system; officials were active but not members.

Notes: The brief description of co-operatives was derived from interview with Mr. Baraquiel de Guzman, Chairman of INJAFEDCO. There were other associations in the municipality of Jalajala that were not yet members of INJAFEDCO like the Sipsipin Irrigator's Association that managed and operated the irrigation facilities in Barangay Sipsipin.

Appendix 9.2

THE NATURE OF JAPAN'S OFFICIAL DEVELOPMENT ASSISTANCE (ODA)

Introduction

Japan started to extend aid to Asian countries in 1954 to assist them in their socioeconomic development. Today, Japan is one of the top donors in the world in terms of ODA disbursement. In 1992, it was the major donor in 25 countries in Asia, Africa, Latin America and the Middle East. Japan's ODA is described by JICA as based on the concepts of 'humanitarian and moral considerations' and the 'recognition of interdependence among nations'.[6] Other than these declared intentions, there were other views on Japan's behaviour in aid.

Various explanations given by analysts of Japan's aid behaviour were based on the following perspectives: mercantilist view—a Japan striving for greater global market shares; social patterns—personal and institutional relationship characterised by crosscutting ties with a central focus on achieving economic self-sufficiency and superiority; Japan's vision of its leadership role in the international political economy; its self interest as the world's largest creditor in maintaining a stable international economic system; a view that Japanese foreign economic decisions are in reaction to foreign pressure such as from the United States; and a perspective that sees Japanese aid policy as complementing Japan's industrial policy and international economic objectives.[7]

The literature on Japan's foreign aid is dominated by the evolutionary and historical perspective that sees the aid program in three major phases—Phase 1 from the 1950s characterised by reparation payments to Burma, Philippines, Indonesia and Vietnam; Phase II from 1960s through the late 1970s with Japanese aid viewed as commercially motivated, a strategy to develop markets and ensure steady raw materials sources; and Phase III characterised by various motives that include political and security reasons and the desire for prestige and acceptance in the international economy.[8]

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[6] Japan International Cooperation Agency document, 1995.

[7] Based on the literature review made by Margee Ensign, *Doing Good and Doing Well: Japan's Foreign Aid Program*, Columbia University Press, New York, 1992, pp. 7-11.

[8] *Ibid*, p. 8.

Types of Japanese Aid

There are three types of Japanese aid, namely bilateral grants, bilateral loans and technical assistance. Japan also contributes to multilateral donor organisations such as the World Bank and Asian Development Bank. Grant aid is a type of financial assistance given to developing countries without obligation of repayment. The grant aid is generally used for aspects of basic human needs that are low in profitability such as medical care, public health, domestic water supply, rural and agricultural development, and human resource development.[9] Japan extends three kinds of bilateral loans, namely project loans, commodity loans and program lending. Loans are focused on economic infrastructure development and directed to medium-income countries that are seen to have developed and would soon no longer need aid.[10]

Institutions Involved and the Aid Process

Japan's aid policy-making system involves four major ministries or agencies: the Ministry of International Trade and Industry (MITI); the Ministry of Foreign Affairs (MFA); Ministry of Finance (MOF); and the Economic Planning Agency (EPA). These ministries are responsible for different aspects of the aid program. There is no agency that coordinates the activities of these four ministries on aid policy.

Two agencies were created to implement policy. The Overseas Economic Cooperation Fund (OECF) is in charge of bilateral loans while the Japan International Cooperation Agency (JICA) implements the grant aid, technical assistance and loans not handled by OECF. OECF is administratively under the EPA while JICA under MFA. **Figure 1** shows how the grant aid program works.

JICA oversees the conduct of a basic design study in order to compile an optimum draft proposal necessary for the implementation of the project. The contents and effects of the proposed project are examined in terms of the system for maintenance and management in the recipient country. After the Exchange of Notes between the governments of Japan and the recipient country, JICA provides support to the recipient country to facilitate the smooth implementation of the project. JICA also provides follow-up services to ensure the continuing effectiveness of the project. Preliminary and full-scale survey, procurement and construction are administered by JICA.[11]

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[9] JICA document, 1995.

[10] David Potter, *Japan's Foreign Aid to Thailand and the Philippines*, St. Martin's Press, New York, 1996, p. 5.

[11] JICA document, 1995.

Various critics of the Japanese foreign aid program argue that the private sector has a major role in the making and implementation of the aid policy. They refer to the network of Japanese trading companies and construction firms that have strong allies in many developing countries and have their own networks in Tokyo through business related associations. These associations lobby members of the Diet and the bureaucracy to influence policies in their favour.[12] For instance, the Nippon Koei, Japan's largest consulting company, is observed to rely on ODA for 30 percent of its contracts. The Japanese aid bureaucracy depends on the private firms at all stages of the aid process from project identification to implementation.[13]

This reliance on Japanese firms is observable in the 'request-based' system of the Japanese foreign aid. The Japanese government requires that aid must be formally requested by the governments of the recipient countries. The request stage consists of eight steps **(Figure 2)** with JICA assisting through the whole process.[14]

JICA coordinates the negotiations and confirmation of the 'Scope of Work' with the government of the recipient country. The field survey is conducted by a consultant chosen by JICA through the process of bidding. The survey results are studied in Japan and the final feasibility study presented to the appropriate ministries. The prime consultant or contractor that could assist in the request preparation must be Japanese. However, very recently the Japanese government has allowed foreign nationals and domestic consultants to become part of the study team (up to 25 % of the total number of study team members) and up to 50% of the subcontractors can be foreign.

It is this request-based nature of the aid program that raises the issue of the influence of the Japanese private sector on the request made by the recipient country. The Japanese companies or consultants and survey teams who assist the recipient government in preparing their request can advise the recipient as to which kind of projects will the Japanese government be most willing to fund. The consultants know the types of projects that will be acceptable to the aid bureaucracy in Japan. Threfore, they can influence what type of 'request' the recipient country will make.

This led the critics to conclude that the Japanese firms are open to charges of manipulating requests more advantageous to corporate rather than the recipient interests.[15] These critics claim that requests could be developed such that only Japanese companies could meet the engineering specifications of the project.

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[12] Alan Rix, 'Managing Japan's Aid: ASEAN' in Bruce Koppel and Robert Orr, Jr. (eds), *Japan's Foreign Aid: Power and Policy in a New Era*, Westview Press, Colorado, 1993, pp. 8-9.

[13] Potter, *op cit.*, p. xv.

[14] Ensign, *op. cit.*, pp. 37-42.

[15] Rix, *op. cit.*, p. 9.

Ensign[16] cites an example in Patcharee Thanmai's paper to illustrate this problem. This example concerns the Thammasat University in Thailand in which its proposal to acquire computer systems using Japanese foreign aid was approved for funding. There was a problem with purchasing during the implementation stage of the project. The Japanese government selected the contractors and there was only one company, NEC, that qualified because the proposal specified particular equipment that only NEC could supply. However, the problem with the equipment was that the university needed printers that could print both in English and Thai and at that time NEC did not have such printers.

Tied Aid

Tied aid means that aid monies must be principally but not necessarily totally utilised to procure goods and services from the donor country.[17] This condition gives the impression that the donor country does not allow their money to leave the country. The Japanese government has started a major untying of their assistance in the mid 1980s[18] such that by 1990, based on their statistics, Japanese aid was 84.5 percent generally untied (recipient can use aid for procurement world-wide) and 15.5 percent partially untied (recipient can use aid for procurement from the donor and most other developing countries).[19]

The Japanese government maintains that even at the request level, the engineering services component of the feasibility studies has become increasingly partially untied. However, many experts in the field of aid argue that while aid projects are untied officially, the real issue is that informal mechanisms or the complex web of relationships among Japan's engineering and construction firms and the aid bureaucracy still ensure that Japanese firms will win bulk of the bids.

The case of the ODA to Thailand illustrates how strongly tied Japan aid was. Three major groups in Thailand—the Thai Construction Industry Associations (TCIA), the Consulting Engineers Association of Thailand (CEAT), and the Association of Siamese Architects (ASA)—were strongly opposed to Japanese ODA conditions that placed them in a disadvantageous position vis-a-vis the Japanese firms. Their discontent with the ODA conditions were aired and raised through the mass media; during conferences and seminars; and by appealing to the appropriate

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[16] Patcharee Thanmai, 'Japanese and U.S. aid in Thailand' quoted in Margee Ensign, 'Toward an empirical approach to high-stakes questions', *Doing Good and Doing Well: Japan's Foreign Aid Program*, Columbia University Press, New York, 1992, pp. 13-14.

[17] Ensign, *op. cit.*, p. 16.

[18] Rix, *op. cit.*, p. 10.

[19] Ensign, *op. cit.* , pp 16-17.

Thai government bodies and the Thai Chamber of Commerce to instruct Thai government agencies getting aid to give priority to Thai firms.[20]

To verify the view that indeed these Thai firms were dissatisfied with the ODA conditions, a survey was conducted by Chittiwatanapong among Thai managers of member-firms of TCIA, members of the CEAT, and members of ASA. The survey revealed that the majority of the Thai contractors and consulting firms believed that they were disadvantaged because almost all the bidding for engineering consulting works were won by Japanese consultants as 'lead firms'.

The Thai architects on the other hand were very disturbed to see JICA's grant projects in Thailand designed by Japanese architect for reasons of 'cultural infiltration'. They felt that the Thai architectural beauty could best be expressed by Thai architects. They also questioned the unnecessary importing of expensive construction parts from Japan (e.g. roof tiles, toilets).

Tied assistance is also criticised for the difficulty of maintaining the facilities installed and/or constructed once projects are funded. For example the Philippine General Hospital completed in 1989 contained state of the art equipment purchased from Japan. However, parts for repairing equipment must come from Japan and funds were not available for these maintenance costs.[21] The same is true with the Chiang Mai University medical faculty in northern Thailand. JICA provided the hospital with high technology equipment beyond the capabilities of the recipient institution to maintain.[22]

Concluding Statement

The implications of the request-based system of Japanese aid program for the Integrated Jalajala Rural Development Project (IJRDP) are covered in the main body of chapter 9.

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[22] Potter, *op. cit.*, p. ix.

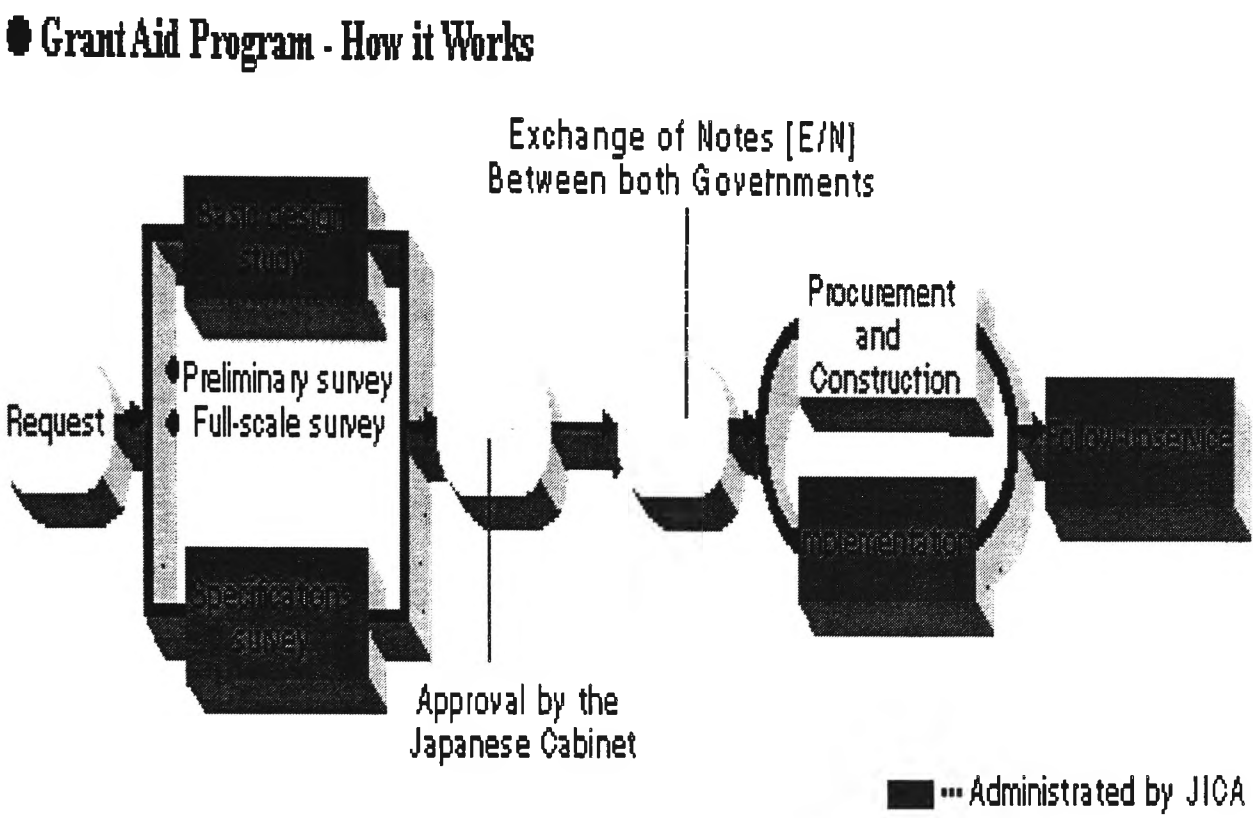

Figure 1. JICA's grant aid program

Source: JICA, 'Support for Japan's grant aid program: Grant aid program', 1995, website: http://www.jica.go.jp/E-jica/lp009.html, accessed on 27 April 1998.

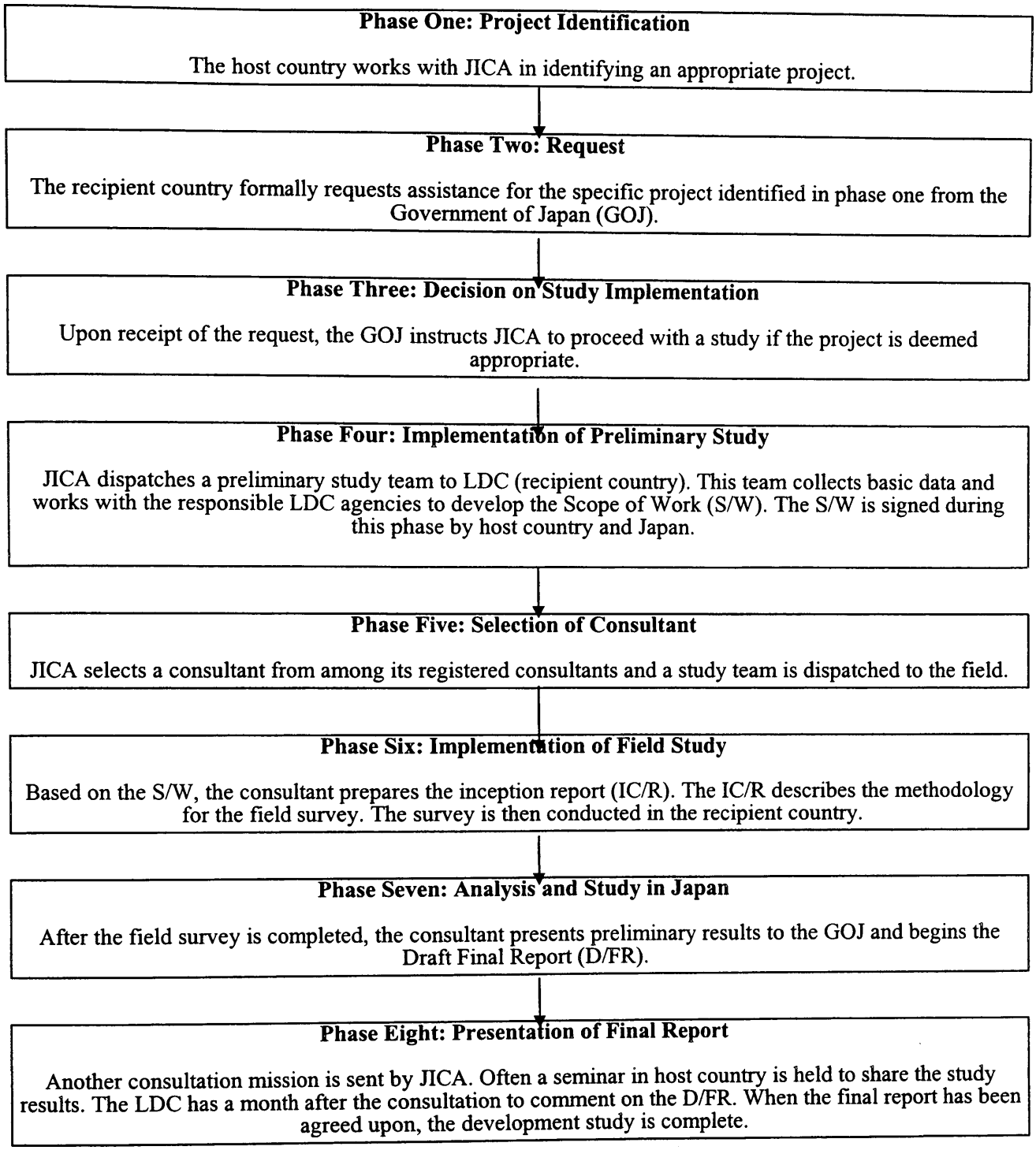

Figure 2: The development study: the request process

Source: JICA, *Development Study*, quoted in M. Ensign, 1992, pp. 40-41.

Appendix 9.3

Existing and Recommended Rice Production Practices in Jalajala

1. Rice Varieties

The rice seeds used by most farmers in Jalajala were contaminated and had been generated from their own harvested rice. There was no certified, registered and foundation seeds sold because of the inaccessibility of the area before the IJRDP infrastructure project.

SEARCA's RPG introduced Foundation Seeds of high yielding yet good eating quality rice varieties as well as ordinary varieties acquired from the Philippine Rice Research Institute.

2. Fertiliser Application

Use of chemical fertiliser was limited due to bad road condition in Jalajala before IJRDP. Urea was normally used and applied at the maximum amount of 100 kg. per hectare. This rate was way below the nitrogen requirement of rice crop and there was practically no phosphorous and potassium applied.

The recommended fertiliser level for the area based on the soil laboratory analysis and on-farm trial was 60-3-30 (NPK). SEARCA's RPG recommended a combination of chemical and organic fertilisers (e.g. chicken manure) to meet the required level of fertiliser in the area.

3. Pest Management

The average volume of insecticide used by farmers in Jalajala was only one litre per hectare, meaning they were not heavy users of insecticide.

Integrated pest management was taught to the farmers in Jalajala to make them understand that spraying must only be the last resort when pest outbreak occurred.

Source: R. Vega and J. Asirot, 'Study on the adoption of sustainable rice production technologies in irrigated lowland rice of Jalajala'.

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