Institut für Wirtschafts- und Sozialwissenschaften des Landbaus der Humboldt-Universität zu Berlin

REVIEW OF THE AGRICULTURAL KNOWLEDGE SYSTEM IN FIJI

- Opportunities and Limitations of Participatory Methods and Platforms to promote Innovation Development -

DISSERTATION

zur Erlangung des akademischen Grades
Doctor rerum agriculturarum
(Dr. rer. agr.)

eingereicht an der
Landwirtschaftlich-Gärtnerischen Fakultät
der Humboldt-Universität zu Berlin

von
Dipl.-Ing. agr. Lorenz B. R. Bachmann
geboren am 30.09.1963 in Hünfeld

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Tag der mündlichen Prüfung: 21.12.2000

Key words:
Knowledge systems – Participatory Rural Appraisal (PRA) – plattforms – innovation development – research and extension priority setting

Abstract

The small Island country Fiji has an articulated agricultural knowledge system with private and public institutions. The agricultural research and extension departments of the Ministry of Agriculture are the focus of this study. A participatory action research methodology was used to investigate the potential of participatory methods and to improve information flows between farmers and the Ministry in order to achieve a systematic Integration of farmers' problems into the knowledge system. Furthermore, the potential of platforms in improvement of the efficiency of work in the Ministry was studied.

Participatory methods proved suitable in improving the dialog with farmers and the analysis of their problems. Besides this, farmers potentials and their ideas for solutions could be assessed. As a result, a model for the systematic compilation of farmers' problems and respective research and extension priorities could be elaborated. The training course on participatory methods revealed the following strength of Ministry staff: organising surveys, field use of tools, presentation and visualisation of findings. Conceptual thinking, analytical skills, interpretation, and report writing skills were identified as weaknesses. These deficits restrict the problem solving potential of participatory methods in the Ministry. Further education of Ministry staff and revised curricula at the local agricultural colleges will be required, to raise the overall level of scientific education.

Four projects that were studied as cases for platforms, revealed that platforms were suitable means for promoting innovation development and somewhat less successful for the diffusion of findings. The most successful platform was characterised by a balanced contribution and participation of all actors involved. Strengths of the platform model were identified as such: better co-ordination, improved linkages, better interplay of actors, better means to reach goals, reduced duplication of efforts, and better use of resources. Weaknesses were seen in the need to achieve consensus and co-ordination, the weakening of hierarchical authority due to increased flexibility, and the fact that experienced-trained staff were not available in abundance in the Ministry.

Three years after the first introduction of participatory methods in the Ministry, a partial institutionalisation could be observed. For the further consolidation of participatory methods and platforms, a linkage unit for further promotion is recommended.

Schlagworte:
Wissens Systeme – Participatory Rural Appraisal (PRA) – Plattformen – Innovationsentwicklung – Prioritätensetzung für Forschung und Beratung

Zusammenfassung

Der Inselstaat Fidschi im Südpazifik hat ein ausgeprägtes Landwirtschaftliches Wissenssystem mit einer Reihe privater und staatlicher Institutionen. Im Mittelpunkt der Untersuchung standen die staatlichen Agrarforschungs- und Beratungsabteilungen des Landwirtschaftsministeriums. Mit einem partizipativen Aktionsforschungsansatz wurde untersucht, welchen Beitrag partizipative Methoden zur Verbesserung des Informationsflusses zwischen Bauern und dem Ministerium leisten können, um damit eine systematische Integration der Probleme der Bauern im Wissenssystem zu erreichen. Weiterhin wurde erhoben, welchen Beitrag Plattformen für eine effizientere Arbeit im Ministerium leisten können.

Partizipative Methoden (PRA) erwiesen sich als sehr geeignet den Dialog mit den Bauern zu fördern und deren Probleme zu analysieren. Neben den Problemen konnten auch die Potenziale der Betriebe und bäuerliche Lösungsvorschläge gut erfasst werden. Als Ergebnis wurde eine Modell zur systematischen Problemerfassung und Bestimmung von Forschungs- und Beratungsprioritäten erarbeitet.

Der Trainingskurs in partizipativen Methoden zeigte folgende Stärken der lokalen Mitarbeiter auf: Organisieren von Untersuchungen, Anwendung partizipativer Methoden im Feld, praktische Implementierung, Visualisierung und Präsentation von Untersuchungsergebnissen. Schwachpunkte wurden hingegen in folgenden Bereichen festgestellt: konzeptionelles Denken, Interpretation und Auswertung der Daten sowie der schriftlichen Abfassung von Ergebnissen. Diese Defizite im konzeptionellen Bereich schränken das mit den Methoden erreichbare Problemlösungspotenzial ein. Weiterbildung der Mitarbeiter und eine Verbesserung der lokalen Agrarausbildung werden benötigt, um das Niveau der wissenschaftlichen Ausbildung anzuheben.

Die Untersuchung von vier Projekten zeigte, dass diese als Plattformen gut zur Innovationsentwicklung und eingeschränkt zu deren Verbreitung geeignet waren. Eine ausgewogene Beteiligung aller Akteure zeichnete die erfolgreichste Plattform aus. Als Stärken des Plattformmodells konnten festgehalten werden: bessere Koordination, verbesserte Verbindungen und Schnittstellen, bessere Zusammenarbeit aller Akteure, bessere Aussichten gesetzte Ziele zu erreichen, Vermeidung von Doppelforschung und eine effiziente Ausnutzung der vorhandenen Ressourcen. Schwächen des Modells wurden in folgenden Punkten gesehen: Konsenserzielung, institutionelle Akzeptanz und Mangel an entsprechend ausgebildeten Fachkräften im Ministerium.

Drei Jahre nach Beginn der Trainingsmaßnahmen konnte eine teilweise Institutionalisierung von partizipativen Methoden im Ministerium festgestellt werden. Zur weiteren Konsolidierung partizipativer Methoden und Plattformen wird eine Linkage-Abteilung empfohlen.

Acknowledgements

This work was funded by the European Union (EU) through a contract for the Pacific Regional Agricultural Programme (PRAP). Without that support, this work would not have been possible. Among my former colleagues at the EU Delegation, I would like to thank in particular the Economic Advisors Gary Quince, Roberto Rensi, and the Delegate Gerd Jarchow.

I am grateful to my supervising Prof. Dr. Uwe Jens Nagel in Berlin for his tremendous support throughout all research phases. Without his interest, patience, consistency and expertise this work would not have been completed in time.

In Giessen, I wish to thank my other supervisor, PD Dr. Andreas Nebelung. I will remember him for his creative feedback and for reaching better understanding of soft systems viewpoints.

Many people at Fiji MAFF supported the work whom I would like to thank very much. I would like to express my special thanks to the Director of Research Dr. Jay Kumar, the Director of Extension Samisoni Ulitu, and the Senior Economic Planner, Paula Taukei. The joint workshops and interim result discussions will be particularly remembered. I am particularly indebted to the PRA research team members Anare Macedru, Ilimeleki Kaiyanuyanu, Satya Bahn Singh and Esala Naerecoko for all their tremendous efforts and contributions during the field work.

Many thanks also go to my former colleagues at PRAP. Here, I would like to mention first the Programe Co-ordinators Brian Smith and Aleki Sisifa. In the PRAP team I will always remember Dr. Steve Rogers for his constructive reviews and long evenings in Suva. Equally, I thank Dr Steve Preston for his many comments and the enriching days in Sigatoka. Dr Mecki Kronen I thank for all her time, energetic support, and feedback, and Veronika Schwanz for the many comments and updates via email.

Among the experts at Koronivia Research Station, I always enjoyed the good informal co-operation with Simon Fielding and Tony Dowling from SCEP, and Dr. David Howling from IBSRAM.

Last but not least, I wish to express my gratitude to all farmers for their warm hospitality and lively contributions during the PRA activities. Although this study is of no direct use to them, I hope further use of the methodologies and platforms suggested will enhance joint learning and enable them to improve their livelihoods in the future.

VINAKA VAKA LEVU.

Grüningen, January 2001, Lorenz Bachmann

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List of Abbreviations

ACP	African Caribbean Pacific Countries
ADB	Asian Development Bank
AEA	Agro-ecosystem Analysis
AH&P	Animal Health and Production
AKIS	Agricultural Knowledge and Information System
AKS	Agricultural Knowledge System
ALTA	Agricultural Landlords and Tenants Act
APR	Activist Participatory Research
APSA	Asia and Pacific Seed Association
ATO	Agricultural Technical Officer
CDF	Commodity Development Framework
CIM	Zentrum für internationale Migration
DED	Deutscher Entwicklungs Dienst
ED	Extension Division
EP&S	Economic Planning and Statistics Section
EU	European Union
FAO	Food and Agriculture Organisation (UN)
FCA	Fiji College of Agriculture
FFMH	Fiji Farm Management Handbook
FJD	Fiji Dollar
FSR	Farming Systems Research
GATT	General Agreement on Tariffs and Trade
GTZ	Gesellschaft für Technische Zusammenarbeit
IBSRAM	International Board for Soil Research and Management
IRETA	Institute for Research, Extension, Training in Agriculture
KIS	Knowledge Information System
M.o.I.	Ministry of Information
MAFF	Ministry of Agriculture, Fisheries, Forests
MAFFA	Ministry of Agriculture, Fisheries, Forests and Alta
MPI	Ministry of Primary Industries
NAES	National Agricultural Extension Systems
NARES	National Agricultural Research and Extension Systems

NARS	National Agricultural Research Systems
ODI	Overseas Development Institute
PAO	Principal Agricultural Officer
PICs	Pacific Island Countries
PLA	Participatory Learning Approaches
PRA	Participatory Rural Appraisal
PRAP	Pacific Regional Agricultural Programme
PS	Permanent Secretary
RAB	Regional Advisory Board
RD	Research Division
RRA	Rapid Rural Appraisal
(S)AA	(Senior) Agricultural Assistant
(S)AO	(Senior) Agricultural Officer
(S)RO	(Senior) Research Officer
(S)TA	(Senior) Technical Assistant
SCEP	Soil and Crop Evaluation Project
SMS	Subject Matter Specialist
SPC	South Pacific Commission
SSM	Soft Systems Methodology
SVRDP	Sigatoka Valley Rural Development Programme
T&V	Training and Visit System
TC&S	Training and Communication Section
TOT	Transfer of Technology
USP	University of the South Pacific

Es geht uns alten Europäern übrigens mehr oder weniger allen herzlich schlecht;
unsere Zustände sind viel zu künstlich und kompliziert,
unsere Nahrung und Lebensweise ohne die Rechte Natur,
und unser geselliger Verkehr ohne eigentliche Liebe und Wohlwollen ...

Man sollte oft wünschen, auf einer Südseeinsel als sogenannter Wilder geboren zu sein,
um nur einmal das Dasein, ohne falschen Beigeschmack, durchaus rein zu genießen.

Johann Wolfgang Goethe[1]

1 Problem definition and research purpose

1.1 Background of the study

From November 1992 until October 1994, the researcher worked in the Delegation of the European Communities for the South Pacific in Suva, Fiji. The Delegation co-ordinates all development efforts of the European Union (EU) for all ACP[2] member states in the region.

As a Delegation staff member, duties involved focused on the macro economic analysis of the potentials and performance of the member countries. Within the sectors of agriculture and environment, duties centred on two regional programs: Pacific Plant Protection Program (PPP) and Pacific Regional Agricultural Program (PRAP). The latter Program provided the framework for this research study.

The program focused on applied agricultural research: farming systems, new sweet potato cultivars, coconut hybrids, biological control of the taro beetle and vegetable seeds. Furthermore it provided a number of research services: biometric service, tissue culture service, agricultural information service. The program ended in 1994 and a review process went underway to determine new priorities for the second phase. Some of the key questions were:

How can these donors' funds be spent most effectively?

What can be done to avoid research findings ending up sitting on office shelves and not being utilised?

What needs to be done to ensure that farmers will adopt the new technology developed?

Priorities for the new phase were set on the finalisation of ongoing research activities and the transfer of resulting innovations to farmers. To support the linkage function between research and extension, an additional component was included into PRAP II. The purpose of this project (P11) was to improve the organisational structure of the National Agricultural Research and Extension Systems (NARS/ NAES), to enhance the management abilities and to improve interaction with farmers.

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[1] Quoted in: RITZ (1983, 11).

[2] Africa, Caribbean, Pacific (ACP). Pacific ACP member states are: Fiji, Kiribati, Papua New Guinea, Solomon Islands, Tonga, Tuvalu, Vanuatu, and Western Samoa.

The PRAP programme provided a good forum for discussion with other experts that helped to guide the research progress. Furthermore, two projects of the programme provided the data for case studies reviewed in this thesis. Finally, PRAP P11 provided the funds and logistical support for the field research of this study.

1.2 Fiji, a small Island Nation struggling to face the challenges of globalisation

With a GNP per capita of US $ 2,130, Fiji is the largest and most developed of the Pacific Island countries and may be classified as a lower middle income country. While Fiji is restricted with geographic remoteness, small domestic markets, and vulnerability to extreme weather changes, its constraints are not as severe as those of smaller Pacific Island nations. Due to its central location and its relatively well developed social and economic infrastructure, particularly in transport, education, and communications, Fiji serves as a regional hub for the smaller Pacific economies. A number of important regional organisations, such as the South Pacific Forum Secretariat and the University of the South Pacific, are located in its capital, Suva (WORLD BANK 1995, 187).

When looking at the major sectors of the Fijian economy, the agricultural sector is the single most important one. It contributed, on average, about one fifth of the national GDP. The backbone of the agricultural sector is the sugar industry which generates 90 % of all agricultural exports and provided 47 % of all employment (ASIAN DEVELOPMENT BANK 1991, 12).

The exclusive dependence on one single export crop makes the sector very vulnerable. Variations in crop yield due to climatic factors combined with fluctuating world market prices lead to an alteration of the share of GDP ranging from 18 to 24 %. Attempts to diversify production into a wider range of agricultural commodities have not been very successful to date.

A look at annual growth rates of GDP[3] indicates that agriculture is losing importance. In the ten year period from 1977 to 1987, growth rates in the agricultural sector still reached 8.7 % which slightly outperformed growth in the industry and trade (7.1 %), tourism and other sectors (8.5 %). However, in the following 5 years, agricultural growth dropped to only 4.4 %, while the other sectors picked up these lost gains.

The main reason for declining growth in the agricultural sector lies in the poor productivity development in the sugar industry. In the past, agricultural growth was mainly brought about by an increase of land under sugarcane production. Cane yields are stagnating or even on a downward trend. Since the mid eighties all suitable land has been under cane production and land is getting increasingly scarce. Production is moving more and more into marginal, steep and hilly soils. Fading production increases of sugar and the lack of successful other agricultural export commodities explain the declining growth rates in the agricultural sector.

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[3] Own calculations based on STATISTISCHES BUNDESAMT 1988, 113; STATISTISCHES BUNDESAMT 1995; IMF 1995, 368.

In a Fiji times article, GRYNBERG (1993) was one of the firsts to see "*...bad dreams coming. Sugar industry reforms must start now.*" The crucial point is that Fiji sells about half of its sugar production to Europe as part of a guaranteed quota fixed in the sugar protocol attached to the Lomé Convention. The received price is linked to the sugar price paid to European farmers and, thus, about twice as high as the world market price. With the conclusion of the General Agreement on Tariffs and Trade in 1994 (GATT) and the following trade liberalisation, direct price subsidy levels for several European agricultural commodities, including sugar will be reduced significantly.

Considering these early warning signs, Fiji's reaction to these challenges has been hesitant. In 1994 Lincoln International, a consultancy company, reviewed the competitiveness of major agricultural commodities. The analysis showed that Fiji producers were not competitive for a number of commodities. The risks of deregulation for most commodities were considered as low, however, opportunities for agricultural growth in the medium term, with a policy of export led growth, were seen as unlikely. Rather the contrary was expected, as the few agricultural commodities with potential (root crops, yaqona, fruit and vegetables) cannot fill the gap likely to occur through losses in the main traditional commodities: mainly sugar but also copra, cocoa and ginger (WOODWARD, K. 1994, 18).

Another difficulty is that Fiji has to compete with its close neighbours, New Zealand and Australia. Both of which have a particularly liberalised and competitive agriculture.

Despite these critical points, the WORLD BANK (1995, 189) still saw Fiji's development opportunities as very optimistic and estimated a real GDP growth of 3.7 to 4.9 % in the period from 1995 to 2002. As an important precondition, the bank assumed that agricultural restructuring would raise agricultural growth and non-sugar exports.

Reality evolved quite differently. In 1998, the country was hit not only by the severest drought in 30 years, but also the market turbulence due to the Asia crisis. Cane production dropped to only about 60% of an average year and the economy went into a recession with a GDP of –4% (MINISTRY OF INFORMATION 1998).

This poor economic performance was certainly one of the main reasons for a change of Government in 1999. The new Prime Minister seems to have understood the seriousness of matter. Addressing the sixth ACP Ministerial Conference on Sugar, the Prime Minister, Mahendra Chaudhry, stressed the need for ACP countries to work together on a common position and to protect the ACP sugar market in the Multilateral Trading System (MTS). These new negotiations include a successor agreement to the Lomé Convention, the new round of WTO negotiations on the Agreement on Agriculture and negotiations on the Special Preferential Sugar Agreement (SPSA) that will expire in 2001 (MINISTRY OF INFORMATION 1999).

Regarding the consequences of world trade liberalisation, a small country like Fiji certainly has no other alternative than to adapt its economy to the new global challenges. In the agricultural sector this will require a strong structural change in its sugar industry.

At the same time, a diversification into other agricultural commodities is urgently required. To achieve diversification, one precondition is efficient agricultural research and extension services that develop innovations and enable farmers to adapt. However, the

efficiency of these services, which are part of the Ministry of Agriculture, Fisheries, Forests (MAFF), is very limited.

Some of the major problems are:

- Farmers' real problems: their needs, production constraints, attitudes and preferences are not known.
- The Research Division produces only a very small output of recommendations. Co-operation with extension is weak and research findings are not well transmitted.
- The promotion of recommendations by extension is faced with farmers' reluctance to adopt these new technologies. Reasons for non-adoption are not known.

The few problems listed illustrate some of the major problems. This study attempts to address some of these problems in order to improve the chances for the Ministry to make progress towards a real diversification of agricultural production in the medium to long term. Considering this significant challenge, it is evident that a single study can only represent a first step in that direction.

1.3 Research design

1.3.1 Research objectives and research questions

The goal of this study is to contribute some findings towards solving a number of problems that affect agriculture in Fiji. A division is made between problems at the policy level and problems that are felt at the farmers' level. The policy problem, due to world trade negotiations (GATT) combined with a low international competitiveness of Fiji's national agricultural sector, is the falling price trend for sugar as a main commodity. This problem of a strong dependency on only a single commodity is particularly serious, because the process of diversification of the agricultural sector stagnates. On the farmers' level these overall problems result in low agricultural farm incomes and standard of living.

The overall objective of this study should be seen in a developmental context. It aims to increase the output and adoption of viable innovations to engage in a sound process of agricultural diversification in order to improve the competitiveness of the sector and, in turn, also farmers' incomes and standard of living. Thus, the overall objective is directed towards solving the above policy and farmer problems. It is clear that this objective will not be easy to achieve, and the current study can only contribute one of many puzzle pieces necessary, in reaching that goal.

The central research problem to be addressed by this study is the limited output of useful innovations by research and the difficulty of extension to disseminate recommendations and promote adoption through farmers[4]. Table 1 summarises the overall research design.

[4] An independent study commissioned by the Regional Advisory Board for agriculture (RAB) equally diagnosed this problem for NARS and NAES in Fiji and a few of the other Pacific Island countries (cf. KERN 1994).

Table 1: Research design

Policy level problem	Falling price trend for sugar as main commodity due to world trade negotiations (GATT) combined with a low international competitiveness of the national agricultural sector. Stagnating process of diversification in the agricultural sector.
Farm level problem	Low agricultural farm incomes and standard of living.
Overall development objective	Increase the output and adoption of viable innovations to engage in a sound process of agricultural diversification in order to improve the competitiveness of the sector and in turn also farmers' incomes and standard of living.
Research problem	Limited output of useful innovations by research and difficulty of extension to disseminate recommendations and promote adoption through farmers.
Specific objectives	Identify ways to make farming problems the subject of agricultural innovation development. Identify constraints for an efficient service of agricultural research and extension to farmers. Analyse the potential role for participatory methods in such a system for innovation development, diffusion and adoption. Identify all actors involved in agricultural innovation, diffusion and adoption and assess how these actors may be integrated in a system to improve performance.

The enquiry is structured into four main research topics. Around each research topic, a number of research questions are grouped.

RT 1 The first research topic focuses on the role of farmers, their problems and interaction with the Ministry of Agriculture (MAFF):

1.1 How can farmers' problems be integrated in the innovation development process?

1.2 How does information exchange between farmers and the MAFF take place?

RT 2 The second research topic examines MAFF's organisation and performance:

2.1 What are the main constraints for an efficient functioning of agricultural research and extension?

2.2 How successful is the MAFF in promoting agricultural innovation?

RT 3 The third research topic focuses on the potential role of participatory methods to improve the process of innovation development and diffusion:

3.1 What role can participatory methods play in the process of innovation development, diffusion and adoption?

3.2 What problems occur during the introduction of participatory methods at MAFF?

RT 4 The fourth research topic attempts to view reality from a wider systems perspective and assesses the role and function of various actors:

4.1 Besides farmers, researchers and extensionists, what other actors play a role in innovation development, diffusion and adoption?

4.2 What organisational set-up is necessary to improve linkages and collaboration between all important actors in innovation development, diffusion and adoption?

These research questions formed the basis of the research study. They were not intended to be seen as a final set of questions that were kept fixed and unchangeable for the entire research phase. In the contrary, they were considered as a starting point for the investigation. Whenever new insights were gained and it appeared useful they were modified or additional questions were taken up.

1.3.2 Working hypotheses

A set of working hypotheses were formulated to support the four main research topics presented above. These were used to help understand and guide the direction and rationale of the research project.

The working hypotheses assisted steering the practical fieldwork and further stimulated the analysis and discussion for this study. Not all hypotheses were formulated at the beginning of the research work, but were developed gradually throughout the process of the research study as new insights emerged.

The validity of these working hypotheses is reviewed in the context of the respective research questions. To enable direct access to this information, references to the respective chapters and pages is given in brackets at the end of each hypothesis.

The working hypotheses (H1 to H 8) are numbered and structured according to the four main research topics. The hypotheses are presented below, and where deemed necessary, some additional justification is given:

RT 1 Farmers' problems and interaction with MAFF

H 1 In small island countries farmers' problems can be addressed comprehensively and in a comparatively short time (chapter 5.5.3, p. 116).

H 2 Analysis of farmers' problems will help to develop sound extension and research priorities (chapter 5.5.3, p. 116).

Experience in many African countries that cover huge areas and large populations have shown that farmers problems can be very diverse and that it is difficult to structure and prioritise their problems. In the Pacific, with its very small island states and comparatively tiny populations, the task appeared easier. This led to the formulation of H 1.

RT 2 MAFF organisation and performance

H 3 Lack of funding or strong fluctuations in funding are a major reason for low output and adoption of innovations (chapters 5.3.6 p. 85 and 5.4.4 p. 97).

H 4 A critical mass of well-educated staff is a prerequisite for effective development of innovation and their dissemination to farmers (chapters 5.3.6. p. 85 and 5.4.4 p. 97).

First discussions with MAFF staff indicated that the Ministry had both periods with an abundance of funds and periods with shortage of funds. The output of innovations did not seem to depend on the amount of funds available. Considering these comments, and the

fact that innovation development is often a long term process, led to the formulation of H 4.

RT 3 Potential of participatory methods

Since the early 1990s a vivid discussion in literature reported about the advantages and successes of participatory methods in many development countries. This lay the ground for testing participatory methods in Fiji. Assuming a similar potential of participatory methods in Fiji, the following hypotheses were formulated:

H 5 Participatory methods are rather easy tools that can be learned quickly (chapter 6.2.4.2, p. 157).

H 6 Linkage problems within small organisations may be overcome by supporting participatory methods to promote informal modes of communication and co-operation. These informal modes may bypass existing institutional or hierarchical barriers (chapter 6.4.1, p. 138).

The last hypothesis was formulated in particular in respect of small organisations. It was assumed that in such small organisational settings such as Fiji MAFF, informal modes of communication and co-operation could play a substantial role to facilitate innovation development. In larger organisations such an impact of participatory methods would appear unlikely.

RT 4 Systems perspective and role of actors

ENGEL 1995[5] investigated several national agricultural research and extension systems and made recommendations for effective types of actor configurations and modes of co-operation. Some of these findings were formulated into hypotheses to test their validity for Fiji.

H 7 Good co-operation of several actors may be achieved by small networks or platforms. Such platforms will enhance system output in terms of useful innovations (chapter 6.3.5, p. 171).

H 8 Platform[6] creation is enhanced through donor assistance or existence of good export opportunities (chapter 6.3.5, p. 171).

1.4 Organisation of the study

The previous sections of this chapter examined the core problem of promoting agricultural innovations and diversifying agricultural production in Fiji. This builds the basis for the research design of this study.

The theoretical concept of this study is presented in the second chapter. The concept of agricultural knowledge systems is used, as the theory enables statements on agricultural innovation and diffusion processes. The progress in knowledge systems thinking from earlier systems including farmers, researchers and extensionists, to more complex systems

[5] ENGEL's theoretical and practical considerations are reviewed in detail in chapter 2.

[6] The definitions of the terms platform, system and innovation as used in this thesis are given in chapter 2.

with multi-actor configurations is reviewed. The later systems are modified to formulate a platform model, that is then related to Fiji as a case study.

The methodological framework of the study is explained in the third chapter. A participatory action research (PAR) methodology was used, as this enables a step-by-step exploration of the subject. The research activities are presented in chronological order and special reference is given to the methods of investigation which included several PRA tools, observation, informal interviews, workshops and a formal questionnaire.

Basic facts on Fiji and the country's agricultural sector are outlined in chapter four. The main production conditions and trends are described. This serves as an introduction to the main subject. A look at the productivity development for a number of crop reviews, the countries past efforts to develop innovations and diversify agricultural production.

Chapter five deals with the analysis of the Fiji agricultural knowledge system. After an overview of all major institutions and organisations in the country, the Ministry of Agriculture is reviewed in detail. The focuses of the investigation are the divisions of research and extension. Then farmers' problems, their needs and preferences are analysed. Consequently, a model of how farmers problems can be used systematically in the knowledge system is elaborated. Linkage and information flow problems within the Ministry and other actors are discussed in the last section.

Approaches to improve the agricultural knowledge system are examined in chapter six. Firstly, an overview of the strategies of various donor projects is provided. A central element here is the introduction of participatory methods into research and extension. Potentials and difficulties of introducing participatory methods are discussed using the example of a training course on the subject. Four case studies of projects are used to compare different approaches for innovation development and diffusion. In addition, the role of projects as platforms is examined closely. Lastly, the question to which extent platforms could assist the process of innovation development and diffusion in Fiji is discussed with Ministry staff of all divisions and project experts.

The main results, the conclusions and recommendations derived, are summarised in chapter seven. Specific attention is given to the path of further institutionalisation of participatory methods. Management implications and necessary steps of organisational reorientation are reviewed. Some areas that merit donor support or future research are highlighted.

English and German summaries of the study are provided in the last chapter.

2 Theory review: Agricultural Innovation and Agricultural Knowledge Systems

Any theory can only reflect a part of reality. Depending on the viewpoint, the theory will explain certain aspects very well and fail to explain others. Conceiving a theory only as a perspective on reality, it becomes clear that the perspective 'looking at the front of the house' can describe the front very well, but it will fail to tell anything about the back of the house and information about the inside will be limited to what can be seen through the front windows.

In this sense, the researcher's intention is not to create a new theory about innovation in agricultural development. Instead, attention is drawn to the possibility to examine reality through several windows (theories) and to combine the findings to form a new understanding. In practice a selection of important theories will be examined. By reviewing their specific strengths and weaknesses, it will be shown what these theories have to offer to interpret innovation and change in agriculture. The underlying assumption is that such multiple perspectives are a better means to interpret the complex processes of development than single positivist[7] models.

This chapter begins with a look at a selection of older and newer theories of agricultural innovation. The main part of this chapter consists of a detailed review of agricultural knowledge systems.

2.1 Comparison of innovation theories

A comprehensive review of innovation theories would be outside the scope of this thesis. Instead, a selection of three theories and their relevancy within the agricultural development process will be examined closer.

Articulated first in the sixties and early seventies by Rogers and others, the 'diffusion of innovations model' is probably among the best known concepts. ROGERS AND SHOEMAKER (1971, 19) define an innovation as:

> *"... an idea practice or object perceived as new by an individual. It matters little, so far as human behaviour is concerned, whether or not an idea is 'objectively' new as measured by the lapse of time since its first use or discovery. It is the perceived or subjective newness of the idea for the individual that determines his reaction to it. If the idea seems new to the individual, it is an innovation."*

In this context social change is understood as a process including three sequential stages: invention, diffusion and consequences (ROGERS AND SHOEMAKER 1971, 38). Technical

[7] Constructivist and positivist viewpoints are compared in chapter 2.2.2.

change in agriculture is consequently understood as the result of the adoption of technical innovations by farmers. Scientific research is seen as the source of such innovations[8].

CHRISTOPLOS and NITSCH (1996, 28) review the diffusion model and describe *adopter categories, adoption process* and *characteristics of innovation* as the three main elements:

The *Adopter categories* classify farmers according to the rate of adoption of a new technology or practise. The first adopters are called innovators. They are followed by early adapters, early majority, late majority and laggards. The categories are associated with certain characteristics. Innovators are presumed to be venturesome, the late majority sceptical and laggards traditional. Earlier adopters are expected to have more education, higher social status and larger and more specialised farms. They are further considered as less dogmatic, less fatalistic, more rational and achievement oriented, and to hold a more favourable attitude toward credit, change, risk, education and science. Furthermore, they participate more in farmer organisations, are more cosmopolitan, have more contacts with outsiders, are aware of new recommendations and exert influence on local opinion. Late adopters on the other hand are characterised as being negative to change, risk and science, and as having little contact with extension services. Several extension methods, in particular the training and visit system (T&V)[9] are implicitly based on the diffusion model, recommend choosing contact farmers in the categories of innovators and early adopters which are sometimes titled as progressive, outstanding or model farmers.

The *adoption process* describes the stages an individual goes through from the first exposure to an innovation to actually adopting it. The model distinguishes five stages: Awareness stage, interest stage, evaluation stage, trial stage and adoption stage.

Difference in speed of adoption are explained by five *characteristics of innovation*:

1. **Relative advantage**: the degree to which an innovation is perceived as better than the idea it supersedes.
2. **Compatibility**: the degree to which an innovation is perceived as consistent with the existing values, past experiences and needs of the receivers.
3. **Complexity**: the degree to which an innovation is perceived as relatively difficult to understand and use.
4. **Trialability**: the degree to which an innovation may be experimented with on a limited basis.
5. **Observability**: the degree to which the results of an innovation are visible to others.

The diffusion model and in particular its practical applications as part of the T&V system or the transfer of technology has been criticised by various authors (cf. RÖLING 1988a, 207; ENGEL 1995, 145).

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[8] 'Transfer of technology' (TOT) is a synonym used in much of the development literature (cf. CHAMBERS et al. 1989; RÖLING 1990) to describe these 'linear' development steps based on the diffusion model.

[9] cf. The training and visit system by BENOR and BAXTOR 1977 in the original form and as a revised version by the same authors BENOR and BAXTOR 1984. A recent critical review if the approach at the example of TV system in Benin is found in LÜHE 1996.

One of the major deficiencies of the model is that the stage of technology generation is omitted in the model. It assumes that a chosen technology[10] is appropriate. If a farmer applies a technology in the correct way, all unfavourable factors (diseases, weather, environment) are expected to be mitigated. The key assumption is that these negative factors can be controlled by proper farm management. However, unlike the conditions in industrial countries where the diffusion model was first developed, farmers in rainfed marginal areas of development countries generally do not have the means to control their environment. They have to adapt their choice of technologies to rapidly changing agro-ecological and socio-economic conditions. "*If the rains are late, if the local shop runs out of fertiliser, or if the children become sick and medical expenses are such that the family can no longer afford to buy the recommended inputs, farmers may have to totally change their plans. Such changes do not fit in the planning framework embodied in the diffusion model"* (CHRISTOPLOS and NITSCH 1996, 31).

Another major flaw of the model is its strong sender perspective that tends to promote elitist tendencies. The characterisation of farmers in the late adopter groups as negative to change, risk and science makes them appear as irrational. Adoption is considered the only rational behaviour. Consequently, extensionists are guided to explain non-adoption as farmer deficiency. "*We know what is best for them. It is our task to help them and become knowledgeable." The diffusion model is thus impregnated with a strong pro-change, pro-innovation and pro-technology biases that encourage its users to develop an elitist attitude towards their target groups"* (CHRISTOPLOS and NITSCH 1996, 32).

Considering this heavy critique, one might ask why the model is presented here again. One reason is that the model is still used in many development countries including Fiji[11]. However, critical revisions of the concept are rare. Learning from the above critique, it becomes evident that it is important that 'adoption studies' are required already as part of the technology generation process to ensure that a technology is appropriate. Furthermore, a new technology's capital requirements and scale of production needs to be assessed in

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[10] The term technology itself requires further definition. The term technology is often used as synonym with technical item, technique or (less often) practice. According to the German encyclopaedia (BROCKHAUS-ENZYKLOPÄDIE 1993, 672) the meaning of technology in the 19th century referred to the science of the development of technics. Today the term includes the totality of knowledge, ability and possibilities of a technical sector. Problems may arise as many people use and understand the term only in a more narrow sense as technique or some technical item. Two examples shall be used to illustrate the problem: If a person buys a radio, this may at first appear as all he/she needs to do in order to use it. However, the technology radio implies more. To use the technology radio it is equally important to have electricity to run it and furthermore the existence of radio stations and their programmes are necessary to listen to the radio. The later requirements are often taken for granted. If a farmer wants to use the technology fertiliser it may at first sight appear as simple as distributing the material on his field. But technology implies more. To use the technology fertiliser, fertiliser factories and distribution centres are required outside the farm. The farmer furthermore needs means of transport to the farm, a fertiliser castor (optional) and a crop variety that responds to fertiliser. In all cases knowledge to apply and use the technology are required. These examples illustrate that 'transfer of technology' may be a difficult job. In agriculture, some of these problems can be avoided if the search for innovations is focused on simple practices, instead of technologies. BLUM (1991, 323) points at a number of practices that may have enormous impact: changes in crop rotation, timing of sowing, renunciation of harmful activities such as burning or overgrazing.

[11] The model is also included in a training manual for staff of plant protection services in Fiji and other South Pacific nations cf. SPC-GTZ (1993, 350).

order to estimate for which group of farmers it might be suitable. Thus, in many cases a diffusion of a certain technology can only be expected to reach a certain specified group of users. Innovations that fit all farmers are rare exceptions. A good monitoring system of extension activities should consequently always be combined with research into the adoption and diffusion processes. For Fiji, experimentation with different farmers groups and different types of technology could show which groups qualify best (or if at all) as 'model farmers' to promote extension efforts. This could provide insights into how adopter attributes could be redefined. In this modified way, diffusion thinking could still contribute ideas for organising extension work. That is the main reason why the model is taken up here again.

Another tradition of innovation research is that of 'induced innovation'. "*Farmers are induced, by shifts in relative prices, to search for technical alternatives that save the increasingly scarce factor of production* (HAYAMI and RUTTAN 1985, 88)". The model, however, does not consider technical change as entirely of an induced character. All actors such as farmers, scientists and planners etc. play active roles in responding to exogenous (supply) and endogenous (demand) factors and taking part in the general progress of science and technology. Consequently, the model defines technical change as "... *any change in production coefficients resulting from the purposeful resource-using activity directed to the development of new knowledge embodied in designs, materials and organisations"* (HAYAMI and RUTTAN 1985, 86).

The induced innovation school points at the importance of the economically scarce factor for directing innovation processes. It makes clear that innovation processes have to be seen in their specific social and economic context. Innovations have to be economically feasible and reward the user with an economic advantage. Economics have to be seen as a cornerstone of development and innovation processes. However, the tradition also has its limitations. In subsistence agriculture, many decisions can not be determined in monetary terms. Hence farmers do not always behave according to economic rationality and environmental factors all too often remain unconsidered.

A third, recent school of thought, ENGEL (1995, 146) labels "*the network tradition"*.

Analysing innovation processes in larger industries, MOSS-KANTER (1989) looks at types of co-operations between companies. *Pooling, allying* and *linking* (PAL) between companies, is recognised as an important strategy to generate innovation and improve competitiveness. This can also be observed in agriculture, where networking is becoming very popular in recent years. Many organisations and NGOs (AGRECOL, IIED, ILEIA, ITDG, IBSRAM just to name a few) are active around the globe trying to exchange information and cooperate in various fields. ENGEL (1995, 147) describes the essence of the network tradition as follows:

> *"It concentrates upon all social interactions relevant to agricultural innovation at a particular point in time within a specific social, economical and ecological context. It assumes that in any given situation a multiplicity of social actors develop and mange interactive relationships in order to improve their practises and develop new ones. The reason that these actors engage in such relationships is perceived interdependence: each is perceived as holding some of the keys to the others' projects."*

Networks, thus, build on the different specialised skills that result from the division of labour in agriculture and surrounding sectors. A concept on how these network relations function is proposed by GREMMEN (1993) with his 'interplay model': practices[12] evolve autonomously in interaction of different social actors. Each can be seen as a competent performance, constraint only by its own defining and rules that emerge by experience. These rules are subject to continues revision by social interaction of the participants in a practice. Knowing as an activity rather than knowledge is crucial. "*The central claim of the interplay model is that improvement is primarily an internal achievement of practices themselves. External influences can speed up or slow down the indigenous improvements of a practice"* (GREMMEN 1993, 159). Open inter-action between practises must be seen as an external influence on practices. These influences are generally not directed only one-way. In this sense innovation in practices is a result of interaction in practises and not to be seen as a discovery process of only one practise such as science. "*Science is often, and mistakenly, seen as the ideal way of advancing knowledge*". In the contrary different practises such as science and technology may be seen as "*enmeshed in a symbiontic relationship ... science as one context of inventive activity"*(GREMMEN, 1993, 116 and 140).

Comparing the three schools of thought (diffusion, induced innovation, networks), all hold some valuable ideas to characterise innovation processes. Therefore, none of the traditions should be discarded, but rather integrated in a more comprehensive conceptualisation of innovation as a result of social processes. In this respect, the network approach appears as a suitable basis for further elaboration.

Analysing various social networks, ENGEL (1995, 112) identifies five basic configurations of networks with different leadership as the driving force of innovation:

- Industry driven configurations
- Policy driven configurations
- Farmer driven configurations
- Research and development driven configurations
- Donor driven configurations

Industry driven configurations

If the market place is the ultimate place where success or failure of agricultural innovation is determined, those social actors who control the marketing or processing of produce lead ahead: marketing boards, traders, retail or food chains. Co-ordination between key actors on the work floor is achieved through co-operative agreements and/or commercial contracts. Innovations are promoted which increase the profit margins of the participants in the product chain. This does not necessarily imply an increase of profitability at farm level: innovation may be required to improve logistics for collecting of produce (e.g. milk collection tanks) or to comply with international standards. Participating farmers are not necessarily large scale or rich, but often some commercial outlook is required. The number of farmers is determined by the market share of leading actors and the current level of on-farm productivity. Increasing the latter is the often the preferred strategy to

[12] GREMMEN understands professional activities just as farmers activities as practises.

increasing the number of producers. Common is that farmers are given production contracts. Generally, agro-commercial establishments actively take part in the transfer of technologies. Research is organised in commodity research programmes. Extension is likewise commodity oriented. Emphasis is laid on the development of appropriate packages. Research and extension services are (partly) company owned and financed in relation or indexed to market sales. Quantities and qualities, on the (world) market, are the main controlling forces, which lead to the development of production oriented technologies and a standardisation of agricultural produce. Competition leads to increasing specialisation of agriculture in sectors and sub sectors (e.g. dairy, cotton coffee, etc.). Even more sophisticated patterns evolve in production chains with specific markets. Market orientation is the strong point of these configurations, while a lack of sensitivity to social differentiation and long term ecological deterioration are often observed as associated negative symptoms.

Policy driven configurations

Where national Government directs the course of innovation, one may speak of a policy led configuration. In such cases, generally, the Government is the main source of finance for research and extension. Commercial or non-governmental actors are relatively weak. The Government imposes its leadership through the implementation of its policies and development projects and programmes. In this role, Governments may be supported to a variable extent by external donors. Technologies are extended via demonstration farmers to the rural constituency. Co-ordination between core actors (e.g. Ministry of Planning, Ministry of Agriculture, etc.) is achieved via the existing hierarchical structures and policies: planning and project approval procedures, technology certification procedures, official mandates of (semi-) government institutions, bureaucratise procedures for budget negotiations, allocation of resources, monitoring and control mechanisms. Industrial actors generally play a secondary role in such configurations. If technologies are believed to be available 'on the shelf' and farmers only need to be trained to use them, research may play a minor role by being bypassed, while technologies are promoted via extension services directly . The resulting configuration is characterised by a rigid definition of tasks and limited flexibility. Just like market led innovation, policy led innovation may contribute to social differentiation. However, focus upon national priorities may also include goals such as social welfare and equity or ecological sustainability. Strong point of the configuration is the high sensitivity to policies, while bureaucracy and inefficient use of resources are often reported as a weak point.

Farmer driven configurations

Here, the relationships between farmers' leaders, farmers' organisations and agricultural policy makers are dominant. However, most case study evidence of ISNAR studies reveal a lack of farmer influence rather than a dominant position. Strong farmer driven configurations seem to be most frequent alongside well developed cash crop industries (e.g. coffee in Columbia, cf. KAIMOWITZ 1989). Farmers are organised via unions, co-operatives, associations or other functional groups. Co-ordination between actors is probably achieved by standardisation of interests: farmers' organisations articulate their needs at different levels, and if possible, influence other actors (e.g. research and extension) to adjust their activities accordingly. The problems associated with (mostly) farmer driven configurations lie in the organisations themselves, their capacity to

effectively make decisions on technology development, their relationships with rank-and-file membership and their representativeness in respect of the variety of farmers' interests.

Research and development driven configurations

Here, the course of innovation is within the hands of national and/or international research institutes. Research institutes generally have a relatively free hand to determine their priorities, research approach and the way they co-ordinate with other actors to disseminate results. Two main currents of work may be distinguished: technology push and technology development. The former is geared towards compilation ready-to-disseminate packages to be transferred by extension following the 'linear model'. In the later, no easy replicability of technological packages is assumed, but the need for local design and adaptation to suit local conditions and resource base of farmers is stressed.

Co-ordination of tasks in research and development led innovation configurations is based on a standardisation of skills and is rooted in the definition of what a competent researcher does: his or her prior qualifications, the accepted research approach (on-farm, on-station, FSR etc.), accepted research protocols (plot designs, data collection methods; etc.) and the type of results expected (new varieties, practical recommendations, etc.). Staff recruitment and training are the institutes most important instruments to maintain the quality of innovative performance. A strong point of research and development driven configurations is their potential to develop 'tailor-made' specific technologies that fit the needs of specific groups of farmers. Its weakness lies in the replicability of results, while appropriate technological solutions are developed only small scale, the wider application fails or lags behind.

Donor driven configurations

Foreign or national donor agencies, agricultural projects and demonstration farmers are the core actors in donor driven configurations. Agricultural projects serve as 'temporary support structures' to ensure that donor policies are safeguarded and implemented. Donor policies and approaches vary widely. Some donors stress the importance of flexibility and mutual adjustment, while others insist on standardisation of all tasks and strict administrative control. In order to achieve results in a short period of time, task-orientation is commonly used. Generally, donor projects have sufficient freedom to identify a suitable approach to deal with the existing problems. However, a major problem of sustainability for the partner organisations arises when the projects are terminated and funds stop to flow (ENGEL 1995, 112-115).

ENGEL (1995, 115-118) is aware that his basic configurations are ideal-types (abstract constructs of realities). He does not propose them as an account of 'what is the world', but rather as a complementary way to view innovation processes. The particular advantage of the concept is that they may help to identify gaps or changes in leadership patterns. Equally imaginable are multiple leadership patterns, where actors of innovation configurations exert temporary leadership in respect of specific tasks or times. Understanding innovation processes should thus be guided by the questions: whose perception is more relevant? And eventually: which perception accommodates the perspective of most actors? And not who's perception is right?

ENGEL's (ibid.) concept is a useful conceptual tool to characterise innovation processes. However, it is clear that there is a continuous transition between the different ideal types.

Within a given agricultural knowledge system, leadership may even vary depending on the commodity examined. The leadership patterns provides an interesting analytic frame for assessing the case of the Fijian agricultural knowledge system. In the empirical section (chapters 5 and 6), the concept will be used to analyse the main driving forces for innovation in Fiji and characterise their specific strengths and weaknesses.

The following Table summarises the main characteristics of the before mentioned configurations of social actors.

Table 2: Basic configurations

Type of configuration /Characteristic	Industry driven	Policy driven	Farmer driven	Research & development driven	Donor driven
Principal co-ordinating mechanism	standardisation of outputs / technical packages	direct supervision, stand. of work processes / technical packages	stand. of interests, norms	stand. of skills, education	mutual adjustments, stand. of technical packages, skills, work processes
Dominant leaders	market actors	agric. policy makers	farmers' organisations	(inter) national research	donors
Core actors	agro-commerce / industry , entrepreneur farmers	agric. policy /extension / demo farmers	agric. policy / farmers' leaders	agric. Research / innovative farmers	agric. projects / demo farmers
Rural constituency	commercial farmers	program farmers	organised farmers	technological farmers	program farmers
Principal source of power/influence	market articulations, prices, quality control, resources	policies / rules and regulations, resources	political clout / resources	(improved) technology, technical expertise	financial resources, technical expertise
'Leitmotif' for innovation	efficiency / output quality	policy objectives	farmers' needs	technical advancement	intervention objectives
Accountability to	individual balance sheet	Government policies	farmers' interests	research community	donor policies

Source: Engel 1995, 118.

2.2 Agricultural Knowledge Systems

Research results, if not being applied by farmers become useless. Extension services alone, without new appropriate messages, are irrelevant for farmers. Innovations that do not solve actual farmers' problems, stand little chance of being adopted. All three statements give good reasons for suggesting a systems approach to agricultural development. The first systems approach proposed by NAGEL (1980) identified research, extension and farmers as the three key elements, or as he called them, sub-systems of the overall agricultural knowledge system (AKS). He used the model to examine the knowledge flow and linkages of the three sub-systems at two Indian state universities.

The agricultural University of Wageningen has fostered research into knowledge systems since the mid eighties and a number of model variations have evolved (cf. WIJERATNE 1988, BLOK and SEEGERS 1988, RÖLING 1988 a, b and 1990). A definition of an agricultural knowledge and information system (AKIS) from this school is given by RÖLING:

> *"An AKIS is a set of agricultural organisations and / or persons, and the links and interactions between them, engaged in such processes as the generation, transformation, transmission, storage, retrieval, integration, diffusion and utilisation of information with the purpose of working synergically to support decision making, problem solving and innovation in a given country's agriculture or domain thereof (RÖLING 1990, 1)".*[13]

For a better understanding, some terms of the concept need further clarification: knowledge, information and system synergy.

One of the pioneers of knowledge systems thinking, HAVELOCK (1986, 13) points at the difficulty in defining the term knowledge and consciously leaves it open. Further along, however, in the context of knowledge utilisation, he describes knowledge as something which can be transmitted or transferred (HAVELOCK 1986, 21). In the contrary, RÖLING (1990, 12) defines knowledge as a property of mind which cannot be transmitted to others unless transformed or encoded. He understands knowledge processes (memory storage, transformation, etc.) as intra-personal. In the same direction LONG (1992, 27) states that "*knowledge is not simply something that is possessed and accumulated: it emerges out of processes of social interaction"*. ARCE and LONG (1987, 5) proposed to define knowledge as being "*...constituted by the ways in which individual members of a society or social group categorise, code, process and impute meaning to their experiences"*. ENGEL (1995, 151) attributes four dimensions to knowledge: "*Firstly, knowledge can be seen as a 'cognition', a human faculty to perceive or conceive; secondly, knowledge is 'practical', intrinsically woven into the daily practises of an individual or group; thirdly, knowledge can be perceived as a property of the 'individual', enabling him or her to infer from experience, observation and /or reasoning; finally, knowledge is 'socially' constructed, embedded as it is in social dynamics of an organisation, a community or a group"*. Therefore, ENGEL (ibid.) suggests to talk about knowing rather than knowledge, as this expresses better the dynamic unity of learning and doing rather than the static aspects of knowledge as a statement about the world.

RÖLING's above cited understanding of knowledge as something not transferable is the reason why he includes information as a separate notion in his definition of knowledge systems (agricultural knowledge and information system). According to him, information, not knowledge is transferred within the system. But RÖLING is not undebated and the term information leaves ample room for different interpretation.

HAVELOCK (1986, 14) understands information as something purer than knowledge, as something more acceptable and manipulateable in scientific terms, less freighted with

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[13] It is vital not to confuse an AKIS with a management information system. The former comprises the entire knowledge flows in agriculture, while the later generally collects and monitors output oriented indicators for better control of single institutions or companies.

cultural baggage. For him information is close to 'message'. With the difference being that the later stresses the attribute of transferability. RÖLING (1990, 12) defines information as "*...a pattern imposed on data which simultaneously affects the interpretation of those data and enables them to be transmitted"*. In other words information is a relative concept, as it is affected by communication between a sender and receiver. In this process information is transformed twice and thus exposed to distortions.

Following RÖLING's conception, knowledge transfer does not happen directly, but it builds up over time as an 'end-result' of information transfer (or better information exchange in communication processes).

ENGEL (1995, 62) has a similar conclusion as he suggests that knowledge transfer takes place in settings that offer "*...joint learning opportunities amongst people who possess different kinds of knowledge*". These settings enable a temporary intensification of communication that in turn enables an accumulation and exchange of knowledge.

The theoretical difficulties in getting to grips with knowledge, information and communication processes, illustrate why these processes cause even more trouble in practice. For the purpose of this study the before mentioned RÖLING and ENGEL definitions of knowledge and information will be retained. These definitions are open enough to point to the various problems that may be encountered in practice. A particular problem in the study case Fiji, but the same holds true for many other development countries, is the multi-ethnic composition of the population. This obliges all actors within the knowledge system to communicate in various languages (e.g. Fijian, Hindi, Chinese). English as the official language, is a foreign language to most actors. Communicating in another language than the mother tongue entails a higher risk of unclear communication and misunderstanding.

Returning to RÖLING'S (1990, 1) AKIS definition, one central idea is system synergy. The system view points to improving the management and the performance of the system, as deemed desirable by the participants of the system. By playing complementary roles and working together, the output of the system will be higher (synergy effect) than by focusing on an isolated improvement of individual parts of the system. RÖLING (1990, 14) contents in this respect, that "*...if only the actors in an AKIS would begin to see themselves and other actors as playing complementary roles, many AKIS would 'auto-improve*'".

Still missing, so far, is a closer definition of the term system within the concept of knowledge systems. NAGEL (1980, 17) defines system as "*a set of units with relationships among them"*. His units are research, extension and farmers. HAVELOCK (1986 b, 77) understands knowledge systems as being similar to concepts from the general systems theory "*networks of connected entities*". Within agricultural knowledge systems thinking, different authors have connected larger or smaller number of entities to include in their system.[14] RÖLING 1994 and ENGEL 1995 created a new knowledge system view by

[14] BLUM (1994) and BLUM and ROUX (1994) include a large number of agricultural institutions within their agricultural knowledge system of Switzerland. They also highlight the fact that other knowledge systems with relations to agricultural knowledge systems (e.g. forestry, ecology) exist. RÖLING (1990, 20) also stresses that AKIS have to be seen as part of larger systems: policy, environment, structural and market conditions, international agricultural community etc. Concepts of agricultural knowledge

distinguishing hard and soft systems thinking. This new important concept will be discussed at a later stage (chapter 2.2.2). However, before doing so, it is important to take a look at what functions an AKIS has to execute and how these can be influenced and improved.

2.2.1 Knowledge system functions

In literature, quite a number of different functions are attributed to agricultural knowledge systems. Table 3 presents a list of functional steps as proposed by various authors.

Table 3: Functions of knowledge systems according to various authors

NAGEL 1980, 23	LIONBERGER 1986, 117	RÖLING & ENGEL 1991, 125	BLUM 1991, 324	EPONOU 1993, 18
Need identification		Anticipation	Problem identification	Diagnose farmers' problems
			Review scientific & indigenous knowledge	
Generation of innovative knowledge	Innovation	Generation	Basic Research & Development	Design a research program
			Adaptive Research & Development	Generate technologies
		Transformation		
Operationalization of knowledge	Validation	Transmission		Consolidate technologies
			Sustainability assessment	
		Storage		Disseminate information and knowledge
		Retrieval		
Dissemination of knowledge		Integration	Optimal means of Communication	Approve and release technologies
	Dissemination	Diffusion		Multiply improved genetic material and duplicate technology packages
	Information			
	Persuasion			
Utilisation of knowledge		Utilisation	Adoption	Deliver technologies
Evaluation of experiences	Reinforcement			Evaluate technologies

At a first glance, it appears that the suggested functions differ considerably. However, a closer look reveals that many functions are similar and differences are a result of divergent terminology for basically one and the same function. For a better comparability, corresponding or similar functions are presented in the same row of the table. The functions cover the spectrum from problem or need identification to the adoption and evaluation of an innovation.

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systems were subject of a recent OECD Conference held in Paris. CARLSON (1995) outlines a number of systems concepts presented at the conference.

Two concepts will be used further. For the analysis of the Fiji AKIS, the concept of EPONOU (1993) will be used. It is very detailed and therefore useful for the practical analysis. For the further theoretical discussion here, NAGEL's (1980) set will be used, as it provides a very good general framework to structure knowledge systems functions. Where deemed useful, ideas of other authors and the researcher's own views are added to complement NAGEL's original concept.

Need identification, opportunity analysis or potentials identification

The direction of activities within an agricultural knowledge system is determined by the actual needs of its sub-systems (or "*connected entities"* - Havelock; or "*actors*" Engel nomenclature) and to a certain degree by the outside surrounding (macro-) system of institutions and policy framework. Regardless of the concrete manifestations of these interests, NAGEL (1980, 24) assumes that the basic determinants are the knowledge needs of farmers. Aware of deficiencies in practice he adds: "*serving the needs of farmers is a postulate to which at least lip service is paid by everyone involved.*"

Two levels of decision making are involved in need identification. On the first level, the actual farmers' level, the problem of distinguishing between individual farmer's problems and problems that concern a larger number of farmers arises. It is a problem of prioritisation. Which of the many farmers' problems should be researched? On the second level, the institutional and policy level, matters may be quite removed from actual field problems. What counts here are the national policy goals, the needs of institutions and the availability of funds. However, policy formulation often leaves considerable room for interpretation. Therefore, which of the actual farmers' problems become investigated, also depends, to a considerable extent, on the personal preferences and prejudices of researchers and extensionists (NAGEL 1980, 24).

Need identification is certainly one of the most difficult functions of an agricultural knowledge system. As NAGEL (ibid.) pointed out, needs may be spelled out by farmers themselves or defined on the level of researchers or politicians.

It may be suggested that need identification could be viewed as a step-by-step process. The first step consists of a collection of existing problems. Then, potential solutions could be collected. Here, it is not crucial if the idea is actually formulated by a farmer or any other member of the system. In the contrary, it would be useful to exploit a larger pool of actors to increase the chance of finding meaningful innovative ideas. These problems and potential solutions should be analysed together with farmers. Does the new idea make sense for farmers (or a defined group of farmers)? Would it fit within the existing farming system(s)? Participatory methods could be the means to enable discussions on the search for innovative ideas. The discussions could collect, in a two-way process, ideas from farmers and act as a particular good first check for ideas originating outside the farmers' subsystem. This would then weed out ideas, which go against farmers' reality or common sense.

Considering that participatory methods can play such an important role in a knowledge system, a definition of the term participatory methods is necessary. Many different terms for participatory methods are used in developing countries, however, 'Participatory Rural Appraisal' (PRA) is currently the most well known term. The methods or tools described

as PRA are still evolving and their definitions can not be understood as definite. CHAMBERS (1994, 953) suggests the following circumscription for PRA[15]:

> *"A family of approaches and methods to enable rural people to share, enhance, and analyse their knowledge of life and conditions, to plan and to act."*

According to this definition the focus of participatory methods is on sharing and analysing knowledge for rural people, with a view to making use of it, 'plan and act'. PRA draws on several sources or traditions[16]. An important source is Rapid Rural Appraisal (RRA). The main difference being, that RRA is more focused on the simple gathering and analysis of information, while in PRA the aspect of sharing and making rural people participate has more weight. The understanding of participation can go as far as empowerment of the rural people.

Returning to the function of need identification in a knowledge system, RÖLING (1990, 24 and 1991, 10) equally calls for more participation, and advocates user control for an effective functioning of AKIS at all stages. It is agreed that user control is an important prerequisite to ensure a proper need orientation. However, a practical problem is the question, which farmers can effectively represent farmers? Here it is of crucial importance that farmers participate who best represent the farming community. Members of farmers organisations might be suitable partners, but in many countries such organisations do not even exist or represent only a small minority of farmers. Another problem is that strong user control may go against the grain of both bureaucrats and researchers in strongly hierarchically structures which prevail in many developing countries. In this respect, it is probably already a big step ahead if a reasonable farmer participation in the field can be agreed on, but to achieve user control it still has a long way to go.

Generation of innovative knowledge

Innovative inputs are the primary input in the knowledge system. Without innovations, a knowledge system would be obsolete[17]. Modern agriculture is depending increasingly on knowledge inputs. The agricultural research sector is generally given the task to generate innovations. Research can be broadly classified into fundamental or basic research and applied or adaptive research (NAGEL 1980, 27). He criticises that "*all too often, the theory-practise scale is perceived as a ladder with a top and a bottom, the top representing the 'pure researcher' involved in basic science and the bottom by the farmer who does the manual labour. A similar differentiation is to be found in within the research sub-system itself, where applied research is less highly regarded than basic research*" (NAGEL 1980, 37). He further stresses that the systems perspective explicitly abandons this view. All elements of the system play a functional role in goal attainment at

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[15] As a broader term for PRA approaches PRETTY et al. (1995) suggests participatory learning and action (PLA).

[16] CHAMBERS (1994, 954) identified five streams that have cross-fertilised each other, intermingled and exchanged elements to various degrees, stand out as sources and parallels to PRA: activist participatory research (APR), agro-ecosystem analysis (AEA), applied anthropology, field research on farming systems (FSR) and rapid rural appraisal (RRA).

[17] Without innovations a knowledge system would only contribute to maintain knowledge. This function, however, could certainly be fulfilled by farmers alone without external support. A special case of knowledge maintenance are gene banks that conserve genetic resources that might otherwise get lost.

the macro level. Status differences blocking inter-system linkages are undesired as they lead to malfunctioning of the system.

Considering the small size of many developing countries and their limited financial resources, it is obvious that fundamental or basic research is outside the scope of most developing countries[18]. Small research systems should be focused on adaptive research. However, returning to ROGERS AND SHOEMAKER's (1971, 19) definition of an innovation as "*an idea or practise perceived as new*" by the user community it becomes evident that not always objectively new ideas are need. There is an abundance of information and technology available on the shelf. EZAGUIRRE (1996, 8) recommends that small countries, in particular, need to make better use of links to external sources of technology and information. Thus, the generation of new knowledge also includes the activity of screening existing knowledge as an important step. In many cases, however, it will be required to test external knowledge via adaptive research under local conditions. Adaptive testing has to do with knowledge generation, but the transition to the next main system function 'operationalisation' must be fluent.

Operationalisation of knowledge

Putting research results into useful form distinguishes the stage of operationalisation of knowledge. This includes all forms of adaptive research and field trials together with individual experiments of extension workers and farmers. Operationalisation of knowledge stands under two main aspects. In the first aspect, research results need to be processed in a such a way that they become applicable for farmers. Innovations must be transformed into sets of recommendations for diffusion by the extension agent. The second aspect refers to the locality of a recommendation. Sets of recommendations must be adapted to the agro-climatic and socio-economic conditions of specific locations (NAGEL 1980, 28).

Operationalisation of knowledge represents the first real test of an innovation under farming conditions. On-farm research[19] is consequently a key activity within this adaptation step. Technologies will have to be modified until they suit farmers' needs adequately. If this cannot be achieved or can only be achieved partly, a technology may have to be discarded or it may only be recommended for a limited group of farmers. Operationalisation is thus also a technology screening process. In this step researchers will have to work hand in hand with farmers and extensionists[20]. This process will provide useful information for the following step of dissemination. Encountered technology and communication problems between farmers, researchers and extensionists will show where improvements are required to enable a smooth transition and transformation of knowledge.

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[18] EYZAGUIRRE (1996) describes how research could be organised in small developing countries.

[19] WERNER (1993) presents a comprehensive guide to on-farm research with a strong participation of farmers.

[20] This also implies a broadened role for all actors. Researchers will need more social and communicative capabilities and extensionist will require more analytical capabilities.

Dissemination of knowledge

Dissemination of innovations bridges the gap between knowledge generation and large scale application at farm level. It requires a double transformation of knowledge, in a first step to extension and as a second step to farmers. Dissemination takes place in view of socially defined and accepted goals which pre-structure promotional efforts. Extension strategies need to be developed accordingly (NAGEL 1980, 28-29).

After a successful operationalisation process, the technology should be appropriate for diffusion to farmers. However, depending on the type of technology, some farmer specific adaptation by the extensionist may be necessary. In this respect sympathetic understanding is required to provide the flexibility to choose the right set or farm specific modification or option of a recommendation for an individual farmer. In other words, if a technology is based on scientific principles, it is important to explain these principles to enable the user to make desired modifications. It is not sufficient if the farmer learns how to apply a new practise or technology. Only if the farmer understands why and how something works, will he be able to improve his new practise.

Utilisation of knowledge

Generating new knowledge is useless, unless it becomes applied productively in some way or other. Utilisation within an agricultural knowledge system means the integration of new knowledge into the system of agriculture and its application by farmers (NAGEL 1980, 29).

The ultimate goal of a knowledge system is obviously the utilisation of that knowledge. Consequently, the rate of adoption is the key indicator of performance and efficiency within an agricultural knowledge system.

Evaluation of experiences

NAGEL (1980, 30) defines evaluation as the "*forming of judgements on the performance of informational inputs (= knowledge) at the user level (= user sub-system)*". Thus, the overall practicality of an innovation is finally determined at farm level. For measuring the performance of the system (quantitatively or qualitatively) a comparative goal is required. Within an agricultural knowledge system, this goal is identical to farmers' needs identified as part of the first system function. The evaluation function, consequently, measures how well farmers' needs were met. Furthermore, the evaluation of an innovation reveals its strengths and weaknesses in terms of usefulness to the farmer and thus highlights areas which require further improvement and additional research. Keeping in mind the circular nature of the whole process, the evaluation revises the state of farmers' needs in a more concrete manner and provides as such an input to a new innovation cycle. The further developed an agriculture is and the more farmers depend on technologies, the more important is the evaluation function, as it enables quicker responses to technology shortcomings (NAGEL 1980, 30).

For studying the adoption and utilisation process of new technologies in the field, participatory methods appear as a suitable tool. They could thus be the right tool for a meaningful evaluation. By handing over the stick to the farmer, they enable the users to comment on the usefulness of the new technology in their environment. Participatory methods could in this way provide a means of more client control in practise.

However, the evaluation function could be seen in a broader context. It should not only be included as the last step, but rather as an ongoing activity. In this context the term monitoring[21] might be the better terminology. Successful dissemination shows that all system components have worked. But to timely locate inefficiencies within the system, monitoring as a kind of early warning system is necessary. In particular the knowledge transformations between the sub-systems can only be monitored as they take place. These transformations are crucial for the success of the system and thus it is important to monitor and correct system flaws as soon as they occur and not at the end when it may be too late. RÖLING (1990, 15) lists knowledge transformations within an agricultural knowledge system at the following points:

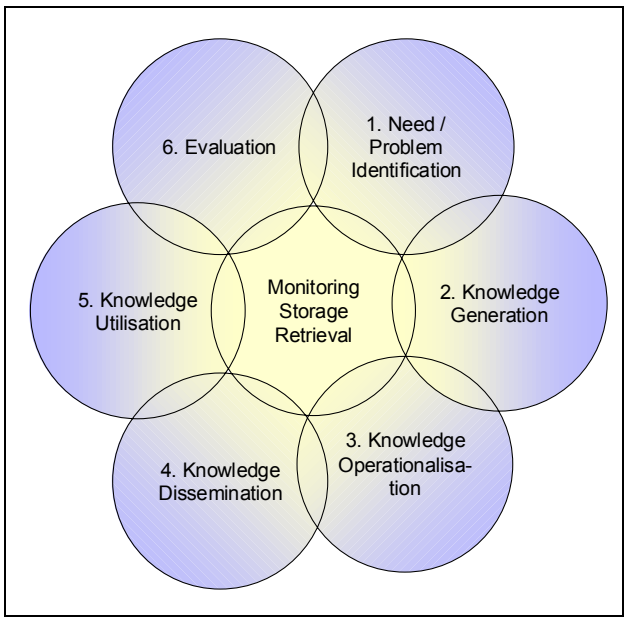
- from information on local farming systems to research problems,
- from research problems to research findings,
- from technologies to tentative solutions to problems (technologies),
- from technologies to prototype recommendations for testing in farmers' fields,
- from recommendations to observations of farmers behaviour (male, female, children),
- from technical recommendations to information affecting service (inputs and marketing) behaviour,
- from adapted recommendations to information dissemination by extension,
- from extension information to farmers' knowledge.

This long list of transformation illustrates the immanent high risk of things going wrong. A way to reduce this risk is to ensure a proper documentation of results at all steps. RÖLING (1990, 16) speaks in this context of the storage and retrieval function of an AKIS. Rather than a separate function, this could be seen as an ongoing continuos function required in combination with the other functions. Considering the huge amounts of information that need to be processed by an agricultural knowledge system it becomes evident that good documentation structures need to be developed. Access to findings (retrieval) is equally important. It is crucial that any member in the system can find the information he/she requires quickly. Of particular importance is a common language for all groups. To ensure that members of different sub-systems understand each other, it may be necessary that crucial documents are developed jointly (e.g. research documentation, extension materials, farmer leaflets, etc.).

[21] KRIMMEL et al. (1990, 7) define monitoring as an ongoing activity during the implementation of a given project. Monitoring compares activities against a plan and suggests corrective action in case of deviations from the plan. In contrast, evaluation is a periodic activity , focusing on major changes or replanning of projects.

Figure 1 summarises the basic knowledge system functions as a cyclic flow pattern. A cycle starts with knowledge need/ problem identification and ends with evaluation. Then a new cycle starts and evaluation becomes an additional input to need identification. The permanent ongoing activities of system monitoring, storage and retrieval of information are symbolised by the central circle. In a real knowledge system information flows and linkages may be informal or formal and there may be need for a specific information centre to facilitate information flows. Counter clock-wise information flows and shortcuts may be necessary as a means of clarification or if a technology prototype proves not to be viable and a new start is required. This is symbolised by the overlapping circles.

Figure 1: Knowledge system functions



Source: own design.

Information and knowledge may flow freely within the circle and accumulate in the centre for easy access at any time. Technology development within the knowledge system is thus, never only a straight forward process. It may take several semi-loops to fulfil one full cycle. However, as NAGEL (1980, 31) stresses, a crucial condition to make the system work in the long run is that "*all functions have to be performed, regardless of their sequence or the concrete organisational setting*."

2.2.2 Controversies in systems thinking

It would be outside the scope of this thesis to present an exhaustive review of systems theory. Instead two new concepts of systems thinking within the school of agricultural knowledge systems will be presented here.

Within this thinking tradition, HAVELOCK (1986 b, 77) understands knowledge systems, similar to concepts from general systems theory, as a "*networks of connected entities*". This implies the notion of 'system' as something concrete. CHECKLAND and SCHOLES (1990, 22) go a new way by questioning this character of system: can a system be taken as something that actually exists, an ontological entity, or is it a perspective, a concept or theoretical construct we use to study real life situations?

These two ways of understanding have their roots in two fundamentally different schools of thought: positivism and constructivism. Positivism is a scientific tradition that takes the 'positive', the existing, the actual, the undoubtedly available as the basic principle of human perception. This philosophical school is best known under COMTE's (1979) maxim: subordination of imagination under observation.

Constructivism, in the contrary, is a philosophical tradition that conceives perception as man made. With the words of KNORR-CETINA (1980, 227, own translation): "*Instead of analysing knowledge as a representation of reality, it can be perceived as manufactured by this reality.*" In the constructivist perspective any technologies or items are seen as dependent on human perception, interpretation and communication. Its social value results only via communication. The traditional epistemiological question regarding 'what is perceived?' is replaced by the question 'how is something perceived ?' Any type of cognition or perception is thus understood as an active construction of an observer, and not as a passive picture (SCHWARTE 1997, 24).

Among system scientists these two basic philosophical traditions have been re-labelled as 'hard'(positivism) and 'soft' (constructivism) systems thinking (cf. CHECKLAND and SCHOLES 1990, 25).

RÖLING (1994, 387) defines hard system science as such:

> *"a system is a limited part of reality with a well defined border".*

Implicit in the definition are the following assumptions:

- The system exists objectively.
- Reality exists independently of the knowing subject.
- Reality operates on the basis of causal natural laws.
- Through empirical, analytical and experimental methods, it is possible to build factual knowledge which represents objects as they exist in the real world. One can build simulation models which integrate the hard science and allow explorations of future states of the system, given different human ends. The information provided is objective and true. After all, scientific knowledge is a factual, timeless, universal, lawlike and context-free commodity (RÖLING 1994, 3).

Hard system thinkers use systemic images (models) to simplify the real world. With these models they try to represent the real situation. The better the outcomes of their models coincide with actual observed events, the better hard systems thinkers consider their knowledge (KRAMER and SMIT 1987, 117). Hard system models are hence very suitable for physical or bio-physical environments. However, in relation to social actors and the processes of communication, problem solving or negotiation they remain weak. A main reason for this weakness is that social actors do not, as assumed by hard systems, behave according to set principles or laws.

Experiencing difficulties in working with hard systems in social contexts CHECKLAND (1981), was the first to use this as a starting point to develop "*soft systems*". In a more recent article, RÖLING (1995, 9) describes soft systems as "*...a network of social actors, that accept a joint problem and go in dialogue through a joint learning path, in order to reach joint action.*" He further specifies that, unlike hard systems with clearly defined borders, soft systems have 'arbitrary or subjective' borders as the interpretation of the problems by the individual actors may influence the constitution of the system.

As a consequence of the mutual learning and negotiation process, a double sense exists: the actors influence each others realities. The motive power for the different actors to participate in the process, is the prospect that via the building of the system problem

solving possibilities emerge, which none of the individual actors could possibly realise RÖLING (1995, 9).

Soft systems thinkers do not perceive the world as a single system or try to develop parts of the whole into representations of the whole reality. Soft systems thinking constructs systemic images or in other words perspectives or windows of the world in order to stimulate reflection and debate. An important aspect of defining systemic images is the explicit mention of its purpose. Soft systems do not have a purpose, but are actively given one. A description of any purposeful whole must be from some declared perspective. Multiple images are thus a means to construct different images of the same situation (CHECKLAND and SCHOLES 1990, 24-25). These images "*are means to an end, which is to have a well-structured and coherent debate about a problematic situation in order to decide how to improve it. That debate is structured by using models based on a range of world views to question perceptions of the situation*" (CHECKLAND and SCHOLES 1990, 42). Further the authors emphasis that "*it is wrong to see soft systems methodology (SSM) simply as consensus-seeking. That is the occasional special case within the general case of seeking accommodations in which conflicts endemic to human affairs are still there, but are subsumed in an accommodation which different parties are prepared to 'go along with'*" (CHECKLAND and SCHOLES 1990, 29).

ENGEL (1995) summarises hard and soft systems thinking by comparing its main characteristics. These are depicted in Table 4.

Table 4: Characteristics of hard and soft systems

Hard systems thinking	Soft systems thinking
The world is systemic... or can be taken as if...	The world is not systemic...but sometimes it is useful to take it as if...
Images are to be systemic ...	Images are systemic when useful ...
System images are used to construct models to represent (parts) of the world ...	System images are used to construct windows to study the world ...
System images are concerned with processes, inputs and outputs ...	System images concern social actors, their activities and relationships ...
The aim of hard systems thinking is to improve one's knowledge of the world through improving one's models...	The aim of soft systems thinking is to improve human performance through debate and reflection ...
Processes are functionally articulated into a goal-seeking whole ... goals are inherent to the whole	Social actors might behave as a systemic whole if they wish to and know how to do it ... but boundaries and goals are permanently (re)negotiated

Source: ENGEL 1995, 30.

Both hard and soft systems thinking have specific advantages and disadvantages. Both directions of thinking may be useful in advancing innovative processes in agriculture. The key is to apply each approach in the domain were it works best. Openness to both approaches is necessary. As a rule of thumb hard systems are more suitable in situations that are better known, where variables are predictable to a reasonable degree. Soft systems are certainly more appropriate to explore new terrain, in complex situations that require iterative approaches or where decisions depend on negotiation processes. Therefore,

depending on the purpose, a prior detailed analysis of the best systems approach, case by case, is necessary. For these reasons, such a flexible approach in the use of the term system is adapted for this study.

This digression into systems thinking should be sufficient to better understand the new concepts of knowledge systems, which will be presented in the following chapter.

2.2.3 Platforms or theatres of agricultural innovation

By introducing the soft systems ideas into their conceptual framework, RÖLING and ENGEL further developed agricultural knowledge systems thinking. The influence of soft systems thinking is reflected in the new definition of a knowledge and information system (KIS):

> *"The articulated set of actors, networks and/or organisations expected to work or managed to work synergically to support knowledge processes which improve the correspondence between knowledge and environment, and/or the control provided through technology use in a given domain of human activity" (RÖLING 1992, 48).*

Comparing this definition with the older definition (see page 17) a few changes strike the immediate attention. The concept is widened to a knowledge information system (KIS), which encompasses any domain of human activity. Agriculture is no longer seen as the only area where knowledge perspectives could be useful. This opening of the approach thus creates room for including other areas such as health care, traffic and transport, rural or urban development, education or environmental concerns etc. All members in the system are considered as actors. In an agricultural context, actors could be e.g. extension agents, private consultants, commercial firms, agricultural schools, growers clubs or associations, co-operatives, Ministry departments or research stations just to name a few. All these actors manage, generate, transform, transmit, store, retrieve, integrate, diffuse and use knowledge and information. The definition summarises these activities as knowledge processes geared towards improving 'correspondence' between knowledge and environment and/or 'control' through technology use. This also needs to be understood in the context of soft systems. Here, boundaries are not fixed and depend on the perspective of the analyst, and therefore, are bound to vary with the function or purpose he has in mind for the system to perform. In a setting with several actors, each with different perspectives and understanding of what e.g. 'correspondence and control' may mean, a struggle and debate on perspectives and definitions is pre-programmed (ENGEL 1995, 37). However, this debate is seen as a positive prerequisite to develop innovations.

Looking for a metaphor to better describe such a multi-actor environment, Engel created the expression '*theatres of agricultural innovation*.' Engel chooses theatres, as they are places where partly pre-mediated, partly improvised actions are performed. Analogue to AKIS, different actors such as directors, managers, designers, stage builders, actors and audience interact intensively to produce both structure and serendipity (ENGEL 1995, 8).

It is easy to agree to the example that innovation processes in agriculture often resemble very well a drama in theatre, but the term theatre also creates undesirable associations: Actors in an AKIS may not like to be compared to acting on stage. They certainly take

their work serious and may not like to be taken as play-actors or comedians. Therefore, a different term appears more neutral: platforms for innovations. The term circumscribes, just as theatre, a space were people may come together to work and discuss. The term is less freighted with associations. RÖLING (1995) introduced the term and suggests platforms as a means, forum or stage for different social groups to negotiate resource use. A platform as a means to improve discussion and facilitate co-operation could also be perceived as an appropriate means in an AKIS. This point will be further discussed a little later. Beforehand, it is necessary to have a closer look at the working procedures in an AKIS.

Given the fact that all actors in an AKIS have a different specialisation (extension, research, financing, policy, etc.), they all have different ideas and information to share with the other actors. But these different backgrounds may make it more difficult to communicate and, in this respect, some kind of co-ordination is necessary to facilitate the exchange of ideas for the joint learning process. Though, in many cases it will be difficult to achieve a consensus, it is necessary that at least the main actors achieve some kind of strategic consensus. The joint understanding of a common problem and the joint purpose to develop relevant innovations may help to achieve this consensus. ENGEL (1995, 71), based on empirical studies at a number of countries in both Central America and the Netherlands, claims that working procedures evolve automatically in the course of the working process. Depending on the purpose, the actors decide on how they want to work, what to do, how often to meet, which resources to use etc. In this process, inter-institutional relationships are build. These are a result of negotiations over objectives, tasks and resource allocations, which never remain static. In practice the content and shape is continuously readjusted. Some necessary readjustments are sealed in formal agreements, while others may be on an ad hoc basis and remain largely informal (ENGEL 1995, 92). This social interaction Engel calls "*networking"*. Thus, to innovate practices, actors experiment, gain access to a range of options and insights, engage in building and managing interactive relationships with those others whom they consider relevant to their concerns. The keys to membership are relevance and competence. This means, actors include those members in their network that are perceived as relevant: those that are able to offer something new and useful in a competent manner to the network or AKIS as a whole.

Summarising the new ENGEL and RÖLING understanding of an AKIS, it becomes evident that the view diverts away from an AKIS with a single fixed perspective of actors and institutions in a given country, to an AKIS with multiple perspectives and potentially more complex actor relationships and linkages. More emphasis is placed on the importance of social relationships between actors and new forms of learning. Developing innovation is no simple process of generating technologies and packaging an extension message with the help of an elaborate system, but a process of enabling joint learning and linkage building within a system that requires constant improvement, adaptation and fine-tuning. It thus requires that all actors engage actively in the process. This active participation is the basic prerequisite for the new direction that ENGEL (1995, 51) outlines as "*knowing rather than knowledge, competent performance rather than use of new technologies and communicative interaction rather than communication as the transfer of messages between sender and receiver.*" This sounds good but what does it mean in practice. 'Knowing rather than knowledge' stresses that knowledge transfer requires

active ongoing reflection, interpretation and practise; 'competent performance rather than use of new technologies' draws attention to the fact that understanding and consequent competent management are a prerequisite to successful technology usage; and lastly 'communicative interaction rather than communication as the transfer of messages between sender and receiver' stress the importance of dialogue and feed back as opposed to a one way communication process.

2.2.4 Viewing the Fiji AKIS

The examination of the Fiji AKIS will proceed in three main steps. Each step contains a specific view, window or perspectives on the AKIS. The first step constitutes an overall view. It presents the main organisations and institutions and other social actors within the agricultural sector. Their main relations and linkages are describe briefly. This first perspective is similar to the analysis by BLUM and ROUX of the Swiss AKIS (cf. ROUX and BLUM 1994, BLUM 1993). This perspective is the most general and in a way 'institutional' view. It depicts the current organisations and institutions as they appear at a first glance. The investigation touches the surface, it does not penetrate deeply into the subject-matter. At the same time the view is wide, including to some extent the outside macro system surrounding the AKIS. The purpose of this first perspective is to give an overview, characterise the wider work field and to point out the subject of the study. Its intention is to provide for a better understanding of the following closer analysis of the core segments of the AKIS.

The second step represents a perspective, which examines the three main AKIS actors,[22] farmers, research and extension, one by one as a close-up.

The view provides a detailed analysis of each actor. The investigation does not remain on the surface, but penetrates deeper into the subject-matter. For research and extension the view will include a look at policies and goals, concepts and methodologies used, priority setting procedures, availability of resources, staff qualifications and the use and flow of information. For farmers, the focus of analysis lies in their problems and constraints, production conditions and management practices. Special attention is given to the question, how farmers and their problems can be better addressed within the AKIS.

After looking at each actor individually, the interplay and the linkages between all three actors will be examined. This view investigates how the different AKIS functions are performed, which linkages exist and how information flows are organised. This analysis provides the basis for the formulation of strategies to improve the performance of the AKIS.

Viewing the Fiji AKIS only in the context of the three main actors would give an incomplete picture of reality. The private sector, donors and educational institutions all play an important role in agricultural development. However, examining all potential

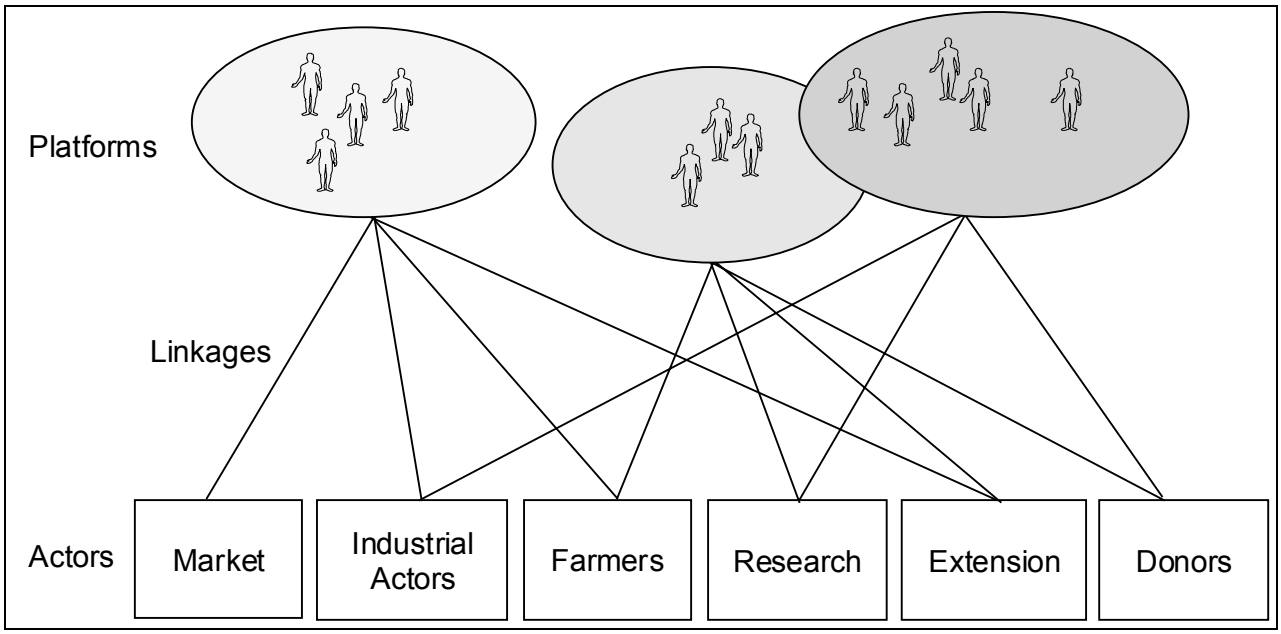
[22] The researcher will use the term actor in the wider sense as proposed by ENGEL 1995. It therefore stands for all institutions or organisations or persons sharing this work field. In the NAGEL 1980 nomenclature, it would correspond to the term sub-system.

actors in depth would be outside the scope of this thesis. Nevertheless, in the third and last step a wider look on the AKIS will be taken again.

In this perspective, the researcher will try to investigate how the AKIS could further evolve. CHECKLAND and SCHOLES's (1990, 45) soft systems approach will be used to look at the knowledge system not as it is, but rather as a verbally rich picture of what could be. Focusing on the newer AKIS concepts suggested by RÖLING 1992 and ENGEL 1995, the idea of platforms as supporting structures for working groups or networks will be taken up.

Figure 2 visualises a model of how platforms could be viewed as constituted by different actors.

Figure 2: Composition of platforms

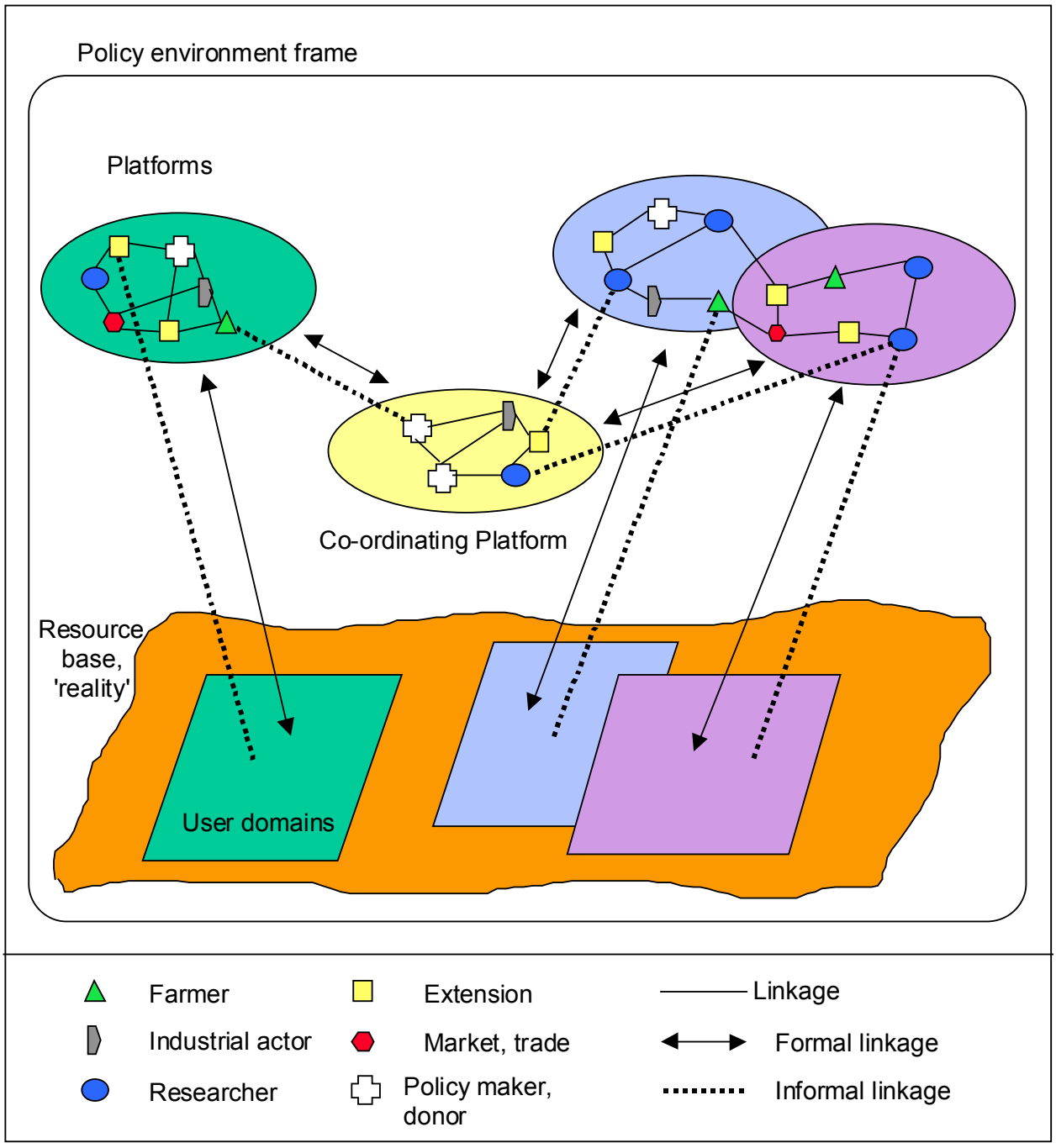


Source: own design.

Actors from different backgrounds (research, donors, policy, market, farmers, etc.) create new or join existing platforms. Members of a platform share a common goal and purpose. Platforms may overlap if some members are also members of other platforms. In the course of their work, all actors agree on joint working procedures. This includes the meeting sequence, information exchange protocols, resource sharing, joint tasks, separation of tasks and other emerging points which may appear necessary.

Figure 3 illustrates the structure of platforms and their linkages within an AKIS. Within platforms all actors are closely linked and collaborate intensively. Different platforms may be linked formally if there are interesting areas for co-operation. Besides these formal linkages, individual actors may maintain informal links to actors in other platforms. Platforms may overlap if key actors are members in two platforms. This strengthens both formal and informal linkages. The innovative direction of each platform is determined by the needs and problems expressed by the resource base ('reality') composed of producers (technology users), consumers and the market.

Figure 3: Platform model



Source: own design with ideas from ENGEL (1995, 203), ROUX (1995, 19), RÖLING (1995, 12).

Equally formal and informal linkages exist between actors in the platform and the resource base. The platforms, thus, address a specific group (in other terminology: target group or recommendation domain) of users in the resource base. Depending on the practises and technologies developed and extended by the platforms, the user groups of the various platforms may overlap more or less.

But an AKIS would not be complete without a co-ordinating centre. This could be perceived as yet another platform with links to all other platforms. The tasks and role of the co-ordinating platform, or in other words AKIS management, are manifold: avoiding duplication of efforts, balancing financial resource allocations and co-ordinating policy and user interests. The management plays a crucial role in enhancing system coherence

and system synergy. Given the soft system character, a management of an AKIS will never execute a strong control as in a strictly hierarchical system. The actors in the different platforms are in the end responsible to their institutions or organisations. As a consequence overall consensus in all cases is unlikely. In reality this may mean that in extreme situations platforms split up in order to reflect fundamentally different approaches or actor profiles. Examples may be incompatible donor policies or private sector company goals. Co-ordination thus becomes a difficult balancing act.

The applicability of this model for Fiji will be the central theme of this last perspective. The following questions will guide the discussion: What kind of networks or platforms already exit? How does co-ordination take place? How can platforms be supported and assisted? Which leadership patterns exist? How can platforms become driving forces for innovation?

This approach of investigating the Fiji AKIS with multiple perspectives should provide for a comprehensive understanding of all actors, their strengths and weaknesses and the associated problems of co-operation. But before applying the concept, a few critical remarks on knowledge systems thinking shall be made.

2.2.5 Some criticism put forward

The main strength of the concept, the review of several actors as part of a system, could also be seen as a major weakness. The fact that several key actors and their interrelation are analysed, means in practice that each actor by himself cannot be reviewed as profoundly as if reviewed alone. For this reason specific weaknesses of individual actors may not become apparent in the AKIS approach. The AKIS concept has the advantage that it provides a better overview and highlights the relations between different actors, but at the same time some degree of detail of the situation of individual actors is lost. This is an immanent weakness of the concept.

The earlier AKIS concepts (cf. RÖLING 1988 and 1990) have a strong normative character. The focus lies on the questions of generating, extending and utilising of knowledge with the aim of increasing system synergy. This also depicts the limits of the concept. The behaviour of actors and their reasoning in the processes of interaction are neglected (LÜHE 1996, 12). While this critique is certainly valid for the older AKIS concepts, the newer versions in particular of ENGEL 1995 with the inclusion of soft systems thinking towards actor behaviour have reduced this problem.

LEEUWIS (1993, 285) remarks that there is a confusion between "*on the one hand, the KIS perspective as a quite legitimate and popular practical tool for enhancing learning and/or developing collective agency and identity, on the other hand, the expectation ... that this perspective would provide a theory to understand and explain adequately the role of knowledge in processes of social change and intervention*." This confusion has some roots in the fact that AKIS attempts to make a holistic picture of a given situation. ENGEL (1995, 33) opposes that "*when we*, (including RÖLING) *emphasise 'wholeness' we definitely do not entertain such a unified theory aspiration. Rather we refer to the fact we probe for coherence among the events and ideas which appear relevant to our inquiry. We refer to the need for gaining more comprehensive ways of debating, not a unified*

scientific theory for understanding. We see the need for doing so because of the ever growing degree of complexity involved in the debate on social and technological issues."

A second point of criticism by LEEUWIS (1993, 286-287) aims at RÖLING's and ENGEL's definition of information. He argues that their information concept stress the individual-cognitive aspects of information, but fails to conceptualise the social dimensions, i.e., the normative, political and interpretative struggles that accompany and shape the production of knowledge and information in communication. He explains his argument by the example of software developments for farming: "*from a KIS perspective the key word in the explanation of limited effectiveness and adoption would be lack of 'anticipation'. That is, communication technologies can fail to foresee (or anticipate): (a) farmers' information needs and/or interpretative frameworks, (b) the practical procedures of problem solving that farmers and extension workers employ in their interactions, (c) the information that farmers already get from other KIS interactions (e.g. farmers' journals) and/or (d) the economic, material, political and cultural constraints and opportunities that characterise the KIS environment. By implication, using a participatory systems methodology and/ or more 'traditional' extension tools such as targeting and user research, such anticipatory problems can be prevented"*. LEEUWIS (ibid.) acknowledges that the KIS perspective is quite helpful in revealing that different types of anticipation problems exist and what these types are, but it fails to explain why they have come into being. Returning to his example, he concludes (op. cit., 287) that "*following the KIS framework we would in the end merely have to assume that producers and developers of communication software are quite ignorant, and that, by using soft systems methodologies etc., we can facilitate the illumination, joint learning and consensus that is needed in order to prevent and cure such 'mistakes'. Here we seem to have found a relic of the optimist 'enlightenment' thinking that characterised the early days of extension and extension science*."

LEEUWIS (ibid.) highlights a weak point in the soft systems methodology as part of an AKIS concept. The perspective helps to identify problems, but it does not necessary reveal the reasons for problems. When LEEUWIS mentions the lack of consideration of 'social dimensions of actors', this critique points to one of the main assumptions of the AKIS perspective. Namely, that all actors have a common interest and work towards a joint goal (because everybody realises that the goal can only be reached jointly). If this consensus of a joint goal is lacking, the system will fail. The joint learning cycle will not even be started. In other words, if important actors do not want to cooperate, for whatever reasons, learning processes may easily be sabotaged.

LEEUWIS makes clear that SSM is no blue print for problem solving that will work in all circumstances. However, in criticising soft systems methodologies as 'optimist enlightenment thinking', LEEUWIS goes too far. It is certainly valid to comment that the approach is no blue print that works automatically in all cases. However, this is also not stated. AKIS and SMS are pragmatic concepts. Their validity could be confirmed in several case studies. However, in a complex environment with many actors, innovation development and diffusions remain a very difficult task and success can never be guaranteed. But even if soft systems methodologies may not always lead to the identification of solutions, they certainly enhance debate and struggle towards finding solutions. Therefore, overall the AKIS concept appears as a very good theoretical framework to assess the conditions in Fiji with.

3 Methodological framework

The framework conditions for the field study were very favourable as the researcher lived and worked in Fiji for more than two years before the research phase of this study began. This good framework comprised of:

- Personal acquaintance with the staff at the Ministry of Agriculture, experts in projects and representatives of development organisations facilitated the preparation and implementation of the study.
- A good knowledge of the agricultural sector in Fiji through the access to studies, reports and other 'grey' materials enabled better preparation and deeper insights.
- Familiarity with country, people, language and culture facilitated the work and exchange of information.

A participatory action research methodology was used for this study. The concept of this approach is reviewed in the first section. The role of the researcher and that of other actors in the research process is examined in the second section. The implementation of the fieldwork with all research activities and important aspects of the research process are discussed in the third section. A summary of the tools applied in the research process is provided in the last section.

3.1 Participatory Action Research (PAR)

Participatory action research is an explorative qualitative research method. In the past the scientific acceptability of qualitative methods was often questioned[23]. Today, this discussion has become less controversial and the use of qualitative methods has been more frequently accepted. WOLCOTT (1990, 26) refers to the discussion and states "*There is no longer a call for each researcher to discover and defend them anew."* For this reason a detailed justification of the method will be omitted here. Instead, a brief explanation of the method and its adaptation in the context of this study will be given.

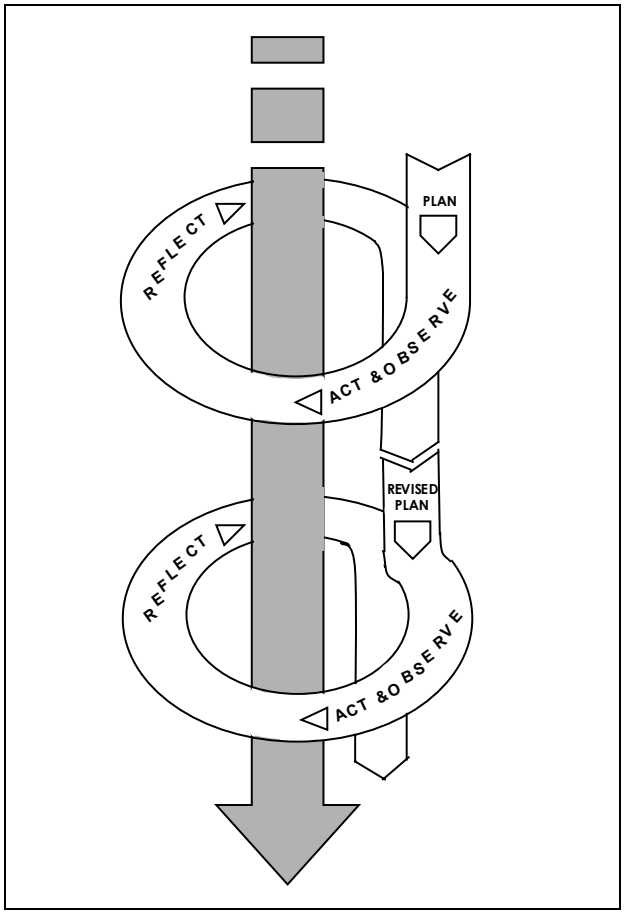
The origins of PAR can be traced back to LEWIN (1946). His ideas can be seen as an attempt to bridge the gap between science and practice. He complained "*research which produces nothing but books is not sufficient*" LEWIN (1953, 280). This statement expressed very well the researcher's own feelings during the review phase of the PRAP programme. It was a regional research programme that had practically no impact on farmers as the ultimate beneficiaries of development efforts. Thus, looking for ways to bring together science and practice became a key issue of this study.

LEWIN (1946) described action research as advancing in a spiral of steps, each of which comprises planning, action, and evaluation of that action. In this step-by-step approach, insights into complex situations are obtained. With each step insights gradually build up. The research process is determined by stages of information gathering, planning of actions, evaluation of those actions and re-planning for a new cycle in the light of the insights that were gained in the previous cycle of the spiral. After re-planning the process

[23] Equivalent to the debate on hard and soft systems thinking discussed earlier in chapter 2.2.2.

continues in a new cycle with modified actions and evaluations. The concept is illustrated in Figure 4.

Figure 4: The action research spiral



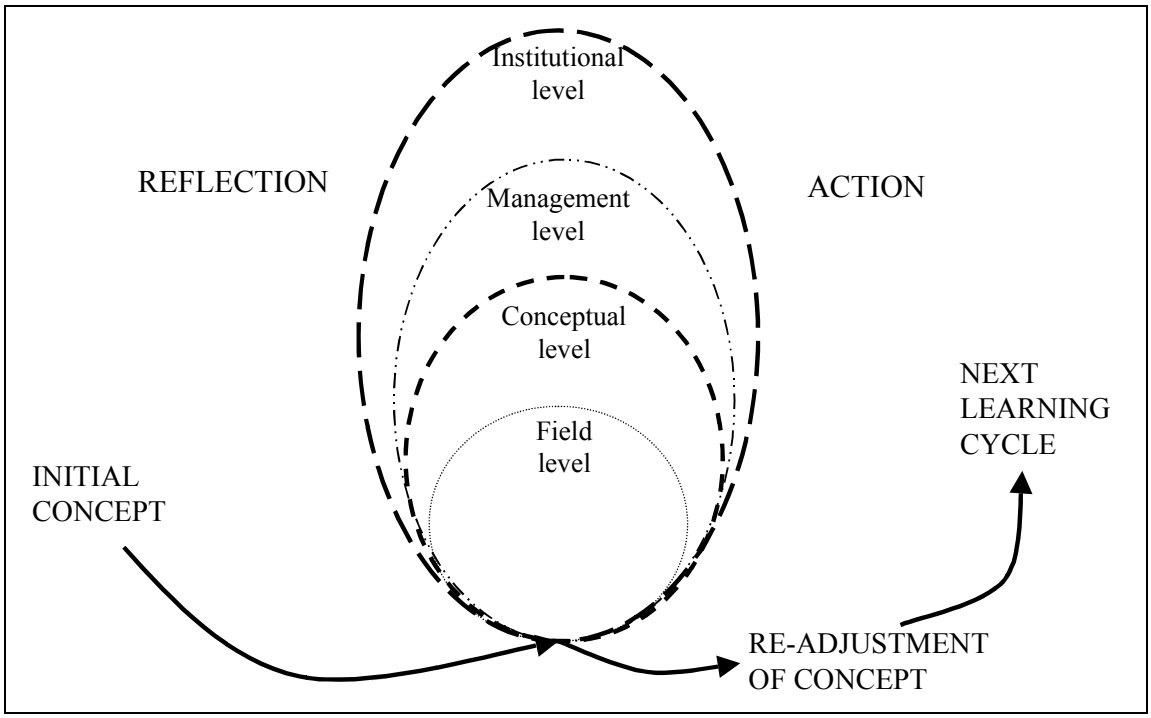
Source: modified from KEMMIS and MC TAGGERT 1988,11.

The action research cycle is in fact a learning cycle. In this context learning occurs at different levels. BAWDEN (1988, 6) calls this "*double loop learning: learning about learning about things*". A researcher tries to find out something about certain events or things and may use a certain '*window*' for '*finding out*'. Reflecting on the way of finding out represents the second level of learning.

HAGMAN et al. (1998, 228) also takes up the idea of learning in cycles and even speaks of triple loop learning. Within a learning cycle several sub-loops can be drawn. Starting at field level, findings will help to revise existing concepts (conceptual level) and these in turn may have an influence on the organisational set-up of an institution (institutional level). Different levels of learning were relevant in the analysis of the Fiji AKIS. In this line of reasoning, the researcher suggests to speak of multiple-loop learning. In addition to the three levels mentioned above, the managerial/organisational level was added. New concepts have an immediate influence also on management and the way action is organised. Taking an example, the loops could be compared to a spider web. If one pulls at any point in the web, changes will be felt all over the net. The same applies to the different loops. In the case of the study, the PRA findings in the field had an influence on the concepts on how field work should be done. It also had implications for management on the question of how things should be organised and finally it also had an influence on the institutional set-up of the organisation. The model is depicted in Figure 5. Depending on the subject researched, multi-loop learning implies that different other levels (or dimensions) of a given study case may be investigated in a single research cycle. In this respect the model helped to draw connections between important research variables.

Besides the analysis of the AKIS, this type of research or multi-loop learning mode was relevant during the phase of the PRA training course. While the practical subject of the PRAs was to investigate farmers' problems and their interaction with the Ministry, the second level of learning investigated the best ways of teaching PRA tools.

Figure 5: Multiple-loop learning in action research



Source: modified design after HAGMANN et al. (1998, 228).

An important feature of participatory action research is its dialogical nature, which enhances participation. Several actors may be involved actively in the research process. EHRET (1997, 35) explains what creates participation: "*Discussion with the clientele, iteration, triangulation, verification – all are essential parts in PAR for obtaining information. Thus, participation is not an add-on; it is the basis of research. The style of co-operation and the attitude of partners determine their interaction and the joint search for improvements. There is no 'subject' which has to be researched, but a partner who is accompanied in a situation-improving process".* As one focus of this study was directed on improving research and extension services, the main research partner was the Ministry. But also other actors played particular roles in gaining information and discussing findings and implications. In this respect, particular farmers and project experts should be mentioned.

Another important aspect of the methodology is that it is capable of recording change. This is of particular importance for the analysis of a dynamic subject such as an agricultural knowledge system. Using learning cycles in timed intervals permits the investigation of changes in this dynamic system. In order to better understand the reasons for the current situation and also to identify potentials for future development, such an approach requires an analysis of the past. In other words a static 'photographic shot' of the system can only catch a certain moment in time. To better understand the direction of progress of the system, several such shots are necessary to gain a reasonable insight and make a prognosis on how the system will or should evolve. This was attempted in this study in several ways. The development of agricultural production and exports were used as an indicator for the efficiency of the Ministry to develop new commodities and increase production. Developments were reviewed in the period 1976 to 1998. The development of staff and resources were reviewed in the period 1984 to 1998. This allowed the investigation into which extent staff and resources were adequate in enabling

good services to the Ministry. Changes in the working approaches and methodologies used by research and extension were recorded at the beginning of the field phase in autumn 1994 and again at the end of research phase in 1998. This long period of observation enabled changes to be traced, which are not visible in short term observations. Thus, it allowed accurate judgement on the impact of participatory methodologies that were promoted by PRAP and other donor projects[24].

3.2 The role of the researcher

In PAR, the research process is influenced by the relationship to the clientele and the tasks at hand. In this respect the researcher's own personality has an influence, too. The researcher is required to keep close contact with his partners in research. Therefore, it is almost impossible to eliminate subjectivity. The researcher is part of the process and thus his personality influences the research process and its outcome.

Before, during and after the field phase, the researcher held different positions that were linked to his professional career and employment status. A description of the roles and their influence on the research process is given here.

Before the field phase the researcher worked for two years in the EU Delegation. His post of donor representative enabled him to meet with Government representatives and the top-level management staff of other institutions. In this period, first contacts with management at MAFF were made, which facilitated later work in the Ministry. Through this development a good overview about the country and its institutions was gained. The research design for study was developed in this period.

Next, the researcher held the position of interim PRAP Programme Co-ordinator (11.94 - 4.95). This post required, in particular, leadership and negotiation skills. Leadership was necessary to run the programme with its eleven components and 14 experts. While, negotiation skills were needed to merge the interests of the donor with those of the various national and regional partner organisations. In this period, the research design was finalised, a first workshop was conducted, and the terms for the PRA training course were negotiated with the Ministry.

During the core field phase (5.95 - 12.95), the researcher worked as consultant attached to PRAP P11. Now, full attention was given to the organisation and implementation of the research activities. The core task was the PRA training course. The task required the researcher to perform several roles or functions: trainer and teacher, resource person, facilitator and moderator and, of course, researcher. The trainer/teacher role was evident for the PRA training course. The role as resource persons related to specific areas of competence and experience. These were useful for the PRA team members, but also in particular during the discussions with farmers. The differences in experience and knowledge between the researcher and the main partners (farmers, researchers, extensionists) were an asset for discussions. As information was shared, discussions became more meaningful and practice oriented. The role of facilitator and moderator was

[24] An overview on the support measures of the main donors is provided in chapter 6.1.1.

required in particular during the PRA fieldwork. 'Handing over the stick' to the farmers required staying behind and enabling them to express their own views. Also during the preparation and analysis stages, the researcher tried to facilitate rather than to teach in order to enable more learning by self-discovery of the team members. Lastly, the actual role of 'the researcher' was to keep an overview, plan the activities, and to observe and analyse the on going processes. An important aspect of the research role was the systematic documentation of the process and its findings.

In the period after the field phase, (1.96 - 7.2000) the researcher's role can be best characterised as that of an external observer and analyst. The activities in Fiji were followed via project progress reports, internet publications[25] and email correspondence with former colleagues. These activities highlight the role of the observer. The aspect of analyst refers to the intensive literature studies and the analysis of all the data collected in the field which in turn provided new insight and room for reflection.

Working in these different roles and positions made it easier to understand other actors and to slip into other roles. It increased the awareness that the position affects the rational, worldview, context and behaviour of any actor in a knowledge system. Changing roles facilitated the understanding that ones current own perception is only just a tiny part of reality. This again helped to become more aware of one's own subjectivity, which in turn increased the tolerance and interest for other views and ideas. But the different roles held, also created some irritations. In particular at the beginning of the field phase, partners were not always clear about the role of the reseacher. It was surprising for them that the 'donor representative' or 'program co-ordinator' suddenly worked on the field level. Overall, the different roles held permitted a deeper penetration into the subject and enabled a more comprehensive understanding.

3.3 Chronology of research activities

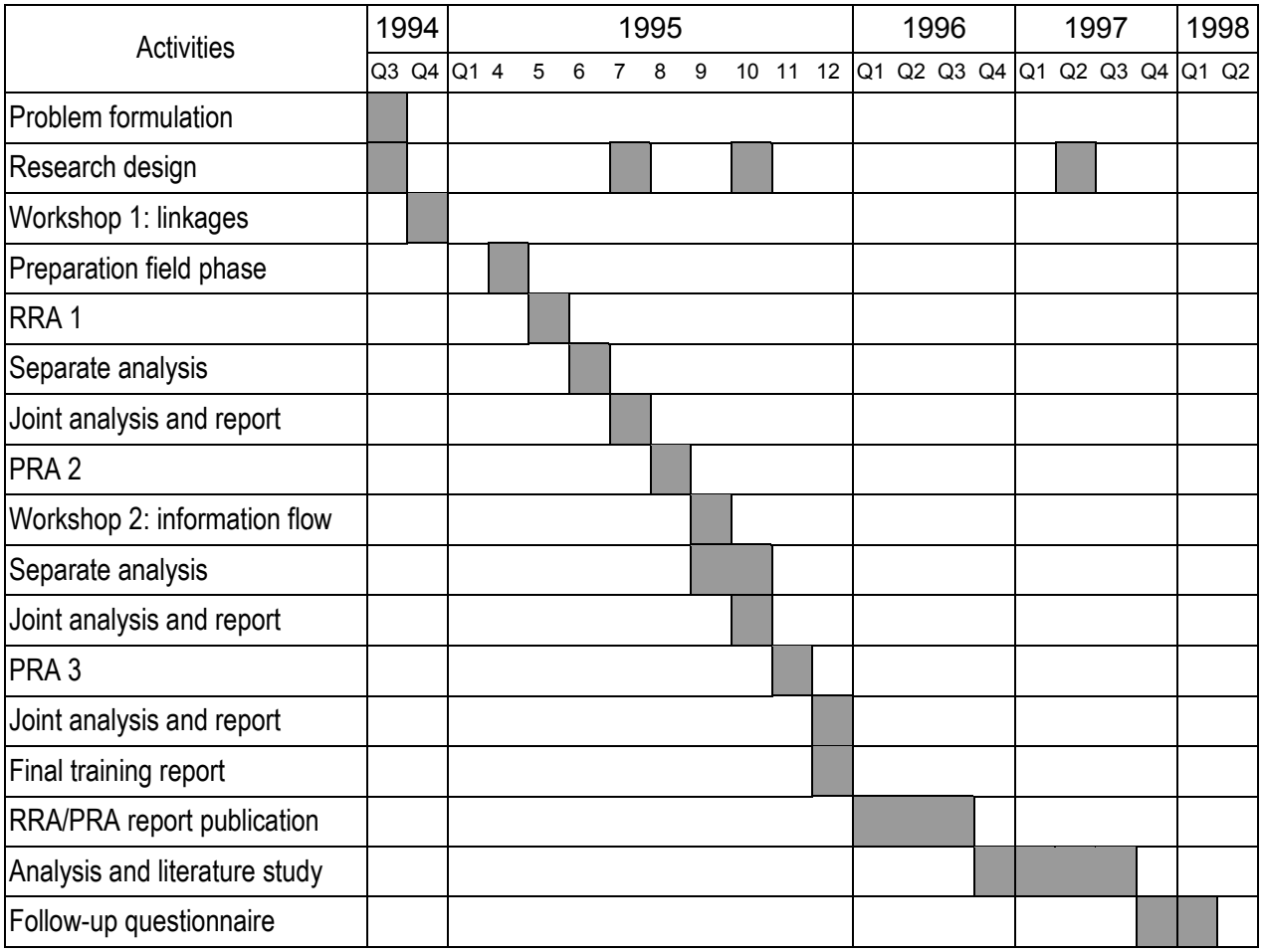
The methodological aspects of the research activities are discussed in two steps. At first, the main research activities are discussed in chronological order. All activities are explained briefly, and reasons for a better understanding of the sequence of the research activities are given. In a second step key methodological aspects of selected research activities are conferred in detail. Particular reference is made to the following points: workshop design and composition of participants in the workshop, a training course in participatory methods, questionnaire design with survey units and sample size.

The research design and problem definition for this study were formulated earlier in 1994. The practical field implementation started with a workshop to examine linkages, and technology development and diffusion at MAFF in November 1994. The workshop result indicated a clear lack of participatory methods at MAFF. For this reason, a training programme for participatory methods was set up. The training programme started in May 1995 and ended in December 1995. This constituted the main field phase. The training

[25] The internet developed fast in Fiji. Government, the local journals, magazines and the private sector started publishing information in the net. This was a good opportunity to stay in touch with the 'other side of the world'.

course was devided in three cycles starting with an RRA and followed by two PRAs. Each RRA/PRA was divided into the phases, preparation, field work, separate analysis, joint analysis and write-up of report. During the training course, in September 1995, a second workshop was held. This workshop focused on an analysis of the information flow at MAFF. A training report and detailed reports on all RRAs/RPAs were published shortly after the researcher left Fiji in 1996. Then, the analysis of the field phase started. In a detailed literature review the researcher became aware of the latest AKIS concepts suggested by RÖLING 1995 and ENGEL 1995. This led to the formulation of the platform model as presented earlier in chapter 2.2.4. A new research topic (RT 4) on platforms was added to the original research design. Necessary questions were included in a follow-up questionnaire that was distributed in Fiji in November 1997. Besides testing the platform model, the purpose of this follow-up questionnaire was to assess changes in the working methods used at research and extension and assess the impact of the training course of participatory methods. The follow-up questionnaire was analysed in 1998 and the present study was compiled in the following two years. The chronology of research events is summarised in Figure 6.

Figure 6: Time chart of research activities



In the following paragraphs important methodological aspects of the main research activities are conferred.

Investigation of the Fiji AKIS

In chapter 2.2.4, the procedure to analyse the AKIS in Fiji has already been outlined in broad lines. Some additional information shall be provided here to specify the different sources of information used. For the examination of the core actors in the Ministry Research and Extension Division, project reports and in particular the Ministries annual reports and other publications were used. These findings were complemented by own observations and informal interviews with Ministry staff and other project experts during the field phase. The review of the role and problems of farmers in the AKIS relied mainly on the results of the RRA and PRAs. Workshops on linkages and information flow investigated the other actors who played significant roles.

Linkage and information flow workshops

The first main field activity focused on the analysis of existing linkages and information flow in the Ministry. Two workshops were convened to gain insights into this subject. The first workshop on linkages was held in Suva in November 1994 and the second workshop was held at Koronivia research station a year later, in September 1995. One day was allocated for the first, and two days for the second workshop. The composition of participants in the two workshops is shown in Table 5. In total, 35 respectively 39 participants attended the workshops. Attention was placed on a good representation of all MAFF divisions and management levels. The first workshop had a stronger emphasis on the core divisions research and extension, while the second workshop had a higher representation of top management and the section for Economic Planning and Statistics (EP&S). In addition, 6 observers mainly from regional and educational institutions were invited to broaden the range of actors.

Table 5: Composition of workshop participants

Group of participants	Workshop I	Workshop II
Top management	3	5
Research	10	5
Extension	8	8
EP&S	2	5
Other divisions	6	4
Project experts	6	6
Observers, others		6
Total	35	39

In relation to the total staff numbers in the various divisions, about 15 % of the permanent staff were present. Top management was represented by about 1/3 of all members in the second workshop. The six project experts in the workshop corresponded to about half of the expert community working with MAFF at the given time[26]. Thus, the composition of both workshops can be rated as a good cross section of the different actors in the AKIS. Working in small groups of 4 to 6 participants combined with plenary discussions made it possible to analyse linkage and information flow problems in depths. The group results were documented on pin boards and the researcher noted, every evening, observations and main contributions during the discussions in a mind protocol[27].

[26] Due to fluctuating numbers, a precise calculation was difficult. For Ministry staff, more details are given in chapters 5.3.3 and 5.4.2.

[27] Own observations and records were complemented by the project reports of the funding projects.

Training course in participatory methods

The training course had tree main objectives:

- to train staff in data collection techniques with particular emphasis on PRA tools.
- to analyse the training process and draw conclusions for future training measures.
- to study farmers' problems and their interaction with the Ministry.

Reaching these objectives required the preparation of a training programme, the moderation of the training sessions, the observation of the training progress and the actual implementation of the field work. Dealing with these multiple tasks simultaneously required quick decision making and a frequent re-planning of activities. This was facilitated by a constant monitoring of the progress of the team on a joint plan of operation that was visualised on a wall in the office. This also helped to keep other partners up to date with our programme.

The RRA/PRA training course was designed as a 'train the trainer' course. The idea was that the researcher would train a number of 6-8 MAFF staff that would become the key resource persons for PRA and train other MAFF staff in the future. As a training method, it was considered best to have a practical 'on the job training' concept. This meant that participatory methods should be taught by repeating and applying the tools several times. To improve linkages between the divisions, it was planned that staff from all major divisions of the Ministry should be included in the course (Research (RD), Extension (ED), Economic Planning and Statistics (EP&S) and Animal Health and Production (AH&P)). The selection of suitable candidates was left in the responsibility of the Ministry. This, however, created a few initial problems. Although the training course was agreed on by MAFF four months before the start, the Ministry had difficulties in selecting the relatively high number of staff needed[28]. Finally, the Ministry could send only four staff members: extension (2), research (1) and EP&S (1). These trainees will be further referred to as the PRA team. For the entire training period the PRA team was located at the main research station in Koronivia.

Table 6: RRA and PRA cycle length in weeks

Phase	RRA 1	PRA 2	PRA 3
Preparation	1.5	4	1.5
Field phase	0.6	1.5	1
Analysis 1	4	5	1
Analysis 2	3.5	6.5	-
Total weeks	10	17	3.5

The training course was split in 3 rounds, a first RRA and two following PRAs. Each round constituted a separate learning cycle that permitted recommendations for the following round. The length of the three cycles is depicted in Table 6. The first RRA had a medium length with 10 weeks, the second cycle was the most detailed one with 17 weeks and the last PRA had an emphasis on 'rapidity' and was completed in 3.5 weeks. While all cycles had a similar field phase with 0.75 to 1.5 weeks, preparation and analysis times differed strongly. The first and the last cycle had short preparation periods

[28] Several aspects added to the problem. The number of staff available at the Ministry was rather low and it was therefore difficult to attribute staff for new tasks. Another problem had to do with the qualifications of staff. As staff with good qualifications were scare, there was a certain concurrence among donor funded project to compete for these counterparts.

(1,5 weeks), while PRA 2 was prepared in more detail (4 weeks). Analysis for the first two cycles required 7 to 12 weeks. It was grouped in two almost equally long phases of separate and joint analysis. The rationale of this division was to enable a better judgement on the abilities of the PRA team members and in particular to test their ability to work independently. In practise, analysis consisted of a short 1-2 day joint discussion of the main field findings and an agreement on how to analyse the information was made. Then, the researcher left to Germany and the PRA team worked independently for a period of 4-5 weeks. Upon the researchers return, the results of this separate analysis were then compared and a joint report was prepared. The reports were presented in half-day workshops to MAFF staff and other interested experts.

The preparation and implementation of the RRA and PRAs followed a structure of 16 steps proposed by NAGEL et al. (1989, 7). The steps cover various aspects starting from problem definition, across research design, implementation and analysis, to utilisation of results. The sequence of steps was originally designed to implement formal surveys with the help of RRA. As a working hypothesis, it was assumed that the sequence might be considered as universal to implement any type of data collection process such as RRA or even PRA. During PRA 2, the sequence was tested completely. In the first and the last cycle, some steps were omitted to save time.

To obtain feedback on the training measures, an evaluation questionnaire was filled out by all PRA team members after each step and at the end of each training cycle. In addition, the researcher kept a daily diary to record the activities carried out and observations that emerged in the process.

During the field work of the three RRA/PRAs, an estimated total of 148 farmers in 20 locations participated in the exercises. In the first RRA, 33 farmers were consulted. In the following two PRAs another estimated 64 and 48 farmers consecutively participated in the PRAs. All PRA activities were facilitated as group exercises. To investigate differences among farmers, three types of groups, average, advanced and women groups, were formed. Group sizes varied from location to location consisting of between 3 to 8 farmers. Sometimes farmers joined the group spontaneously or left prior to the full completion of exercises. For this reason the total number of farmers could only be estimated[29]. This large number of farmers combined with the grouping, permitted a good insight into the diversity of farms in Fiji. At the same the time, the field phase required intensive co-ordination with the field extension offices of the Ministry. This, together with many informal discussions with the PRA team members, permitted the study of the interaction farmers on the one side and the Ministry on the other.

Questionnaire

The above experiences during the PRAs, together with a study of existing documents, formed the basis for the individual analysis of the research and extension divisions of the Ministry. These results were compared with the findings of a formal questionnaire distributed at the end of the research period, three years after the first workshop. The

[29] The estimate is based on 4 farmers per group, a conservative assumption. The total number of farmers (including part time participation) is therefore even higher. In the first RRA, 12 locations were visited. In the following 2 cycles, 4 more each were visited. Among the 20 locations visited, 12 locations were settlements and 8 villages.

purpose of this follow-up questionnaire was to gain information for two lines of inquiry. First, its function was to trace the changes in the AKIS due to the various project interventions and in particular the training course on participatory methods. Second, the model of platforms for innovation development was presented with a short paper and a discussion of the concept was stimulated with a range of open questions[30]. The main purpose here was to evaluate, to which extent, this model might be suitable to reduce existing linkage problems in the Ministry. The questionnaire was distributed to five groups: research, extension, top management, project experts and the trainees in the training course on participatory methods. To account for the different working approaches used in the different divisions, the questions were formulated specifically for each group. The questions regarding the interaction and linkages between the divisions were the same for all groups. The set of questions on platforms was equally identical for all groups. The length of the questionnaire was adjusted so that it could be filled within a 1 to 1½ hour time period.

The questionnaire was sent via email to Fiji and copied locally by PRAP P11 and then distributed within the Ministry in December 1997. To secure the anonymity of MAFF staff, the questionnaires distributed did not ask for the name of respondents. Only the division, position and function were recorded. The questionnaires were recollected by P11 and returned to the researcher in February 1998. In total, 60 questionnaires were distributed of which 41 were returned. Table 7 highlights the sample size and distribution of respondents. The average rate of returned questionnaires with 68 % may be considered as good. All members of the PRA training course replied and also extension staff had a very high rate of replies with 88 %. Two thirds of experts and half of the researchers replied. The number of replies from top management was disappointingly low with only 2 questionnaires returning. Despite several reminders, no further questionnaires were returned[31].

Table 7: Questionnaire sample size

Addressees	Questionnaires		
	distributed	returned	
	no.	no.	in %
Top management	7	2	28
Research	16	8	50
Extension	24	21	88
PRA team	4	4	100
Project experts	9	6	67
Total	60	41	68

The information was analysed in a spreadsheet program using descriptive statistical methods (means, averages, and percentages).

It may be asked why the various divisions were not interviewed with a questionnaire at the beginning of the field phase. This point was considered, but at that time another project (SCEP) had already started a questionnaire survey to review in particular the research and extension division[32]. In order to avoid duplication of efforts and not to hinder

[30] The questionnaire was distributed by email to most experts. The simple reply function of these email programmes allowed, in several cases, for discussion as the questionnaires went back and forth several times.

[31] Work overload of management may be the main reason for not replying.

[32] The results of the report on the Research Division were also used as additional reference in this study (cf. DOWLING and KUMAR 1995). The report on the Extension Division was not yet completed

the few Ministry staff with yet another survey, the researcher decided to refrain from distributing a parallel questionnaire.

Case studies

Four case studies were selected to illustrate the work of the Ministry with the help of a few practical project examples. The cases are examples of projects that were implemented by MAFF in co-operation with different donors. Each case examines the following elements: brief history, project goals, research and extension approaches, farmers' participation, configuration of actors involved, and a comparison of the main strengths and weaknesses.

The first case study is an example of the Ministries approach during the 1980s. It shows a large scale project with a straight "transfer of technology" approach. The other three cases describe projects that applied participatory methods for technology development and diffusion. As the first case study is an older MAFF project, the assessment was based on discussions with former staff, visits to the project area and available reports. The three other case studies were all EU funded projects. The researcher was familiar with these projects through several field visits during implementation in the role of donor representative and later as program co-ordinator. Internal project reports and discussions with the project experts and other local project staff provided complementary information.

The case studies were also used to validate the platform model. The assessment focused on the question to which extent the projects, seen as platforms, contributed towards innovation development and diffusion. In this respect the study cases complement the findings on platforms derived from the follow-up questionnaire.

3.4 Tools and data quality

Given the complexity of the subject studied, it is evident that a proper analysis could not be achieved with a single or standardised method only. Studying the Fiji AKIS and all the interaction of several actors required a comprehensive approach with a systematic combination of various tools and methods.

To explore something unknown requires an open mind, flexibility in the concept and step-by-step progressing. Qualitative research tools, such as PRA tools and in particular open approaches to questioning, are ideal for such explorative research. It is not the aim of this study to describe these tools here in detail. Descriptions on the tools and manuals on PRA are already published in considerable numbers[33].

Qualitative research tools can produce a wealth of information. At the first stage much of this information is descriptive. Therefore, the information may be difficult to analyse and many researchers of the positivist fraction consider it as less reliable, only case specific and generally subjective. To improve the reliability of qualitative information, it is

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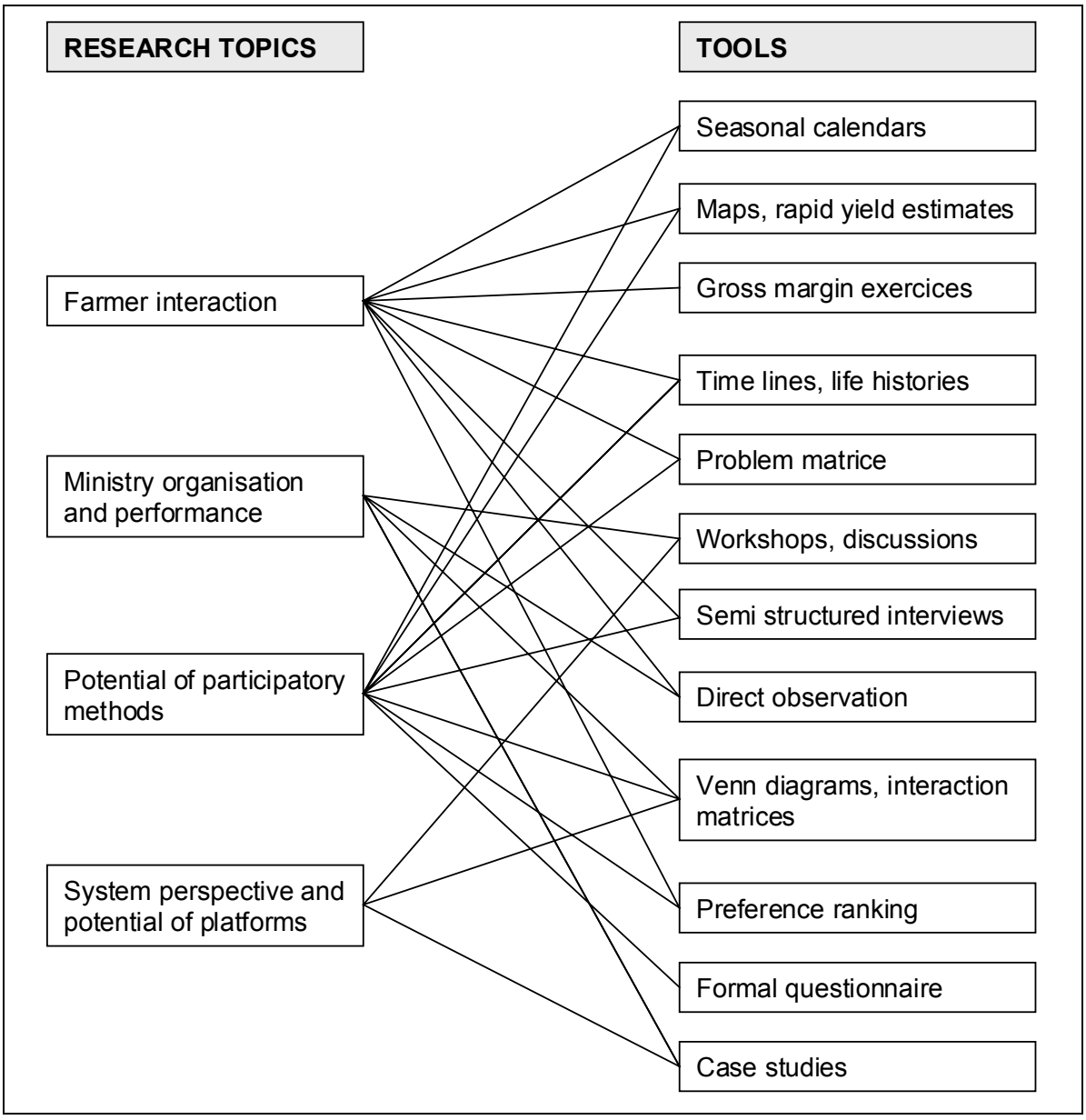
when the researcher left Fiji. Later the report was classified as confidential so that it became impossible to obtain a copy.

[33] A selection of manuals and trainer guides have been published in the meantime (e.g. THEIS and GRADY 1991, LEURS 1993, SCHÖNHUT and KIEVELITZ 1994; PRETTY et al. 1995).

necessary to cross check the information gained with one tool or method with other tools or methods. Triangulation is such a systematic method of cross checking. During the training course a graphic tool to display triangulation was developed. Figure 7 illustrates the method at the example of this study.

Figure 7: Triangulation of tools and research topics



The research questions or variables on one side were faced with the different tools used for the investigation on the other side. Then all variables are linked with arrows to the respective tools. The chart permitted to control that all research questions (variables) were investigated via several (at least 2) tools or means of investigation. This chart depicts very well the triangular (or even multi-angular) links of research questions and tools. It creates a visual possibility to verify whether there is a good balance between research questions and tools used. Two different types of triangulation were used; methodological and data source triangulation. The first refers to the different methods or tools used. The second checks if information remains the same at other times, other locations or with other

informants. For example in this study farmers' problems and interactions with the Ministry were investigated with several tools such as seasonal calendars, maps, life profiles, gross margin exercises or field walks, just to name a few. Data source triangulation included the selection of several locations and of different respondents (average and advanced farmer groups, women groups).

The above approach was one aspect to ensure a good quality of information. Another has to do with the method of participatory action research by itself. The nature of advancing the research process in cycles produced the chance to verify findings from one cycle to the next. An intention was not to extract findings, but to discuss them, derive conclusions and feed these back into discussions again in order to allow sharing and validating of conclusions and emerging new ideas. This approach was crucial for the analysis of the AKIS. Regarding the different viewpoints and tools used, it cannot be concluded that any one perspective is right or wrong, better or worse than another. The many viewpoints and methods create an overall richer picture of the AKIS, and help to gain a better understanding. This richness of picture may be seen as an indirect quality indicator that the recommendations derived are well founded and constitute a good starting point for a reorientation of the Fiji AKIS.

4 Fiji: country and agricultural development

This chapter serves the purpose of providing an introduction into the country and it's agricultural sector. The chapter begins with a description of the country's basic conditions for agricultural production. This is followed by an analysis of agricultural development in major commodities.

4.1 Basic facts

4.1.1 Geography

Fiji is located in between 15° and 22° southern latitude and 177° western and 175° eastern longitude. The date line, which would separate the country in two zones, is indented towards the east to include all islands of the Fiji group. Out of the 332 officially registered islands only about 100 are inhabited. The two main islands Viti Levu and Vanua Levu account for more than 85 % of the total land area (18,272 km^2) which is about equivalent to one quarter of the size of the German federal state of Bavaria. The larger islands are of volcanic origin and very mountainous. The highest peak Mount Victoria reaches 1324 m. In contrast, most of the outer islands are flat atolls with very limited land area, coraline soils and coconut palms as the dominant vegetation.

Administratively, the country is divided into four divisions. The main island is divided into a western division (north-western side) and the central division with the capital Suva in the south-east. The second largest island Vanua Levu together with Taveuni and Rotuma build the northern division. Kadavu, the outer islands of the Lau group and Ovalau, with the old colonial capital Levuka, form the eastern division. The two main islands are less than 100 km apart and well connected by air and sea links. However, some of the outer islands are up to 800 km away from the main island and transportation is very limited.

Despite improvements in the transport systems, these islands' remoteness is still a major constraint factor for development. The distance to the closest markets in New Zealand and Australia is 2100-3000 km (Berlin - Casablanca), Japan 7000 km (Berlin - Calcutta) and the American market is at a distance of 9000 km (Berlin - Johannesburg). These long distances lead to high transport costs that hinder trade between countries and also increase the cost of providing administrative services and facilities such as schools and health centres on national level (EUROPEAN COMMISSION 1989, 8).

4.1.2 Population and ethnic groups

Using the 1986 population census data, the population in Fiji was estimated at 803,000 for 1998. Following Papua New Guinea, Fiji has the second largest population of the small island states in the South Pacific. However, in the global context all Pacific Island countries together account only for 0.14 % of the World population (Table 8).

Table 8: Fiji in global comparison.

	Population 1998 (million)	Percent of total	Area (1000 sq. km)	Population density 1998	Growth rate p.a. (1980-85)
Fiji	0.8	0.00013	18	44.4	1.7
Pacific Islands	8	0.14	1 349	5.9	1.8
Asia	3 363	56.7	27 160	123.8	1.7
Africa	761	12.8	30 307	25.1	2.9
Latin America	507	8.5	20 535	24.7	2.3
North America	301	5.0			
Europe	798	13.4	4 933	161.8	0.3
World	5 927	100	135 793	43.6	1.7

Source: U.S. Bureau of the Census 1999, A-3; STATISTISCHES BUNDESAMT 1988, 31.

Since the beginning of the century, the population in Fiji has grown more than sevenfold. The largest increase occurred in the two decades following World War II. The population growth rates of the then 3 % per year have dropped to 1.2 % today. This being the result of a family and birth control programme that started in the early 1970s. Together with the family planning programme in Singapore this success was considered a model for the third world countries (CONNEL 1984, 307).

Today's Fiji is a multicultural society of indigenous Fijians, Indians, Chinese, Europeans and other Pacific Islanders. Before the colonial times, only Fijians and few other Pacific islanders populated the islands. Late in the last century, up to 1916, the British colonial Government invited workers from India to settle in Fiji and work in the sugar plantations. Most of these workers stayed and the Indian population grew steadily. By its independence in 1970 the Indian population already outnumbered the indigenous Fijian population. This led to increasing conflicts between the two ethnic groups. Soon after the Indians won the political elections for the first time in 1987, two military coups brought the indigenous Fijians back to power. The military coups led to considerable political unrest and many Indians migrated overseas. This caused a severe loss of skilled labour and urban elite. Though, the ethnic tension was high, the conflict never escalated in open violence. Several attempts to solve the conflict and re-establish a democratic constitution failed (cf. YUNUS RASHID 1995; VASITI WAQA 1994). Finally, in 1997 a new democratic constitution could be agreed on and for a second time an Indian politician was elected Prime Minister. It may be hoped that this sensible attitude will further guide the countries' political developments in the future[34].

[34] Unfortunately, new political unrest was triggered in May 2000, when a group of indigenous Fijians assaulted Parliament and took a large group of members of Parliament including the Prime Minister hostage. On condition of a new review of the constitution, the hostages were released. The full impact of this new political crisis is not clear, yet It may be anticipated that this will cause a new economic crises and lead to new losses of skilled labour due to the migration of Indian citizens (cf. MINISTRY OF INFORMATION 2000, several press releases in May to July 2000).

4.1.3 Climate

Surrounded by the huge Pacific Ocean, Fiji has a moderate tropical climate. There are two main seasons. The rainy season (summer) from November to March and the dry season (winter) from April to October. The rainy season is largely determined by the southeasterly trade winds that carry huge amounts of precipitation in summer. The large islands of the group all have distinct dry and wet zones. The southeastern parts of the islands receive in between 3000-5000 mm of precipitation as the clouds hit the main mountain range first. In the lee, the northwestern side of the islands is much drier with 1800 to 2500 mm of precipitation. The same drier climate applies to the low-lying atolls. The southeastern zones receive rain throughout the year with rather little differences in winter and summer, while the northeastern zones have a marked dry season from June to September. Of importance for agriculture, is the high variability in rainfall. The chance of having actual rainfall close to the average in any given month is quite small. For example records at Sigatoka research station, which is representative for a dry zone climate, show that every month in the period of 1927-72 was either the highest or the lowest rainfall month (CHANDRA, 1979, 6).

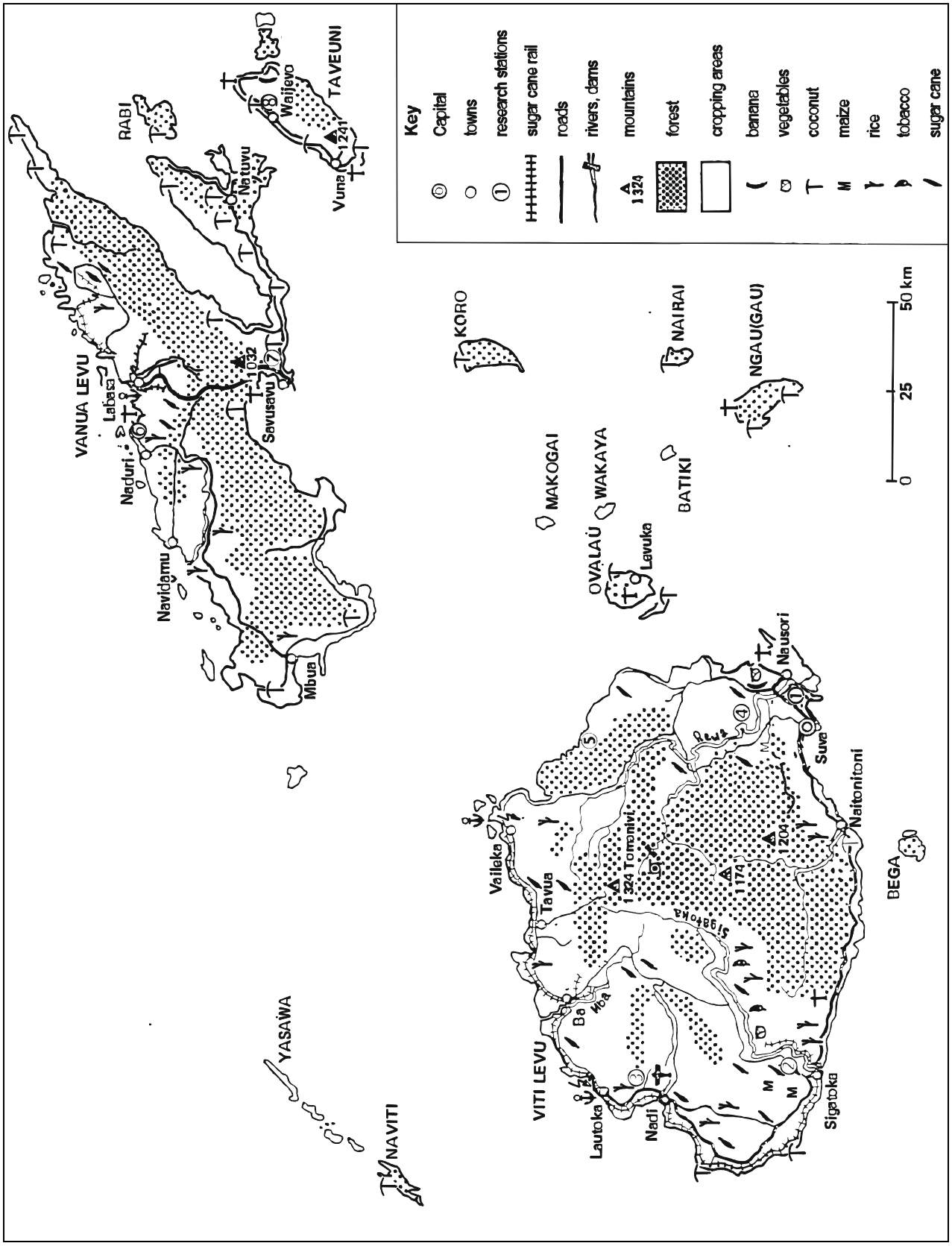
Fiji has relatively mild temperatures, a reflection of the oceanic influence on the climate. Temperatures are warm throughout the year with daily averages around 25° C in winter and 28° C in summer. This is also the season when tropical cyclones occur. These cyclones cause heavy windstorms and flooding. Minor cyclones come to pass almost every year. Larger devastation, due to cyclone storms is recorded on average every four years, severe flooding every five years (CHANDRA 1983, 6).

In recent discussions, global warming is often argued as a factor that might even increase the number of events and intensity of the cyclone storms. Another associated effect, sea level rise, would represent an immense danger for all Pacific Island countries. While small atolls could even be submerged by the sea during storms, larger islands face extensive flooding of low lying areas and damages to the reefs with unpredictable consequences for the overall eco system.

4.1.4 Topography, land use and major farming systems

Due to its volcanic origin, most islands of the Fiji group are very mountainous. Almost 70 % of the land is on steep slopes and, in particular in the wet zone, still largely covered by rain forest. The remaining 30 % of land is partly flat or gently hilly and constitutes the major agricultural areas. Arable agriculture is possible on flat to gently rolling country, whereas agro forestry or pastoral farming systems can be extended to relatively steep slopes. Out of the 1,820,000 ha of total land, flat and gently hilly land combined, constitute about 590,000 ha. This demonstrates the small size of the available resource base. According to the 1991 agricultural census, all this land is already being farmed (MPI 1992, 84). Hence, most suitable farming land is in use and further expansion will go to an increasing extent into marginal lands with higher risks of soil erosion and degradation. Figure 8 depicts the major type of land uses.

Figure 8: Land use and economic structure



Source: adapted from STATISTISCHES BUNDESAMT 1986, 80.

Despite the rather small size of the country, factors that determine agricultural production are surprisingly variable. Consequently, a large number of different farming systems exist. A detailed description would be outside the frame of this general introduction. CHANDRA (1983, 46) describes a simplified model for farming systems that uses the rainfall as main criterion and distinguishes three rainfall zones. The model is presented in Figure 9.

Figure 9: Crop and livestock enterprises in relation to rainfall

	Zones		
	Wet	**Intermediate**	**Dry**
Rainfall	> 3000 mm / yr.	2000-3000 mm / yr.	< 2000 mm / yr.
Seasonality	weak	moderate	strong
Crops	Coconuts	Vegetables	Sugar cane
(most preferred zone)	Wetland rice	Cocoa	Irrigated rice
	Ginger	Passionfruit	Dryland rice
	Cassava	Maize, sorghum	Pulses
	Taro	Broomcorn	Yams
	Yaquona	Tobacco	Citrus
	Bananas and plantains	Watermelons	Masi
	Breadfruit	Sweet potatoes	Pineapples
	Coffee	Irish potatoes	Mangoes
		Turmeric	
Livestock	Dairy cattle	Beef cattle	Goats
(most preferred zone)	Poultry, pigs	Horses	Sheep

Source: CHANDRA 1983, 47.

The model represents only a simplified distribution pattern of crop and livestock enterprises, as all enterprises are to some extent actually farmed in all zones. Most of the agricultural activities are concentrated on the main island, Viti Levu, because this is where most markets and the best infrastructures are. The remaining islands have a much smaller choice in agricultural activities, as they face the difficulty of small consumer populations, restricted markets, low infrastructural support and poor accessibility.

4.1.5 Land tenure

Land is a very sensitive subject in Fiji. To understand the current land distribution and land rights, it is essential to have a closer look at the historic development.

As it is the case with many of the indigenous peoples of the South Pacific, the life of the Fijian is very much bound with the land. It represents his major source of security, and is the only permanent material asset he and his children possess. The social customs and nature of the Fijian are such that it is almost impossible for him to acquire (or rather retain) what more sophisticated societies regard as material assets. The Fijian, therefore, places tremendous value on land and feels entitled to it. He regards retention to this entitlement as the essential safeguard of his heritage. The Fijian system of land tenure is, basically, one of entailed freehold, and is closely tied to the Fijian social structure. The Fijian way of life is based on closely related family groups, living together in villages, cultivating well-defined land areas originally acquired by conquest or occupation of empty land. Several such family groups, claiming decent from a common ancestor, are linked in a larger social unit - the *mataqali (*or *tokatoka,* or *yavusa)*.

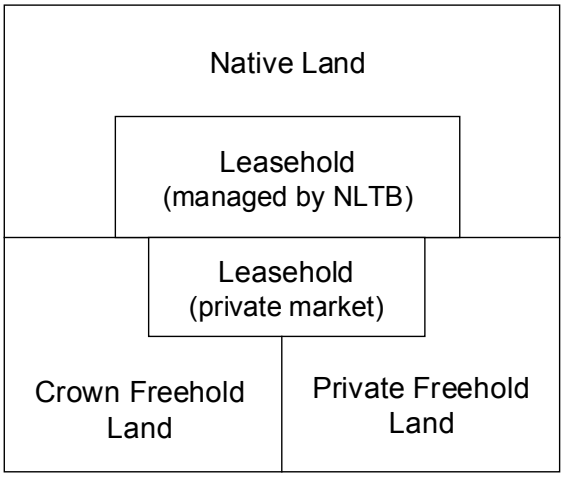
First changes to customary land tenure began to creep in when the first settlers arrived and bargained with chiefs for land to establish plantations. It was not until the middle of the last century that chiefs realised that the land they had given, had in fact, been alienated from them for good. Faced with the treat of becoming landless, the chiefs tried to cede Fiji to a powerful authority. Negotiations to cede Fiji to the British crown started in 1874. The Terms of the Deed of Cession divided land into three different groups of land ownership system. These were:

- **freehold land** (8.2 %), alienated land which had become bona fide property of Europeans and other foreigners,
- **crown land** (8.6 %), land yet to be claimed by Fijian owners, extinct mataqali land and land required for public purposes,
- **native land** (83.2 %), land claimed by Fijian owners which is communally owned by a *mataqali* (MAFF 1994, A 4).

Because native land was not allowed to be sold except to the crown for public purposes, the concept of leasing began to emerge with the enactment of the Native Lands Ordinance in 1880. With the restructuring of the sugar industry in 1916, plantations were dissolved and the land was offered in small lots of 3 to 6 ha, to the Indian contract workers for lease. This colonial decision built the basis for ongoing land disputes (ORTLEPP 1986, 36).

Unable to buy land from freeholders (mostly Europeans) and from the Fijians, as it was illegal, Indians demanded better security of tenure and compensation for land improvements. In an attempt to solve these land tenure problems, the Colonial Government set up the Native Land Trust Board (NLTB) in 1940.

Figure 10: Partition of land



Source: own design.

The Board, as a non-Government corporate body, acts as an estate agency with the following main functions:

- to control and administer all native land for the benefit of the Fijian landowners;
- to control adequate land for the maintenance and support of the Fijian landowners;
- to lease out land outside native reserves in view of the economic development of the country as a whole;
- to secure realistic rents for the leasing of such land;
- and to prevent the wasteful system of the haphazard leasing of the most fertile land;
- to enforce good land husbandry (MAFF 1994, A 4).

Land legislation was revised again in 1967 with the Agricultural Landlords and Tenants Act (ALTA). The leases were concluded for a period of 30 years, thus, many of the leases would expire from 1997 onwards. This created considerable social unrest for the two main ethnic groups. According to a recent report of the NLTB (THE REVIEW 1994a, 22), Fijians argue that "*as a direct result of the colonial paternalistic attitude, Fijians were largely discouraged from actively taking part in Fiji's economic development. This is vividly reflected in many acts and regulations solidifying communalism and discouraging individualism.*" Today, Fijians are increasingly aware of living in a cash economy, and would like to take back part of their best native lands, which are leased out. On the other side, the Indian farmers would like to have the renewal of their leases and the payment of compensations in the cases that leases are terminated.

Continued uncertainty about the settlement of the land question, lead to a stagnation of investment in agriculture, which is felt, in particular, in the sugar belt. The issue was discussed frequently in Parliament; however, no for all parties acceptable, solution could be identified (cf. THE REVIEW 1994b, THE COURIER 1996, 13). Recent surveys indicated that 70 % of the leases might be renewed and that Government will offer a resettlement scheme for those farmers that cannot achieve a renewal of their lease[35].

4.2 Productivity development of selected crop enterprises

The current chapter examines the actual production development for a selection of important crops. The central aspect of the analysis is to assess the performance of the Ministry in promoting agricultural innovations in order to diversify agriculture that is heavily concentrated on sugar cane production only. Observing and analysing innovative developments has some methodological difficulties. One way to assess innovations would be to study statistics on the technology developed and the respective adoption rates by farmers. However, the Ministry does not maintain such statistics. Therefore, a different approach is taken here. As a simplified correlation it is assumed that yield or production increases are caused by agricultural innovations. Thus, increases in crop yields or

[35] SUNDAY TIMES: Weekly review dated 8.8.1999.

production are considered here as an indicator for innovation development and the existence of successful research and extension services[36].

Therefore, a look at the countries crop production statistics for the last two decades is made. Production areas, total production and yield for a number of crops are compiled in Annex 2. The production figures are illustrated with the help of three charts. Figure 11 depicts the development of total production from 1976 to 1998 for major crops. Figure 12 depicts the development of yields in the same reference period. To which extent production changes are influenced by changes in the cropping area or yield is analysed in Figure 13. The data of Annex 2 is modified by regression analysis to calculate the average area growth in % per year and the average annual yield growth in % per year. The findings for all charts are discussed together for each crop.

Sugar cane is grown in the drier western climate, which has a high annual variability in rainfall. For this reason the production shows a strong annual fluctuation. In the reference period, production ranged from 2.2 to above 4 million tons. Sugar cane production exceeds the production of the second largest commodity rice by a factor of 200. This illustrates the dominant role of sugar cane within the Fijian agricultural sector. Sugar cane yields show a similar variation as total production, and varied in the range of 40 to 60 t/ha. Overall, sugar cane productivity could be rated as stagnant for many years. The regression analysis showed that cane yield has slowly declined with - 0.2 % per year. Another alerting fact is that current cane yields are below average by world standards (LANDELL-MILLS 1991, C2-2). Overall, however, sugar cane production rose slightly as the area under production increased steadily with about 1.7 % per year. These figures illustrate that apparently no major innovations to raise productivity could be introduced. On the contrary, productivity was on a slow decline. These findings are not good results for the privately owned research and extension services of the Fiji Sugar Corporation (FSC).

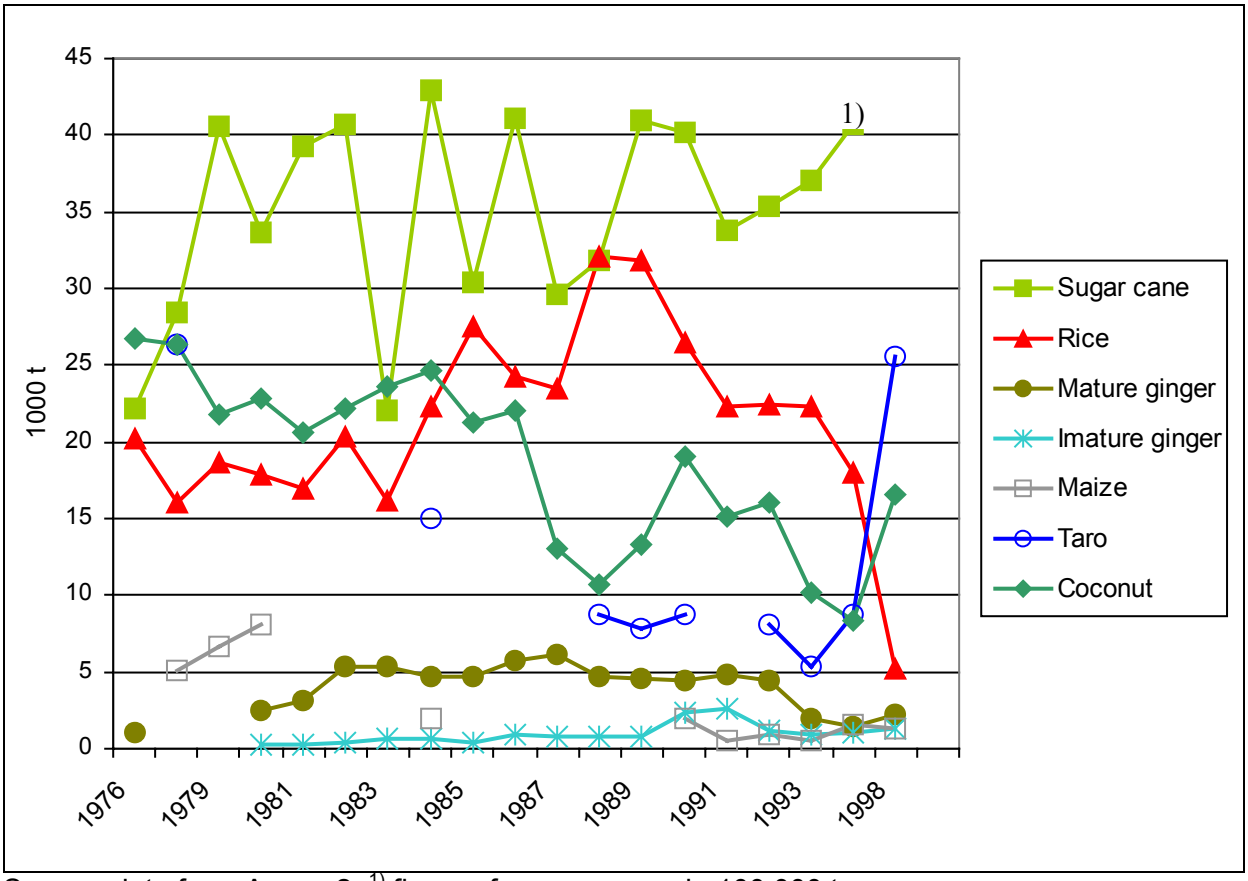
Rice production followed a humpback course during the reference period. Starting at about 20,000 tons, it rose to above 30,000 tons by the late 1980s, only to drop to below the starting figure in 1998. The production rise was achieved by a large rice scheme financed by the ADB. The project promoted a comprehensive package of 'green revolution' type innovations, including fertiliser, pesticides, improved varieties, training, irrigation, harvesting machinery and enhanced milling capacities (OVERTON 1988, 147). The project is now considered a complete failure with the 1994 local rice production being 20 % below the production before the project intervention and a drop in national self-sufficiency from 52 to 43 % (MAFF 1995, 9). Rice yields reach 2.2 t/ha and rose slowly in the reference period by about 1 % per year. But in the same time the production area declined at a similar rate (-0.75 %) which explains the overall drop in rice production. Thus, rice can be considered as an example of innovations being developed, but obviously not being able to be introduced successfully into practice.

[36] Changes in production may not always be caused by innovations, but also climatic factors and prices of commodities may have a substantial influence. This limitation must be kept in mind. Nevertheless, in the absence of precise data, the indicator permits at least an indirect way of assessment and a tentative judgement of the impact of research and extension services on crop production.

Very hopeful was the development of **mature ginger** in the eighties. Production rose from 1,000 tons in 1976 to above 6,000 tons in 1987. The entry of new exporters and better marketing promoted this development. However, since then, farmers faced increasing disease problems and the production declined to 2,170 tons in 1998. A grower shift from mature to the less diseased **immature ginger** partly compensated this effect. Production rose from 200 tons in the seventies to 2,550 in 1991, only to drop to about 850 tons in 1993. Since then, production and area have been on a gentle upward trend again. Yields for immature ginger rose from 1 t/ha to almost 3 t/ha in the early nineties. The regression analysis shows that this corresponded with an annual increase of 6.7 %. The area under production rose even faster at a pace of 9.1 % per year. These figures illustrate that ginger is an example of innovations being promoted quite successfully for a certain period of time. In this respect, a certain success in crop diversification could also be achieved. However, new efforts are required to fight the disease problems. Ginger now contributes only 1 % to agricultural export earnings, and therefore, even if the disease problem can be solved, it is evident that the crop can only play a niche role in agricultural diversification with a potential in the range of 2-4 %.

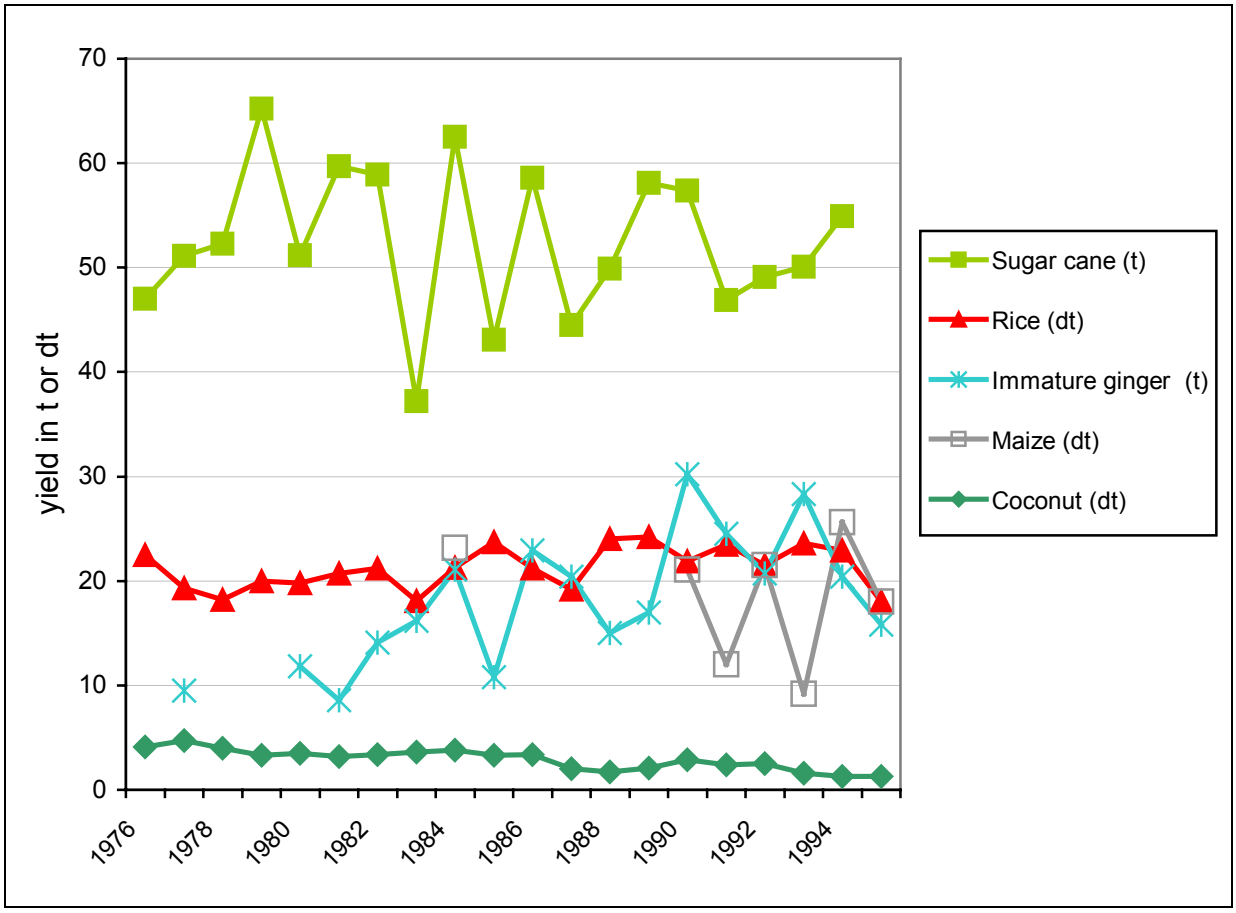
Maize was promoted as a diversification crop in the late seventies with production reaching 8,000 tons in 1980. However, since then production dropped to 1,300 tons in 1998. The regression analysis shows that the main reason for the decline is a reduction in production area of more than –5.7 % per year and an average yield reduction of -2.1 % per year. This long decline of almost 20 years indicates a clear lack of attention to this crop by MAFF.

Figure 11: Production development for major crops



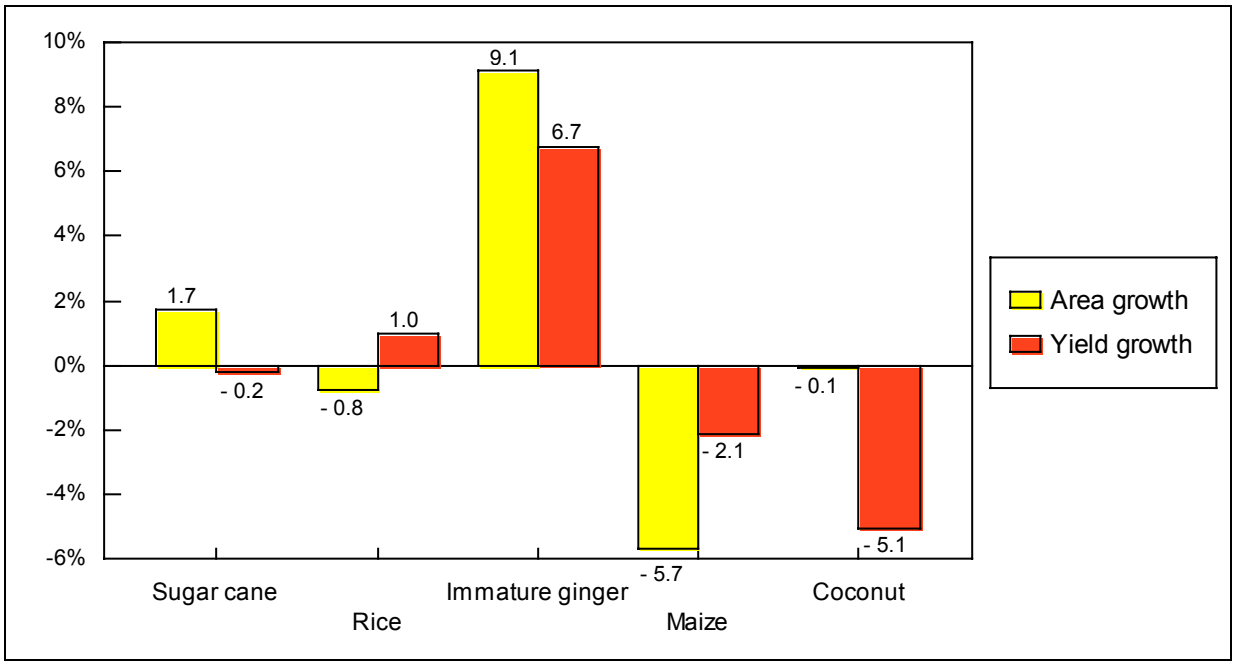
Source: data from Annex 2; [1)] figures for sugar cane in 100,000 tons.

Figure 12: Yield development for selected crops 1976-1998



Source: data from Annex 2.

Figure 13: Average area and yield growth in % per year for selected crops 1976-1998



Source: data from Annex 2; data modified by regression analysis.

The production statistics for the main staple food, **taro,** were not kept very consistently, and there are only production figures available for certain years. These show a strong rise in exports from 1,900 tons in 1993 to 6,800 tons in 1998. The main reason for the rapid export growth in the nineties lies in the recent introduction of taro blight in Western Samoa (BROWN 1995, 77). Production there was virtually wiped out by this terrible fungal disease, and Fiji managed to overtake an increasing part of Samoa's market share in New Zealand. This example shows that Fijian farmers and exporters were able to respond to new export opportunities quickly. The rise in production was, thus, not caused by innovations in the classical agronomic field (e.g. varieties, production techniques) but purely by an expansion of production area due to the new marketing option.

Copra production declined steadily in the reference period from 26,700 tons to about 8,400 tons in1994. According to DE TAFFIN (1993)[37] the major reason for the decline in production lies in the fact that the Fiji coconut palms are ageing, increasing numbers of palms are senile and replantation levels are far too low. This explanation is also confirmed by the regression analysis showing a slow decline in the area cultivated of – 0.1 % per year and a dramatic decline in yield with an average of - 5.1 % per year. Nevertheless, copra remains the main source of income for many rural Fijians, in particular for the population on the outer islands. For this reason the Minister announced coconut as new (old) priority crop for MAFF in 1996. A coconut rehabilitation centre with hybrid seed garden and coconut nursery was built on Taveuni Island to support the nation-wide campaign for coconut replantation. However, to date, replantation targets could not be met and farmers are still reluctant to plant new palms[38]. It remains to be seen if the introduction of high yielding hybrid palms, as currently supported by MAFF, can reverse the negative trend. Similar to rice, coconut is a commodity for which innovations were developed, but as yet could not be introduced successfully into practise.

MAFF also made attempts to promote the production of **cocoa, coffee** and **vanilla**. However, all these efforts were not very successful, with production volumes remaining at very modest levels[39]. An area were some progress was made are **fruits** and **vegetables.** In the five year period 1976-80, fruit and vegetable exports contributed on average only 0.8 % to all agricultural exports. In the period 1994-98, the average of fruit and vegetable exports had already reached 5.0 %[40]. For these crops, no detailed individual crop statistics were available. However, the overall increase in exports for fruits and vegetables indicates that innovation development and diffusion in this area was more successful. Compared to other crops, fruits and vegetables might have the best potential to contribute to the country's goal of export diversification in the near future.

Conclusions

The examination of production and productivity development for various crops depicted a mixed picture. Sugar cane production and yields stagnated over the last two decades. This

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[37] CIRAD coconut expert. Festive speech during the inauguration of the new EU funded Coconut Rehabilitation Center on Taveuni Island 6.3.1993.

[38] Samisoni Ulitu. Director Extension. Personal communication 30.11.1995.

[39] Production statistics were too irregular to allow a meaningful analysis.

[40] Own calculations based on FAO 2000.

is an indication that the privately operated research and extension services of the Fiji Sugar Corporation did not manage to innovate production techniques significantly[41]. A small increase in production could only be achieved via an expansion of the area under cane.

MAFF, responsible for all non-sugarcane crops, equally faced difficulties in diversifying and innovating agricultural production. The majority of crops examined in detail indicated only moderate progress or even failures to expand production (rice, coconuts, maize). Limited success was achieved in respect of ginger and the recent development for taro was equally encouraging. Among the crops reviewed only briefly, cocoa, coffee and vanilla were further examples for stagnating or declining production. Only the area of fruits and vegetables showed a significant increase in exports.

Considering the few cases of successes, the performance of the Ministry in terms of innovation development and diffusion can only be rated as unsatisfactory. A profound analysis of the reasons for successes or failures is outside the scope of this introductory chapter. However, a few important points shall be made.

Although several innovations were developed, the fact that farmers did not adopt these, is an indication that farmers' needs and problems were not properly taken into account. Production conditions at farm level and on international level were not sufficiently analysed. This deficit certainly contributed to a limited economic viability of innovations. This may be seen as one major reason for technology failures.

To reach the goal of export diversification, a good analysis of markets and innovations that promote local competitiveness are required. Furthermore considering, that all suitable land resources are in production, future development will have to focus on increased production intensity and efficiency. Unless this is achieved, further expansion of production is likely to lead to increased cultivation on steep slopes. This concern is raised in various publications.[42] However, little empirical information on the real extent of the problem is available. The first results of HOWLETT (1995, 39) on soil erosion in Fiji and other Pacific locations indicate that the concern of soil erosion may be overestimated. Problems of soil degradation exist, but they are by far not as pressing as, for example, in sub-Sahara Africa. Nevertheless, the question of the sustainability of farming systems and effects of innovations will need to be given more attention in the future.

This represents a considerable challenge for existing research and extension services to develop and disseminate appropriate innovations. The following two main chapters will take a detailed look at the main players involved with innovation development and diffusion in Fiji, and identify solutions as to how the situation may be improved.

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[41] A detailed review of the Fiji sugar industry comes to similar conclusions and highlights many problems of the sector (cf. LANDELL-MILLS 1991).

[42] Soil erosion problems and aspects of sustainable farming practises are raised by ROGERS (1992) and NAKALEVU (1994). The problem is also discussed in detail in the national environmental strategy (cf. GOVERNMENT of FIJI and IUCN 1993).

5 The Agricultural Knowledge and Information System in Fiji

The examination of the Fiji AKIS will proceed in several steps. A first overall perspective describes all major actors and institutions of the AKIS. Then, all major actors are reviewed one by one. The analysis starts with a general view of the Ministry of Agriculture, Fisheries and Forest (MAFF) followed by a close up of the Division of Economic Planning and Statistics (EP&S). Then the Research Division (RD) and the Extension Division (ED) are investigated. As last actor, the focus is directed on the farmers and final users of the knowledge system. To complete the picture, the interplay of all actors, their linkages and information flows are examined.

5.1 Overview: organisations, institutions and actors within the Fijian Agricultural Knowledge and Information System

More than one might expect of a small island country, Fiji has an elaborate agricultural knowledge system with a considerable number of different organisations and institutions. For this reason, it would be outside the scope of this thesis to describe all system actors. However, the most important players in the governmental, educational, and private sector, with relevance to agriculture, will be reviewed briefly. The major players are depicted in Figure 14, which illustrates the overall setting and the linkages between these various actors.

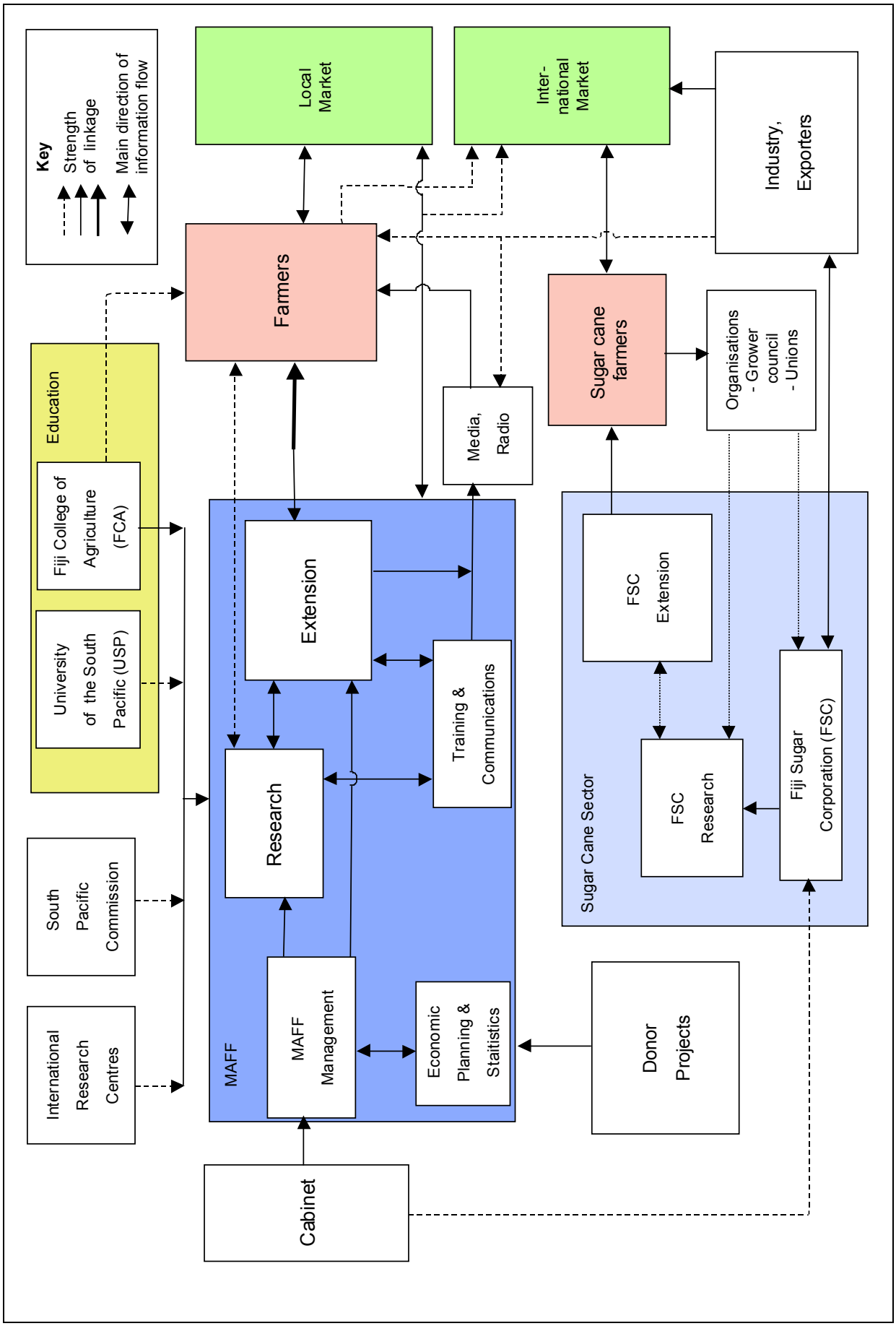
At a first glance, the most striking feature is the existence of two separate research and extension sub-systems. The larger research and extension sub-system lies within the Ministry of Agriculture. The second research and extension system is operated by the Fiji Sugar Corporation (FSC). The latter and smaller system will be looked at first.

Fiji Sugar Corporation (FSC)

The corporation is a private sector company and covers all aspects of sugar cane production, milling and marketing. Agricultural research and extension for sugar cane farmers are other aspects of FSC's work. However, in relation to the milling and marketing activities, they are minor ones.

The sugar cane research centre is located close to the main sugar mill in Lautoka in the western division. The centre is small with only 6 permanent professional staff members. The qualifications of existing staff are low (1 MSc, 5 BSc), which reduces the potentials of the centre to produce innovations (EYZAGUIRRE 1996, 65). One of the main activities is the breading of new sugar cane varieties. In the past, the centre produced a number of excellent varieties that have found worldwide distribution, but at present the output is rather limited.

Figure 14: Simplified model of the Fijian AKIS



Source: own design.

During the research period the major work was concentrated on soil fertility and fertiliser trials, physiology and plant protection. The centres biggest problem was the lack of qualified staff.[43]

The research centre's linkages with the FSC extension are weak. Main areas of co-operation were the introduction of new sugar cane varieties and fertiliser recommendations. The information flow was not very interactive, with limited feed back from extension. A central problem was the limited understanding of growers' problems, their farm management decisions and preferences. Growers' yields were far below the potential of the varieties and researchers lacked understanding of why their recommendations were not followed.

Some reasons for the linkage problems could be attributed to the set-up of the FSC extension service. The service had two main goals. First, to provide farmers with a service for inputs and help in the organisation of the harvest. Second, to provide advice in the application of new recommendations. A good analysis of the extension set-up is given in the LANDELL-MILLS report (1991, 30): *" there is little substance, at present, to the organisational links between the Chief Extension Officer located at the Sugar Cane Research centre in Lautoka and the Extension Officer at Lautoka and the three Technical Field Extension Officers at the three other factories; and the links between these factory based Extension Officers and the Farm Advisers in the field are weak, too. The later are sub-ordinates to the FSC's Field Officers and form part of the field staff reporting to the field manager of each mill. This leaves the Chief Extension Officer in a position of a captain without troops. Extension work is not the primary concern of the Field Officers, most of whose time is taken up by administrative and organisational responsibilities in connection with the distribution of farm supplies and the organisation of the harvest. Subordinate to the Field Officers, the Farm Advisers are also partly occupied with these tasks. Moreover, the Farm Advisers have a markedly inferior status to the Field officers in terms of educational qualifications, pay and fringe benefits. In all, it cannot be said that the extension service at present rates sufficiently high in the hierarchy of FSC functions."*

This set-up explains why most organisational and production target oriented tasks are performed well. In this respect extension has enabled a considerable expansion of the production of sugar cane. This achievement was acknowledged by the Government extension service, where FSC extension enjoyed a good reputation. However, the actual extension function of farm advice and knowledge exchange with growers lagged behind.

Sugar cane farmers have some control over the industry through the Sugar Cane Growers' Council. However, agricultural issues, which trigger innovations on farms, play only a minor part in its dealings, whereas overall industry matters, administrative, payment and price issues constitute the major part of the Council's activities. The Council also has a representative in the Sugar Cane Research Committee. But as the Committee has not met for several years, its input towards research policies has been minimal (LANDELL-MILLS 1991, p. 29).

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[43] Personal communication 9.12.1994 with the head of the research station Mr. Jaishiree Gawander. In 1999 FSC realised the problem and set up a 6 million FJD programme for sugar cane research (SUNDAY TIMES 1999).

The focus of this study lies on the aspect of diversification of agricultural production. As the mandate of FSC is exclusively focused on sugar, a deeper review of the sugar cane research and extension would not provide relevant information. Instead the further analysis will be focused on the Ministry of Agriculture, which co-ordinates all attempts to diversify agricultural production.

Ministry of Agriculture, Fisheries and Forests (MAFF)

The Ministry of Agriculture, Fisheries and Forests (MAFF)[44] has the mandate for all farmers in Fiji. However, research and extension regarding sugar cane farming is excluded from its mandate and remains the unique responsibility of the FSC. The main clientele of MAFF are all non-sugar cane farmers, who represent about two thirds of all Fijian farmers. This entails a broad range of agricultural activities, as farmers are more or less subsistence oriented, with a variable degree of commercialisation into different crop and livestock enterprises.

On national level, agricultural policies are determined by Fiji Government and approved by Cabinet. The Ministry is responsible to Cabinet and has both executive and consultative functions. In this respect, MAFF is providing advice on policies to cabinet and implementing its policies. Directly contributing to this consultative function is, in particular, the top management level of the Minister, his permanent secretaries and all heads of departments including the directors of research and extension.

The Department of Economic Planning and Statistics (EP&S) has a specialised role in this function. It monitors the impact of agricultural policies, appraises and assists donor and national projects. Moreover, it advises on farm management issues and updates the Fiji Farm Management Handbook. This reference contains the current recommendations for all crop and livestock activities[45].

The Ministry's research and extension set-up is composed of six divisions or sections. The Research Division (RD) and Extension Division (ED) are two large separate units that deal with crop production only. These divisions are the focus of this study. The department of Animal Health and Production (AH&P) accommodates veterinary services, adaptive livestock research and extension under one single roof. An assistance to both extension divisions, is the Training and Communications Section (TC&S) that compiles extension materials for both field work and mass media publication and conducts training workshops for Ministry staff and farmers. The Fisheries and Forests departments also both have own research and extension sections.

Educational Institutions

The University of the South Pacific (USP) and the Fiji College of Agriculture (FCA) offer training and education in agriculture. Most MAFF staff are former students of the three year course for Tropical Agriculture at FCA. USP's school of agriculture is located at Alafua Campus in Western Samoa. It offers a 3-year Bachelor of Agriculture (BAg) course and the opportunity of a two-year postgraduate Master of Agriculture (MAg) course. As the Alafua courses are outside the country, fewer Fijian students make use of

[44] An organisational chart of the Ministry is provided in chapter 5.2.1.

[45] cf. MAFF 1994.

the opportunity. Since 1994, USP has offered a distance education programme in agriculture.

Both institutions keep close ties with the Ministry; however, FCA is linked tighter as it is located next to the main research station in Koronivia. Some of their student courses are taught by research or extension staff from MAFF. FCA also operates a large farm for agricultural experimentation, providing teaching opportunities and food production for the boarding students. FCA maintains very little direct research or extension contacts with farmers. The curriculum focuses on the basic scientific principles of tropic farming.

USP's School of Agriculture in Western Samoa works in close co-operation with FCA. The Institute for Research and Extension and Training in Agriculture (IRETA), located at Alafua campus, co-ordinates regional research activities and maintains an information and extension service to the Ministry staff in all member countries of USP[46] via satellite. IRETA also assists the national extension services mainly with publications and opportunities for training workshops, but does not provide active extension to farmers.

Regional and International Institutions

Another institution with regional mandate is the South Pacific Commission (SPC). With its Headquarters in Noumea (New Caledonia), SPC represents all Pacific countries including the rim countries Australia, New Zealand, Japan, several countries in North and South America and the former colonial powers Britain and France. SPC operates an agricultural centre in Suva. The centre plays an important role in assisting countries in the organisation of national plant protection and quarantine services. Moreover, SPC provides a modern agricultural information network with satellite links to all member countries. The centre also hosts the regions second largest agricultural library[47]. SPC and USP also maintain closer links with the agricultural Universities in Hawaii, New Zealand and Australia. International institutions with agricultural mandate are not present in Fiji. Therefore, linkages to these international centres are weaker.

Donor Assistance

Donor funded projects play an important role in the Fiji AKIS. Typically, two to five projects at a time are linked to the Ministry. Development assistance is provided to various domains of agriculture, but a certain focus lies on quarantine, control of pests and diseases and the save transfer of genetic materials between Pacific Island countries. Though many projects have a regional mandate, which requires the experts to share their working time between several countries, Fiji, as the regional hub, benefits considerably from outside technical assistance. Usually, the experts that hold MSc or PhD qualifications generally outnumber local staff with equivalent qualifications. Consequently, donor projects have a strong advisory role within the AKIS.

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[46] Member countries of USP are: Cook Islands, Fiji, Kiribati, Nauru, Niue, Marshall Islands, PNG, Solomon Islands, Tokelau, Tonga, Tuvalu, Vanuatu and Western Samoa.

[47] The largest agricultural library is maintained by the School of Agriculture at the Alafua Campus in Western Samoa.

Private sector

Trading and industry still only play a minor role in Fijian agriculture. Mechanisation and the usage levels of other inputs outside the sugar sector are low. As capital is scarce for most farmers, business for traders is limited and consequently private sector technology development for farming purposes is underdeveloped. Some exporters have production contracts with farmers, and besides providing technology, have an impact on marketing and quality standards.

Few supporting organisations exist for the majority of subsistence farmers in Fiji. Most common are co-operatives that deal with marketing of commodities like cocoa, ginger, beef, dairy products or pineapples. Some co-operatives also organise input distribution. However, most farmers are not formally organised. One exception is the cane belt, where a number of farmers' organisations operate (e.g. National Farmers Union, Fiji Cane Growers Association).

Media

Radio broadcasting is an important media for agricultural extension. Fiji Radio transmits programmes weekly with agricultural topics. Print media is also important. Unfortunately, no specific agricultural journals for farmers exist. The major daily newspapers publish weekly articles on agricultural or horticultural topics. Several monthly magazines such as 'The Review', 'Island Business Pacific' or 'Pacific Islands monthly' occasionally publish articles on business ventures in agriculture. However, these magazines, unlike the newspapers, circulate little within the farming community.

5.2 Ministry of Agriculture, central player in the Fijian Agricultural Knowledge and Information System

5.2.1 Goals and organisational structure

The Ministry of agriculture is the central executive body to the implementation of the Fijian Government's policies and strategies for the agricultural sector. During the researchers fieldwork, the following policy goals were set out in the planning document, 'Opportunities for Growth' tabled in Parliament in February 1993, and emphasised:

(i) a move away from import substitution towards promotion of exports,
(ii) the importance of markets in planning and management,
(iii) the need to improve productivity and cost effectiveness,
(iv) the importance of private sector investment,
(v) reorientation from production targets towards financial performance and price competitiveness,
(vi) intensification and quality control,
(vii) provision of essential services by MAFF (extension, research, marketing assistance, regulatory, infrastructure development),
(viii) privatisation of selected operations, and
(ix) soil conservation and sustainable land use (WOODWARD 1994, appendix 3, 1).

During the beginning of the research period, the Ministry was in the process of digesting this tough 'liberalisation package'. In the research period, the Ministry showed difficulties to break with the past tradition of input subsidies, production targets[48] and protected domestic markets. The required changes towards quality control, competitiveness, and in particular service orientation, hardly seemed to gain ground.

MAFF, the Ministry has three main divisions: agriculture, fisheries and forests. In the past, the rank and importance of the various divisions shifted, which was reflected in the name and organisation of the Ministry[49]. The Ministry has a typical hierarchical structure with the Minister and his Permanent Secretary heading the organisation. On the next level there are Deputy Secretaries for Operations and Services and the Conservator of Forests. Also on this level, but lower in grade, is the Director of Administration and Finance. Figure 15 depicts the organisational chart[50] of the Ministry.

Under operations figure the Directors of Animal Health and Production, Director of Extension, Director of Fisheries, and in lower grade, the Principal of the Fiji College of Agriculture. Under services come the Directors of Research, Director of Drainage and Irrigation together with the Chief Economist. The Principal Agricultural Officer of the Training and Communication section is also attached to this level. Under the Conservator of Forests, figures the Deputy Conservators for Timber and Resource Development.

The division of labour between the various departments is very articulated, but several assignments are not very practical. A key issue is the separation of livestock and crop research and extension. Both livestock research and extension are grouped under the small Division of Animal Health and Production. Crop research and extension are split into two large, separate divisions each dealing only with crop specific research/extension. Additionally, the departments of Fisheries and Forests have their own research and extension sections. This organisational set-up is likely to increase the chance for duplication of efforts as it increases the needs for information exchange between the different departments. During the research phase, considerable efforts were made by the Ministry to reorganise and streamline the structure and procedural routines. However, while several procedural routines (in particular accounting) were revised, proposals for organisational changes have come to nothing.

The efficiency of the Ministry was effected by frequent changes in top management positions. In the period 1993-96 the position of the Minister was occupied by four different people, the positions of the Permanent Secretary and the Director of Fisheries by three different people, and the positions of Deputy Secretary Services, Conservator Forests, Deputy Conservator Timber, Director of Extension, Director of Drainage/

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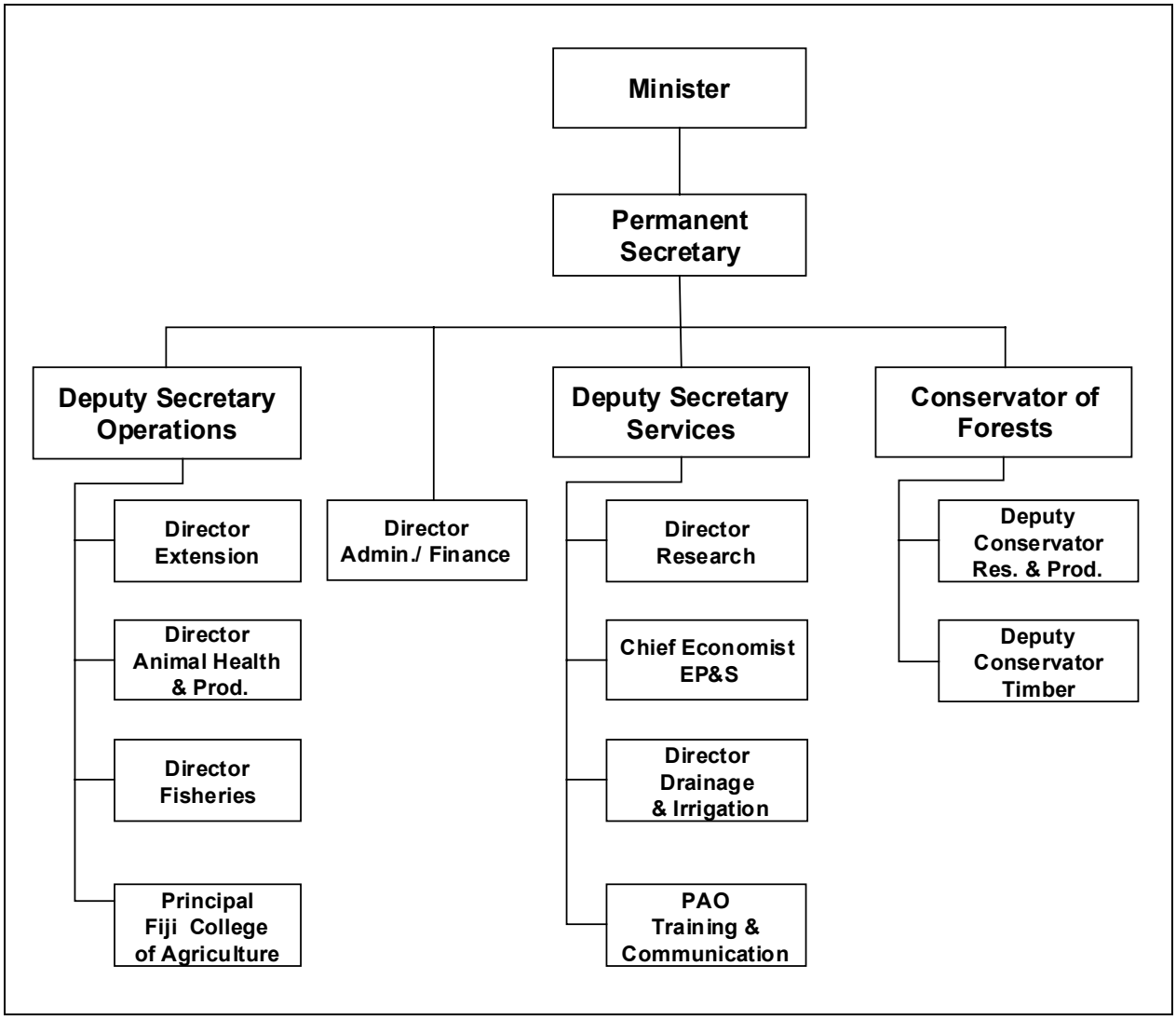
[48] In 1997, the Fiji Government partly returned to past wisdom, a commodity development framework (CDF) with input subsidies for exports commodities was approved (email from Dr. Kronen dated 19.1.1998).

[49] Prior to 1991, the name of the Ministry was Ministry of Primary Industries (MPI); from 1992-95 and again since 1999 Ministry of Agriculture, Fisheries and Forests (MAFF), from 1995 to 1999 Ministry of Agriculture, Fisheries and Forests and ALTA (MAFFA). For simplicity, in this study the abbreviation MAFF is used.

[50] The Fiji Government is on the Internet now. The latest Government structure can be viewed at the following address: http://fiji.gov.fj/cabinet/minstry.html.

Irrigation and the Chief Economist by two different people. This high rate of change, in case of the position of the Minister, even annually, makes medium- to long-term planning very difficult.

Figure 15: MAFF organisational chart



Source: MAFF, 1996.

A further comprehensive review of the overall Ministry is outside the scope of this thesis. In line with the theoretical concept of the knowledge systems perspective, the research will now be focused on the agricultural departments within the Ministry. Firstly, the role of the department for economic planning and statistics will be examined. Then, the divisions of research and extension will be reviewed in detail.

5.2.2 Economic Planning and Statistics Division

The division for economic planning and statistics plays a central role in Fiji's MAFF. The role of the division comprised the of following responsibilities:

- Provide back-up support services to the Ministry on a wide range of issues, including economics, statistics, farm management, land use and other related issues.

- Co-ordinate sectoral level planning and policy related activities.
- Maintain a close liaison with relevant Government Ministries and statutory organisations, in the formulation and evaluation of development projects and policy proposals for the primary sector.
- Prepare implement and review sectoral development plans and projects.
- Submit budget and aid proposals.
- Monitor international prices and trade agreements.
- Prepare and appraise primary sector development projects.
- Collate, monitor and review the Ministry's annual capital budget.
- Provide statistical information on the agricultural sector.
- Implement and oversee the MAFF Management Information System (MIS).
- Prepare farm plans, appraise projects and assist with training courses in farm management.
- Assist the Fiji College of Agriculture with specific lectures and courses (MAFFA 1996, 83).

The long list of tasks illustrates the wide range of activities of the division. A key role lies in the advisory function for the Minister and Cabinet. Responsible for the formulation and evaluation of development projects and policy proposals for the primary sector, the division had a strong influence on capital investments and priorities for development. Through this advisory function, the division had a closer and more influential relation on Government and agricultural policy decision making than other divisions within the Ministry. The division is located in the Ministry headquarters in Suva.

The tasks within the division were split into four sections:

- Commodity development and marketing
- Projects
- Statistics
- Farm Management

The **commodity development and marketing section** was responsible for the analysis of marketing and commodity information, marketing studies and marketing strategy formulation. In the research period, the focus of activities was on traditional markets such as dairy, rice and ginger. With cocoa and copra, the section undertook measures for consolidation and rehabilitation. Core activities consisted of the monitoring of international price developments and the potential impact of GATT for local producers.

The **projects section** has the leading role for planning, appraising, monitoring and evaluation for both existing and new projects within the Ministry. This is a very important role as the section analyses, the successes and failures of past projects and suggests consequences for future intervention. In this respect the section worked together with other divisions of MAFF. However, fulfilling this leading role, the section had several difficulties. The diversification of agricultural enterprises did not proceed substantially[51].

[51] Comparing the annual reports for the eleven year period 1984 to 1995, not a single new commodity was developed. On the contrary, the number of major commodities reviewed degreased from 25 to 16.

Still, considerable emphasis was placed on traditional commodities, although the long-term international prospects were not very promising (e.g. cocoa, copra). A systematic search for alternatives and potential new commodities ideas did not take place. In the research period, only limited progress was made. While the number of new project proposals was still at zero in 1993, it grew to three in 1994 and seven in 1995. In 1998 two new donor funded projects could be attracted[52].

The **statistics section** maintains an agricultural database with a wide range of information. Recording of local market prices constitutes a major part of the task. This is one of the strengths of the section. Organising the agricultural censuses in ten year intervals is another responsibility of the section. Apart from recording prices, the section largely relies on other Ministry divisions for data collection.

The major tasks of the **farm management section** are to prepare farm plans and farm feasibility studies, provide farm and project appraisal services and assist farmers with loan applications. A key function is the updating of the Fiji Farm Management Handbook (FFMH): the manual compiles the latest research findings on all crop and livestock enterprises. For this reason, the manual plays a central role for all divisions. An important problem with the manual was the specific economic language that made it difficult to understand for non-economists. All staff that the researcher contacted during the fieldwork, had very limited background in economics. During the research period, the section was lagging behind in the updating of the FFMH. The 1994 update appeared only late in 1995 and even then, uncompleted. The gross margin section on crops was missing completely, and for livestock, the 1990 figures were simply reprinted. Based on the PRAs, a number of recommendations[53] were made for the FFMH, including more detailed enterprise descriptions, consistent fertiliser and pesticide information, additional production figures in more customary area sizes (acre and sqchain instead of ha) and staff training requirements, for staff in basic economics.

The size of the overall division with 28 permanent staff members was small to medium (Table 9). A particular critical point was the high number of vacancies. Already since the mid eighties, time and again a number of senior positions were vacant. The position of the Chief Economist could only be filled in 1995. In the same year, the positions of 2 Senior Economic Planning Officers and 2 Senior Agricultural Officers were vacant. Candidates with good economic qualifications were difficult to find. The curriculum at FCA includes only basic elements of agricultural economics. The division even assisted FCA in teaching,

Table 9: EP&S staff resources

Grade	Vacancies	Positions
Chief Economist		1
PAO/ PEO		1
SAO/ SEO	2	5
AO/ RO	2	6
GT		
ATO		
AA/ SAA/ STA/ TA	2	13
Other		2
Total	6	28

Source: own compilation from MAFF 1994, 72; MAFFA 1996, 85.

[52] Calculated on the basis of the MAFF annual reports for 1994 and 1996 and 1998.

[53] Detailed recommendations, see BACHMANN et al. 1997 b, 41.

which resulted in a kind of 'short circuit': As most staff within the division are college leavers from FCA, the level of economic qualification at the division can not be raised significantly with new college leavers.

A good and cost effective way to buy-in additional expertise was the recruitment of a senior economist via the British Overseas Development Institute (ODI). The division should try to expand this co-operation and also explore assistance from other countries that offer similar programmes (e.g. CIMIT, DED). The ODI support certainly strengthened the economic qualification within the division. The problems with understaffing and staff qualification were certainly the major reasons that constrained the overall performance of the division.

The financial situation of the division could be considered as rather stable. Since the mid eighties, with the exception of the year following the military coup, the allocated budget grew steadily. Table 10 depicts the development of the budget.

Table 10: Allocated budget of EP&S in '000 FJD

Budget items	1984	1988	1989	1990	1991	1993	1994	1995	1996	1998
Established staff	442.2	275.0	313.0	393.5	363.8	511.3	516.3	516.3	529.2	399.2
Unestablished staff	17.2	15.1	20.8	20.8	24.6	27.4	27.6	26.8	28.7	22.0
Travel & Communication	16.1	7.6	11.7	16.8	15.8	18.0	18.0	18.0	18.0	18.0
Maintenance & operations	6.1	6.2	4.3	19.4	18.2	22.0	22.0	22.0	22.0	22.0
Purchase goods & services	1.5	6.9	10.2	14.4	14.7	20.0	20.0	20.0	20.0	20.0
Special Expenditure	0.5	8.1	215.8	567.8	728.4	25.0	25.0	25.0	25.0	175.0
Total	483.6	318.9	575.8	1032.6	1165.5	623.7	628.9	628.1	642.9	656.5

Source: own compilation from MPI 1985,73; MPI 1991,102; MAFFA 1999, 60.

In the period 1994-95, the budget stagnated, increasing again in 1997 and 1998 due to the new funds released for the commodity development framework (CDF).

In this respect Fiji, is rather fortunate compared to other development countries that faced rather tough declines in Government spending for agriculture in recent years. The present overall resource base can be considered as acceptable. The division was equipped with a good number of vehicles and good computer facilities.

5.3 Research Division

5.3.1 Mission and goals

The Research Division (RD) is one of the major players within MAFF. In the recent process of organisational review, the division's mandate was reformulated and a new mission statement was defined:

> *"The Research Division is committed to the provision of high quality and relevant applied agricultural research and support services, and the dissemination of research findings"* (KUMAR and HINE 1993, quoted in DOWLING and KUMAR 1995, 7).

The mission statement was further detailed by a set of objectives:

1. develop elite lines of germplasm and make these available to Fiji's farmers;
2. maintain and improve existing genetic resources;
3. devise packages of crop husbandry and land management practices in response to farmer needs;
4. protect crops in an economically feasible, socially acceptable and environmentally friendly manner, with emphasis on preservation and maintenance of the existing bio-diversity through natural resource management;
5. provide a relevant and effective agricultural analytical service;
6. provide timely information to the Government; and
7. maintain an effective research capacity (DOWLING and KUMAR 1995,7).

The mission statement for the RD focused on good quality applied research services and their dissemination. This is certainly a very sensible overall goal for the research department of a small island nation like Fiji. Scarce resources are not wasted on basic or fundamental research. Another valuable aspect was the consideration of the dissemination of research findings. This broadened the mandate of research and took the necessity of disseminating results into account.

Taking a closer look at the Research Division's goals, a more diverse structure of tasks was apparent. Besides research, a number of services were of importance: maintenance and development of genetic resources, analytical services (chemistry laboratory) and the information provision for Government. Overall, the focus of the new tasks had a strong service orientation. This characterised the new working philosophy. The intention of the review team was clear: trying to convert the inward-oriented Government department towards a more service- or client-oriented organisation. However, some of the old philosophy was still visible in the tasks. In task four the division was 'to protect crops'. Obviously, crop protection can only be done by farmers themselves and not by Ministry staff. But in the past, RD staff occasionally did even that: spraying crops for farmers[54]. A move forward, however, was visible in task three, where new farming practices should be 'in response to farmers needs'. But whether this goal can be achieved by simple 'packages' remains questionable.

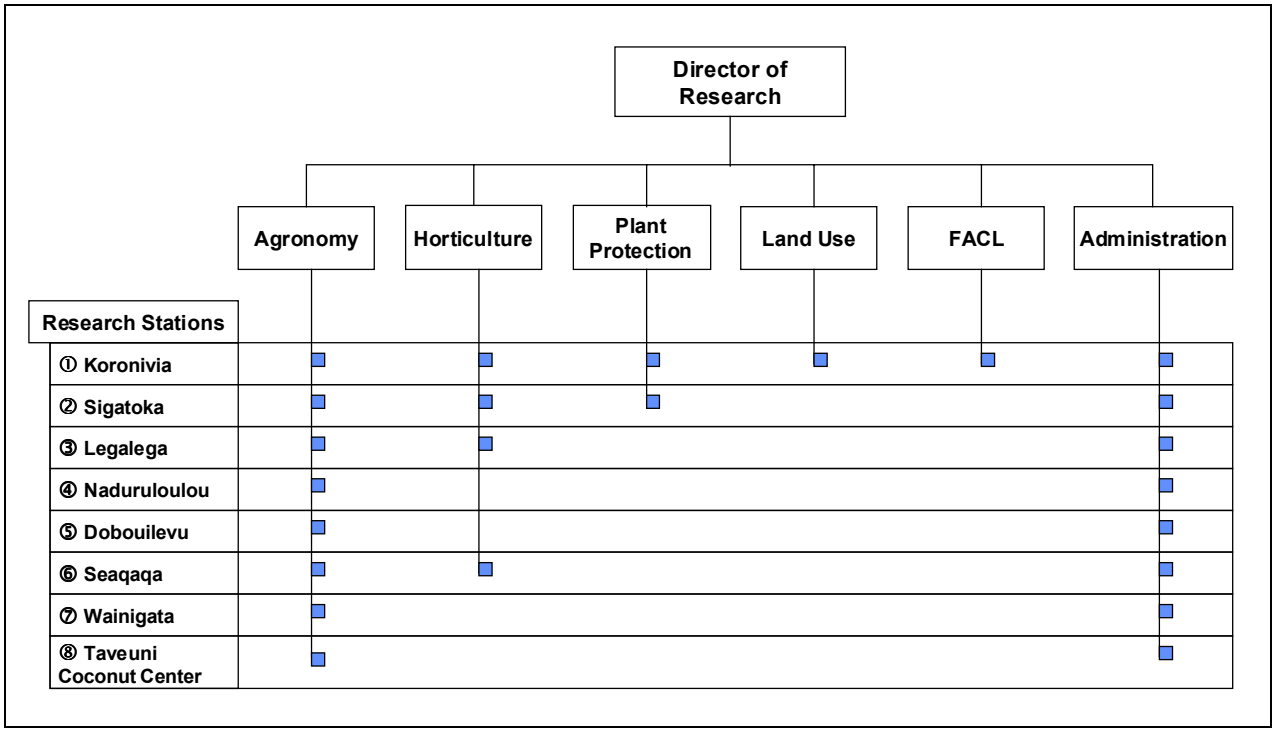
5.3.2 Organisational structure and tasks

The RD is headed by the Director of Research. The division was grouped into six main sections: Agronomy, Horticulture, Plant Protection, Fiji Agricultural Chemical Laboratory

[54] The Ministry has the role to inspect all traded goods in order to protect agriculture against the introduction of pests and diseases from outside the islands. This includes spraying farmers' fields if introductions of pests or diseases are observed.

(FACL), Land Use, and Administration. The organisational set-up and the location of research stations are depicted in the following figure.

Figure 16: Research Division, organisational chart and station locations



Source: own design.

Agronomy, was the largest section, and like all other sections, headed by a Principal Agricultural Officer (PAO). The section was responsible for the introduction, maintenance and improvement of germplasm in the country. This task required activities such as testing of new varieties for adaptability to local conditions, disease resistance screening and operating facilities for maintaining the distribution of seed and planting material. For selected elite germplasm, packages of environmentally sound cultural practices were developed. This work involved several aspects:

- seed bed preparation and soil management practices,
- genotype by sowing date by plant arrangement studies,
- fertiliser trials and plant nutrition studies,
- pest and disease control,
- cropping systems research,
- adoption of other technologies to suit the needs of farmers,
- pre- and post-harvest handling processes, and
- reports and other material to meet the information needs of farmers and the extension division (DOWLING and KUMAR 1995, 10).

The **horticulture** section was located on the four larger research stations. The research programmes were commodity-oriented and concentrated on fruits, vegetables and cereals. The tasks were comparable to those of the agronomy section. Besides farmers, the horticultural industry was also an important client of the section.

The two sections' research programmes were largely commodity-oriented and followed recommendations of periodical ISNAR reviews (1982, 1985, and 1991). The technical programmes for 1993 had the following content:

- Rice improvement programme directed on improved production practices and appropriate machinery for resource-poor farmers.
- Root crops improvement programme for improving ginger quality and production, taro and sweet potato varieties, and control of diseases in taro and yaqona.
- Tree crops (cocoa and coconut) improvement programme with emphasis on coconut hybrid evaluation, seed garden maintenance and disease and pest control in cocoa.
- Vegetable and maize improvement programme for better varieties and production practices for potato, onion, garlic, tomato and maize.
- Tropical fruits improvement programme focused on better varieties and production practices for mango, papaw, passion fruit, pineapple and some indigenous fruits.
- Pulses improvement and crop diversification programme aims at better varieties and more appropriate rotation systems in sugar cane farms (DOWLING and KUMAR 1995, 38).

The **plant protection** section was located at the two main research stations. Its main purpose was to reduce losses due to pests and diseases. Typical activities of the section included:

- identifying and defining pest and disease problems,
- establishing procedures to mitigate and control pest and disease problems,
- develop new control systems and standards,
- maintain quarantine services to control potential introductions of new pests and diseases, and
- manage a pesticide register to control pesticide usage in the country (DOWLING and KUMAR 1995, 11).

The section specialised in a number of fields. Most prominent was the work in biological control and IPM in co-operation with GTZ and biological control of taro beetle in co-operation with the EU. Of particular importance was the work on fruit flies that was financed by FAO. The existence of a number of fruit fly species in Fiji made it impossible for Fiji to export fruits to Australia and New Zealand[55].

The **Land use** section was located at the main research centre in Koronivia. The section was more service-oriented rather than being involved in adaptive research. The main tasks could be summarised as:

- providing soil and land use information for planning and management of land,
- offering advisory services in the fields of soil science and soil conservation, and
- promoting sound land use practices for minimum soil degradation.

[55] As fruits were one area where major export chances were expected, post harvest treatment of fruits against fruit flies was an important area of research.

Special fields of work included a new soils mapping of Fiji, and the build-up of expertise in geographic information systems (GIS). In co-operation with IBSRAM the section was conducting research on soil erosion.

The **Fiji Agricultural Chemistry Laboratory (FACL)** was located in Koronivia and provided laboratory services for several Fiji Government departments. Chemical and physical analysis was offered for soils, plants, animal feeds, irrigation waters, and food and forensic samples. FACL was assisted by Australian and New Zealand Aid, with a focus on training and quality assurance.

The **Administration** section was responsible for the financial monitoring of all programmes. It was also in charge of the management of all research stations. The section also hosts the specialist library and information services for all staff.

5.3.3 Available resources and staff qualifications

Among the small island nations in the South Pacific, Fiji has the largest agricultural research department[56]. In 1995 the RD had 118 established and 154 unestablished staff (Table 11). In the past decade, the department managed to increase the total number of staff positions. The number of established staff increased from 109 in 1988 to 118 in 1995.

Table 11: Development of Research Division staff and remuneration levels

	1988		1995		Shift in	Salary
Grade	Positions	Vacant	Positions	vacant	positions (%)	levels (FJD)
Director	1	0	1	0	0	33.461
PAO	4	0	4	1	0	26.255
SRO/RO	17	7	23	4	35.3	14.111-19.111
SAO	3	1	3	1	0	19.111
AO	3	1	3	0	0	14.911
GT	4	2	2	0	-50.0	12.073
ATO	10	5	10	4	0	11.212
AA/ SAA/ STA/ TA	50	12	54	10	8.0	5.153-8.660
Admin. staff	17	0	18	1	5.9	5.100-11.212
Total established	109	28	118	21	8.3	
Unestablished	130		154		18.5	
Grand total	239		272		13.8	

Source: own compilation from MPI 1988,76; DOWLING and KUMAR 1995, 24 and A1a.

The trend for unestablished staff was similar. The largest increase occurred in middle management (SRO/RO) with additional 6 positions; while the overall largest group of

[56] EYZAQUIRRE (1996, 63) points out that Fiji, due to its size in the region, resumes a regional responsibility to maintain and improve the genetic materials of the region.

field staff (AA/SAA/STA/TA) grew less by only 4 positions. This size suggested that the department had a substantial potential to conduct research programmes. However, in this case, size was not a good direct indicator for institutional output. The division faced several problems. A major problem was vacancies. As a consequence of the military coup in 1987, many qualified staff left the country. This problem was still felt during the research period. The high number of 28 vacancies (1988) could only be reduced to 21 in 1995. A considerable number of officers were filling posts in an acting capacity basis only, as they did not have the necessary formal qualifications for the post.

Table 12 highlights staff qualifications in relation to positions. In brackets are the numbers of officers undertaking additional studies. An obvious important fact was the very low level of formal qualifications in the department. Among the 118 established staff, only 2 held a masters qualification, and only one officer held a doctorate qualification. In total, 20 officers held a bachelor or postgraduate qualification. The large majority of staff held the FCA diploma title.

Table 12: Position and highest qualification of Research Division staff

Highest qualification	DR	PAO	SRO/ RO	SAO/ AO	GT	ATO	SAA/AA STA/TA	Clerical Staff	Total
Doctorate		1							1
Masters	1		1						2
Post graduate			3				1(1)		4(1)
Bachelor		1(1)	12(6)	1(1)	2				16(8)
Diploma		2	7(1)	2(1)		11(2)	33(7)		55(11)
Certificate			1				1		2
Not stated			1	2		1(1)	9	17	30(1)

Source: adapted from DOWLING and KUMAR 1995, 31.

This situation was far from desirable. The very nature of a research post requires the clear ability to work independently, develop new ideas, put existing facts and information into question, and to creatively analyse and combine different factors. This ability is generally only acquired properly in a master's course, and only to a certain extent in a bachelor course. Activities and outputs of the RD, that will be discussed later, need to be seen in this context of low staff qualification.

The budget development of the RD is shown in Table 13. The total budget amounted to 3.9 million in 1998. Compared to 1.75 million in 1984 this corresponded to an average annual increase of 5.9 %. This can be considered as an increase above the necessary compensation for inflation. However, the real development was more dynamic. While the budget grew at a higher rate until 1993, it was on the decline in the following two years and grew stronger again from 1997.

The most expensive item on the budget was staff salaries. Taking the average for 1994 to 1998, these accounted for close to two thirds of the budget. The next biggest budget item was capital construction (12.5 %). This item included new funds that were released in 1997 under the commodity development framework programme. After this came value-added tax. This tax was newly introduced in 1993.

Table 13: Research Division's budget development

Budget items	1984	1988	1989	1990	1993	1994	1995	1998	Ø 1994-1998 in %
	in '000 FJD								
Established staff	721	566	811	757	1162	1174	1203	1353	35.9
Unestablished staff	844	488	588	613	784	791	811	971	24.8
Travel & Communication	22	18	33	47	49	49	49	41	1.3
Maintenance & operations	48	33	49	80	72	72	72	60	2.0
Purchase goods & services	50	30	36	78	75	75	75	52	1.9
Operating grants and transfers	20	15	15	30		0	3	0	0.0
Capital purchase	46	128						0	0.0
Capital construction		95	333	30	275	120	150	1034	12.5
Special expenditure							300	0	2.9
Capital grant and transfer			127	782	949	657	200	0	8.2
Value added tax					426	317	337	428	10.4
Total	1751	1373	1992	2417	3792	3256	3200	3939	100.0
Aid in kind		600	2200	600	1090	1846	893		

Source: own compilation from MPI 1985,57; MPI 1989,77, MPI 1990,85; MPI 1991,87; MAFF 1994,59; MAFF 1995,100; MAFFA 1996,103, MAFFA 1999, 73.

Foreign aid in form of capital grants and transfer played a major role (8.2 %). But these contributions showed a very high variability over the years. In some years (1992), they contributed more than 40 % to the budget. Equally important, if not more important, was aid in kind (constructions, vehicles, laboratory equipment, etc.). Aid in kind ranged from 0.6 million to 2.2 million per year. Considerable constraints for the work of the division were the low budgets for travel, communication, maintenance, and operations (1.3 and 2.0 %). These budgets did not permit many activities, and reduced the mobility of staff. This was certainly one reason why researchers 'had to focus' on on-station trials rather than seek close co-operation with farmers in remoter locations. Here, donor funded assistance played a vital role. Without external assistance, the division would have faced more difficulties to function.

The available physical infrastructure of the RD can be considered as comparatively good. In 1995 the division disposed of 47 vehicles, 27 tractors and a number of other farm machinery and implements. Furthermore, the division maintained 124 staff quarters (MAFFA 1996, 104). The available annual reports only occasionally specified the actual conditions of the vehicles and other machinery. However, own observations made during the fieldwork suggested that the conditions were reasonable. Calculating the number of established staff (118 in 1995), about 2.5 officers shared one vehicle. This was certainly a very good ratio for a research division.

Summarising the strengths of the division, they lay in the good infrastructure, and, with some limitation, the financial resources of the division. The main weaknesses were, the high numbers of vacancies and the generally low level of formal education of the staff.

5.3.4 Research priority setting

The current chapter examines how these priorities are determined, and which actors play an important role in this process. For this purpose both research and extension staff were requested to rate the influence of selected actors in the formulation of research priorities. The results are listed in Table 14.

Interesting enough, was the result that both researchers and extensionists rated the Fijian Government as the most important player. Researchers, however, ranked the role of extension, donors and the private sector as close to strong (3.6 to 3.8). Surprisingly, they rated themselves and farmers only as medium players (3.4). The influence of regional or international research centres and the personal preferences of researchers were considered only to be weak to medium (2.5-2.7).

Table 14: Actor influence in the formulation of research priorities

Actors	Strength of influence as seen by	
	RD[1] (n = 7)	ED[2] (n=21)
Fiji Government policies	4.1	4.1
Extension	3.8	3.1
Donors and projects	3.7	3.5
Private sector	3.6	2.3
Farmers	3.4	2.4
Research division as a whole	3.4	4.0
Regional/intern. Research centres	2.7	3.2
Personal preferences of researchers	2.5	3.4

[1] Research Division, [2] Extension Division;
Ranking scale: 1= none, 2= weak, 3= medium, 4= strong, 5= exclusive.

Extensionists saw the influence of the Research Division quite differently. They rated researchers as the second most important player, with a strong influence of 4.0 (whereas researchers attributed this role to extensionists with 3.8), followed by donors and the researchers personal preferences, with a medium to strong influence (3.4-3.5). Regional or international research centres were considered as medium players (3.2), whilst farmers and the private sector were considered to play only a weak role (2.3-2.4).

While interpreting these ratings, it appeared necessary to take a look at how these decisions had taken place in practice. DOWLING and KUMAR (1995) reviewed the developments in the RD over the past years. They draw the attention to the fact that ISNAR, as an International research centre, had a considerable influence on the formulation of research plans in Fiji. The authors reveal that the "*current (1995) research program has many similarities to that proposed in 1985, principally in terms of its scope and the commodities being investigated"* (DOWLING and KUMAR 1995, 8). Besides recommendations for priorities, ISNAR also made proposals for the overall set-up of the RD as earlier as 1981. An extract of the recommendations made by the ISNAR 1981 review, are summarised here:

- The research planning process needed greater involvement of users (farmers) in identifying problems and priorities;
- medium (5 year) and long-term (10 to 15 years) research plans should be developed and these should include an assessment of human, physical, and financial requirements;
- RD should have additional staff, but first the transfer of service and regulatory activities should be addressed;
- the role and necessity of each research station should be assessed in relation to short and long-term plans;
- additional travel, operational and maintenance funds should be made available;
- research must be more involved with national development projects to assist in determining their viability;
- RD, ED and farmers must work closer together;
- research publications must improve and diversify to address the needs of different target audiences; and
- structural changes are necessary, including (1) integration of land use and livestock research sections within RD; (2) the addition of a social science unit including an agricultural economist; and (3) relieving the Director of RD of the responsibility of research station administration (ISNAR 1992; quoted in DOWLING and KUMAR 1995, 8).

ISNAR was again invited to review the RD in 1985 and 1991. The later report stated that little attempts had been made to implement the earlier recommendations. The authors drew particular attention to the fact that, *"there was still no formal mechanism in place for identifying the value or worth of research being undertaken, or for recognising if the work follows any pre-set, clearly identifiable priorities"*(DOWLING and KUMAR 1995, 8).

Returning to the interpretation of the influence rating of RD and ED staff, the lack of an official procedure apparently led to reduced clarity and transparency for all parties involved. Decisions on priorities seem to take place as need arises, e.g. as running programmes come to an end or new funds become available. Thus, changes take place in a more long-term perspective. This may explain why both staff groups considered the Government as the strongest player. They themselves felt rather weak, as they could not influence priorities in the short term and, therefore, any changes taking place appear to be effects of long-term policy changes. The civil service hierarchy, where all decisions come from the top (i. e. the Government), strengthens this perception.

Summarising the results, it becomes evident that the real influence of actors involved in the formulation of research priorities is difficult to determine. While staff from both research and extension consider the Government as the major play, this appears at least doubtful, as DOWLING and KUMAR 1995 have shown that the Government was unable to implement recommendations made by ISNAR for almost two decades. This, in the contrary, indicated a weak Government, a weak MAFF top management and the overall malfunction of the organisation. An important point raised was the role of farmers in the process of determining priorities. Both staff groups and the 1981 ISNAR report criticise that farmers' needs and problems were given much too little weight.

These findings clearly stress that there is a need to establish a transparent official procedure to determine research priorities for short-, medium- and long-term. A proposal of what these procedures could look, will be made in chapter 5.5.4.

5.3.5 Main activities and working approaches

The main activities and working approaches are described in two subsequent ways. In the present chapter, some more general and descriptive aspects of the working approach are provided. The topic is conferred separately for the RD in this chapter and for the ED in chapter 5.4.3. Furthermore, different working approaches and co-operational aspects will be discussed with the help of a number of case studies of selected projects implemented by MAFF in chapter 6.3.

At first, it should be noted that 'the approach' of the Research Division did not exist. A large number of different research techniques and methods were applied. Depending on the individual task and context, a selection of methods were applied. A number of regulations on these issues existed, but these were of a more administrative nature and were generally rarely consulted.

This made it difficult to discuss the approaches applied. In an attempt to provide an overall characterisation of the RD, the working approach could be called 'classical' or 'traditional'. Traditional or classical refer to the fact that the division was strongly influenced by what could be called the general 'agricultural wisdom' of the sixties to the eighties. The best proof for this can be seen in the strong focus on experimental on-station work. Nevertheless, newer ideas made their way into the system. These were promoted by externally funded technical assistance projects. In this respect, the division could also be characterised as, 'in the search process for the new approaches'. This search process was very open and ongoing. 'Open' characterises the situation in Fiji very well. People listen very well with considerable respect for new ideas promoted by outside assistance. There was little resistance to new approaches, and a good climate for experimentation. This climate was also beneficial for the research activities of this study. While this openness facilitated the introduction of new methods, it still does not say anything about the final acceptance of these methods and their institutionalisation. This aspect will be looked at in more depth in chapter 6.2.5.

As the first aspect of working approaches, the main sources of information used by researchers were reviewed. Table 15 displays the results.

Journals and books ranked as the most common sources of information. This was followed by training workshops, private sector, experts and the Fiji farm management manual on one level. Farmers, other colleagues and subject matter specialists followed in last position.

At first sight, these findings appear rather typical of researchers, who use books and journals as their main sources of information. Based on observations during the field phase, the researcher would question these findings. During the seven month that the research team worked in the main agricultural library in Koronivia, not a single research officer carried out a literature search[57]. The observation that researchers were not 'up to date' with international developments in agriculture was also mentioned by several experts with whom the researcher had contact[58].

Table 15: Main sources of information used by the Research Division

Information sources	Frequency (n=8)
Journals	3,0
Technical books from the library	2,8
Training workshops	2,5
Private sector, companies, traders	2,5
Fiji farm management manual	2,5
Project experts	2,5
Progressive farmers	2,3
Other colleagues	2,3
Subject Matter Specialists	2,3

Ranking scale: 1= rare, 2= occasional, 3= common.

The fact that other parties such as experts, farmers and colleagues also functioned as sources of general information, indicated that researchers exchanged views with their environment quite regularly.

The main activities of RD staff were collected with the help of an activity profile. In the follow-up questionnaire the respondents were asked to rate the time spent on various activities for an average month with the help of 40 points (1 point equivalent to1 half working day). Figure 17 illustrates the findings expressed as a percentage of total time allocation.

Officers spent considerable time with the design and planning of research activities (10-15 %). The executive field officers spent about one quarter of their time with activities on-station, while the middle management staff spent only about 15 % of their time. Surprising, was the fact that the executive officers spent more than 20 % of their time with on-farm activities. This result could be seen as a first sign of the impact of the training inputs provided through the various donor funded assistance projects. Researchers started to change their role and enlarge their methodological toolbox. Nevertheless, on-station trials still played the dominant role.

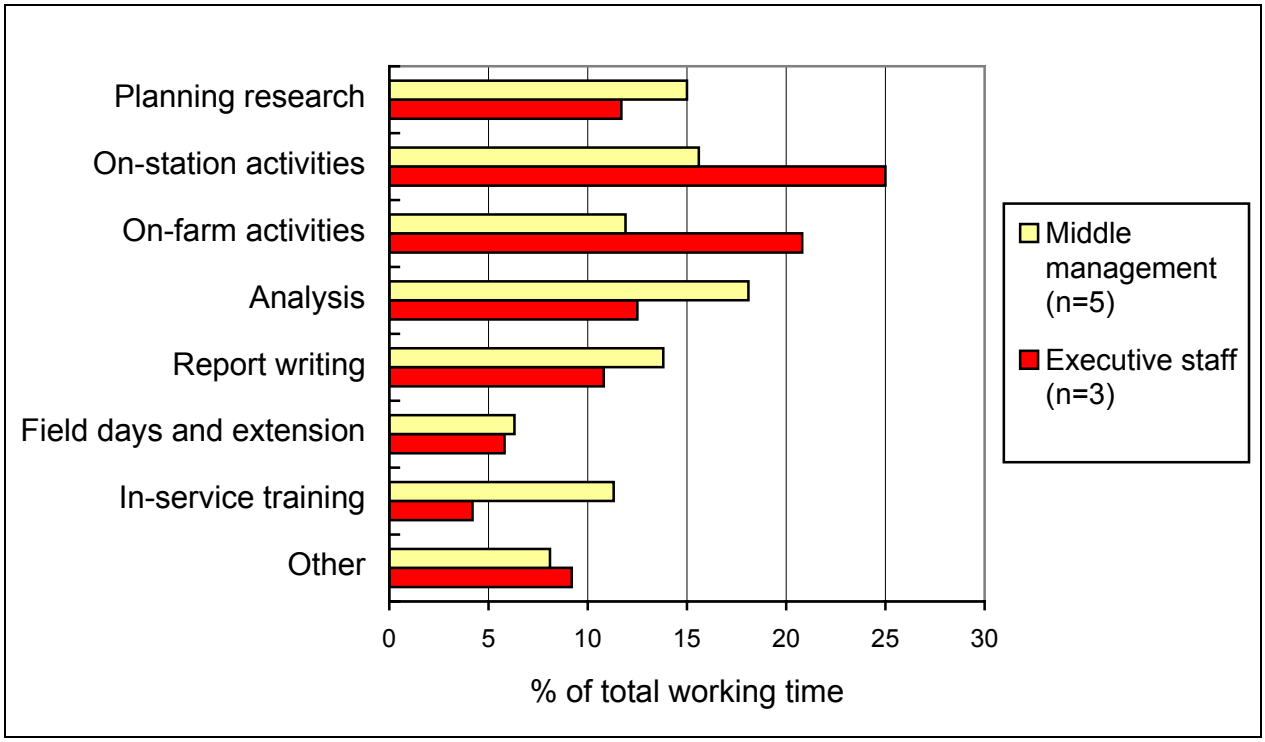
Analysis of trials and activities was another important activity field. Here, the senior staff spent about 18 %, while the executive officers spent about 12 % of their time. These figures reflect that senior staff needed more time for discussing and assisting the analysis of the various ongoing research projects. While the executive staff were mainly responsible for the field implementation and initial steps of analysis, the senior staff assisted in particular with more difficult steps of analysis or help in the interpretation of

[57] This view is also supported by the official library statistics. In 1998 only 370 users were recorded of whom 97 % were students (MAFFA 1999, 84).

[58] An interesting case was the Pineapple project at Seaqaqa research station. Local researchers had never heard anything about modern pineapple production using e.g. fertilisation according to plant leaf nutrient analysis, control of flowering periods with plant hormones. The project will be discussed later as one of four case studies.

findings. Rather little time was spent on report writing (11-14 %). This was certainly a weak point in the system. A look at a number of reports revealed that these were often written in a very basic format and could by classified as simple trial descriptions. In particular interpretation and conclusions were weak.

Figure 17: Time allocation of Research Division staff



Source: own data, follow-up questionnaire.

Field days and extension accounted for a very little part (5-6 %) of the work of researchers. But as this was not part of the official mandate, this was also well understandable. However, from the AKIS perspective, enforced co-operation with extension would be desirable. That this was taking place to a considerable degree, could be concluded from the generous time allocated to on-farm activities. These were generally carried out in close co-operation with extension staff.

In-service training was the key instrument to improve the knowledge base and abilities of staff. The questionnaire results indicated that senior officers make far more use (11 %) of training opportunities than lower grade staff (4 %). From informal discussions with research officers another aspect emerged. Making use of training was very person specific. While some officers tried to attend all possible training opportunities, others were positively uninterested and might not participate for years on a single course.

Other activities accounted for close to 10 % of total time. This figure does not require further discussion. The above figure illustrated in broad categories how researchers spent their working time. It did not yet say much about the methodology, or in other words, what and how things were done.

Research work was organised in several sections or small working groups. Mainly commodity-oriented, these groups were headed by an SRO or RO officer. One to four executive officers constituted a group. Each group worked on a number of different research topics. The number of research topics dealt with by individual officers was very

variable. Most officers worked on 3 or more research topics per year. Only one officer mentioned 2 or less topics. The average number of research topics per researcher was four.

It can take a long time for a research topic to lead to a recommendation. Many research questions never lead to a useful final recommendation. This was also the case here. While each officer worked on three or four topics per year, the average number of recommendations produced was only 1.6 per year. Again, there was a considerable variation. Four officers only produced one recommendation once every second or third year, while two officers claimed to be very productive with 2 or more recommendations per year.

As the final step, a recommendation had to be approved by an official RD meeting. The other steps necessary to reach this stage are shown in Table 16.

Table 16: Steps before recommendations release

Methodological steps	Number of researchers		
	Rarely done	Occasionally done	Always done
On-station trials	0	0	7
On-farm verification		1	6
Test for environmental safety	1	3	3
Analysis of market potential	1	2	4
Economic analysis	0	2	5
Documentation in research notes, technical bulletins	0	1	6
Publication in Fiji Agricultural Journal	1	3	3
Preparation of farmer leaflets, extension materials	0	4	3
Meeting for official approval	0	1	5

The first prerequisites were on-station trails. This was mentioned by all 7 researchers. If these trials proved successful, then, on-farm verification trials were conducted. This was always done. Only one researcher mentioned it being done only occasionally. This indicated a positive trend. Informal discussion with researchers at the beginning of the research phase, and the linkage workshop held in 1994 still, considered on-farm trials as an exception.

Tests for environmental safety of new recommendations were becoming more frequent. Three officers mentioned them as done occasionally and another three as always done[59]. An assessment of the market potential and an economic analysis was mentioned by 4 and 5 officers respectively, as a step that was always performed, while 3 and 2 respectively, considered it as a rare or occasional routine. Although this ranking by RD staff indicated that economic and market aspects were considered, a few comments appear necessary.

[59] Environmental awareness is promoted by a large number of NGOs (e.g. Greenpeace, SPACHEE) but also donors and international organisations (e.g. UNDP, EU; GTZ, etc.). It already plays a considerable role in public opinion. However, besides talks and discussions, still very few funds are allocated to this sector.

Dealing with economic aspects was a rather new field for the RD. Only a single socio-economist was assigned to the work field. One person is far from adequate and this was also seen so by RD top management (cf. DOWLING and KUMAR 1995, 42). This is an area, to which the RD will have to attribute considerable more attention in the future. More farm economists will be necessary to enable a sound check of the economic viability of new technologies.

The documentation of research findings was another weak area of the RD. Six researchers stated that research findings were always documented as research notes or technical bulletins. These documents, however, are in-house documents of the RD and little read by extensionists or other interested outside parties. Proper publications in the Fiji Journal of Agriculture were much less frequent: one officer rated it, as rarely done, four as occasionally done, 3 officers and as always done[60]. Similar, was the rating for the preparation of farmer leaflets or other extension materials: 0 rarely, 4 occasionally, and 3 always done. For the practical success, extension and farmer oriented documents are much more important than scientific publications. To ensure better adoption rates for recommendations, this was an unsatisfactory result. In the AKIS terminology this could be considered as a crucial underused interface.

5.3.6 Summarising conclusions

The new mission statement of the Research Division focused the work on applied agricultural research and the dissemination of research findings: This statement can be seen as a modern and suitable mandate. This represents certainly a step in the right direction for the division.

For the assessment of the divisions resources and staff development, a look back at the hypotheses formulated at the beginning is necessary:

H 3 Lack of funding or strong fluctuations in funding are a major reasons for low output and adoption of innovations.

H 4 A critical mass of well-educated staff is a prerequisite for effective development of innovation and their dissemination to farmers.

The conditions formulated in hypothesis three (lack of or fluctuating funding) were certainly not given at the RD. The budget had a positive development, constant funding was available and the existing facilities were adequate to conduct sound research. Therefore, a lack of resources could not be seen as the limiting factor for performance. Considering that the output of the AKIS as outlined in chapter 4 was very limited for the last two decades, this means that despite good funding, only limited output was achieved. Considering that the conditions of the hypothesis were not met, the hypothesis cannot be validated here definitely. The case will be examined a second time, in respect of the situation for the Extension Division (chapter 5.4.4).

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[60] The fact that three officers rated it as always done, appears palliated. During the researchers stay in Fiji from 1992 to 1995, not a single issue of the Journal of Agriculture was published. Since then, attempts were made to revive the journal, but according to an email by Dr KRONEN (21.3.1998), it still struggled heavily to receive articles.

Hypothesis four, however, could be seen as confirmed. The RD lacked the 'critical mass' of well-educated staff. Sufficiently qualified staff were rare, thus affecting the quality of work. Therefore, low staff qualifications could be seen as a major reason for the low output of the AKIS as a whole.

The consequences of low staff qualifications can be illustrated by a look at research trial designs[61]. Many field trials conducted by the RD were simple copies of earlier work. Officers did not dare, or have the abilities, to conduct new 'explorative' research. With such a 'business as usual' approach, where trials are always done in the same traditional way, no progress can be achieved in research. Work of the RD could be characterised by too much routine, too little creativity and research in the real sense of researching.

Based on this problem description, it is clear that the RD has to focus on increasing the qualification of its staff. The division should facilitate all opportunities for further education, promote overseas leave for study purposes, and increase training opportunities through project linked activities. In the medium to long term, benefits would also be possible through better curricula at the local college of agriculture (FCA). This might raise the entry qualification of staff at the Ministry. In the medium to long term, the division should attempt to make sure that at least half of all researchers attain a Bachelors, or better, a Masters degree. With low qualifications, not much more than 'routine research' can be expected.

In the follow-up questionnaire, researchers indicated that there was no sound system in place for the determination of research priorities. Determination of priorities was intransparent and research priorities were largely perceived as imposed by the Government. ISNAR played a major role in suggesting priorities for research, and stressed the need for more farmer orientation in their first review as early as 1981. A systematic analysis of farmers' problems has still not taken place. To better focus the direction of priorities, this would be urgently required. A model of how that could be undertaken, will be presented in chapter 5.5.4.

The review of researchers main sources of information indicated, that they lacked up to date information. Researchers would need to review international developments more closely and make better use of the existing library services. PREUSS (1994, 222) came to similar conclusions for small research systems in Africa. He called for the need to increase the 'borrowing capacity' of research systems. Small counties have to rely much more on existing information elsewhere rather than trying to do everything themselves. He further pointed out the need to allocate staff and funding, for increasing the borrowing capacity. This recommendation is certainly also very relevant for research in Fiji.

The review of research activities and methodologies used, indicated that the division started to adopt some of the new methodologies promoted through donor projects. At the beginning of the research phase in 1993 the RD was still almost exclusively involved with on-station research. However, the training workshops held by technical assistance projects, seem to have shown some effects in the meanwhile. The follow-up questionnaire findings indicated that on-farm research played a growing role in the division. Direct co-

[61] In chapter 5.5.2 the problem will be highlighted by using the example of a tomato variety ranking carried out as a PRA field exercise.

operation with farmers and participatory technology development, were gaining ground in the division. This finding was very encouraging and should be further consolidated in the future.

5.4 Extension Division

5.4.1 Mission and goals

The extension division (ED) is, size-wise, one of the major players within MAFF. However, compared to research, extension had a lower reputation. This lower profile was also visible in the lack of a clear mission statement and outline of organisational goals. In an interview with the Director of extension[62], he explained that there was no official paper that highlights the division's policies or goals. He himself, unhappy with the reply added:

> *"We have no clearly defined methodology. Our work comes close to the T&V system, but it is not quite that. Strictly speaking, we do not follow any approach by the word. We try to find our own Fijian way."*

However, screening the annual reports form 1984 to 1995, something close to a short mission description could be found in the 1994 report:

> *"The ED has been the main arm of the Ministry responsible for promoting and facilitating the production of different types of food for various needs and the actual production of primary commodities for export, through the efficient use of the country's agricultural resources. The objectives of the extension task have been to guide the growers on proper utilisation of agro inputs in order to reduce production cost, and to diffuse integrated technology (traditional and improved) that is appropriate to the financial situation of Fijian farmers"* (MAFF 1995, 90).

The two statements give a first notion of the work of the division. Goals were not clearly set. The division rather stood in the second line and waited for orders. Whatever directives came from Government or MAFF top management, the division was the 'main arm' to implement these. This was a very submissive understanding of its function. Technologies 'are to be diffused' and farmers 'are to be guided'. This approach was very far away from modern concepts such as participatory technology development (PTD) or participatory extension work. The vague and unclear definitions of goals represent a very poor framework for a successful extension work.

5.4.2 Organisational structure, available resources and staff qualifications

The ED is structured according to geographical areas. The director of extension is based in headquarters that are located in the capital of Suva. Four geographical divisions (central, western, eastern and northern) have their respective offices in the main provincial cities. Besides these main offices, a number of smaller extension offices are

[62] Personal interview, 4.3.1993.

located across the country. Some of the offices are under one roof with research stations (Sigatoka, Taveuni coconut centre, Seaqaqa). Each division is headed by a PAO. The practical fieldwork is carried out by the lower grade staff ATO and AA/SAA. In the middle of the hierarchy are SAOs and AOs that have more co-ordinating and supervising functions and usually join field staff only for major field events. The staff development in the ED is depicted in Table 17. Unfortunately, the available statistics were not consistent over the years. For several years, only total staff number figures were available.

Table 17: Development of staff in the Extension Division

Grade	1984	1989	1990	1992	1994	1995	1998
Director	1					1	
PAO	4					5	
SRO/RO							
SAO	1					14	
AO	11					11	
ATO	28					37	
AA/ SAA/ STA/ TA	112					86	
Admin. staff	49						
Total established	206	147	115	167	155	154	206
Unestablished		122	91	182	145		172
Grand total		269	206	349	300		378
Vacant positions	17					11	

Source: own compilation from MPI 1985, 65; MPI 1990, 92; MPI 1991, 95; MAFF 1993, 45; MAFF 1995, 90; MAFFA 1996, 90. MAFFA 1999, 66.

Unlike the Research Division, that had a slow, but gradual increase in staff numbers, development in the Extension Division was characterised by high fluctuations. Established staff positions were above 200 in the early eighties and dropped sharply to 115 in 1990.

Since then, staff numbers have climbed, with several ups and downs, to 206 in 1998. The number of unestablished staff, followed in large terms the same trend, and ranged from 91 to 182 positions. Several positions were occupied with staff filling posts in an acting capacity basis only, as no officers that met the necessary requirements for promotion (formal qualification and years in service) were available.

These high fluctuations in staff numbers compared to the RD are an indicator that the ED had less influence in top management of MAFF. Not all divisions were equally affected by budgetary cuts, and some divisions obviously managed to negotiate better conditions.

In the practical work, such heavy fluctuations in staff are difficult to digest and certainly have negative effects on the quality of work. High numbers of new staff joining and losses of qualified older staff, affect the knowledge base and disrupt learning processes over time. Work becomes more short sighted and less guided by a long-term perspective. Consequently, the accumulation of experience and knowledge is reduced. These

unfavourable conditions were one main reason for lower staff morale in the division. This could be felt at any time while working with extension staff.

No official statistics were available regarding the level of formal qualification at ED. Instead the qualification and position of ED staff that participated in the follow-up questionnaire are depicted in Table 18.

Table 18: Qualification and position of Extension Division staff

Highest qualification	Director	PAO	SAO	AO/ RO	GT	ATO	SAA/ AA STA/ TA	Total
Doctorate								0
Masters								0
Bachelor			(1)	2		(2)	(1)	2(6)
Diploma DTA	1		1	2		5	7	15
Certificate			1				2	3
CTA								
ODILT							1	1
Total	1		2	4		5	10	21

Figures in brackets indicate multiple qualifications.

The sample can be considered as representative of the overall divisions. With the exception of the position of PAOs, all position levels are presented. The figures indicate that the level of qualification in the ED was considerably lower than in the RD. Within the division there was not even a single officer that held a Master's degree. The majority of staff, including the director, held the DTA obtained at FCA. Only six officers held a Bachelor degree.

It is self evident that the overall low level of formal qualification represented a serious constraint for the development of the division and limits the actual and potential quality of the output of the division. The average qualification of a DTA has to be considered as more of a technical qualification only. The college course teaches technical information and skills, but it does not enable a critical scientific approach or train the ability for independent and self-determined working or learning. Thus, staff qualifications had to be seen as a major limiting factor for the development of the division.

The budget development of the ED is shown in Table 19. Unfortunately, the budget statistics were not consistent over the years and need to be interpreted with care. Budget development was very volatile, with a total budget of 4.78 million in 1983, a peak of 6.68 million in 1989 and a decline to 4.43 million in 1995. This corresponded to an average annual growth of 5.7 % in the 1980s that was followed by a sharp annual decline of 9.5 % in the 1990s. This decline was also apparent, when comparing both budgets of the RD and the ED. While the budget of the ED still exceeded the RD budget by 3.1 times in 1984, it declined to only 1.4 in 1995. This shows how drastically, the ED has lost importance compared to the RD.

At the end of the 1980s the largest item on the budget was capital expenses (4.48 million). This stood for foreign aid contributions that were shown as part of the Ministry budget.

Table 19: Extension Division's budget development

	1983	1984	1989	1990	1992	1993	1994	1995
Budget items	'000 FJD							
Established staff	1522	1439						
Unestablished staff	473	523						
Travel & Communication	111	111						
Maintenance & operations	185	196						
Purchase goods & services	37	37						
Operational expenses			2205	2837	2878	3591	3354	3898
Operating grants and transfers	358	558						
Capital expenses			4482	3783	2864	1027	788	177
Capital purchase	10							
Capital construction	736							
Special expenditure		68						
Capital grant and transfer	1352	2458						
Value added tax						421	105	360
Total	4784	5388	6686	6620	5742	5039	4247	4435

Source: own compilation from MPI 1985,57; MPI 1989,77, MPI 1990,85; MPI 1991,87;MAFF 1993,45; MAFF 1994,59; MAFF 1995,100; MAFFA 1996,103.

These had declined to less than 0.2 million in 1995. However, this was mainly a consequence of different accounting procedures. Foreign aid contributions were no longer shown as part of the Ministry budget. Development aid to agriculture had declined in that period too, but by far not as drastically as this budget line suggests. Rather little can be said about the budget breakdown itself, as in recent years, only operational and capital expenses were differentiated. Operational expenses grew steadily during the 1990s. This indicated that the functioning of the division was still safeguarded. From discussions with staff, the researcher concluded that the budgets were tight at all times, but they still provided sufficient funds for a certain number of field activities.

Adequate funds are certainly an important aspect for successful extension work. However, this is only one aspect among many others. Even with funds, it is still more important to promote the right extension messages with the right methodologies. In a discussion among the research team Mr. Naerecoko made the point on the issue:

> *"We (MAFF) are always short of funds. Often there are no funds to run the vehicles or implement activities. But when we had the JICA (Japanese aid) rice project, we had plenty of funds and we could carry out all activities we liked. But we were not any more successful. All the support that went in to the rice production schemes is considered a failure now."*

The available physical infrastructure of the ED could be considered as comparatively good. In 1995 the division disposed of 86 vehicles, 17 tractors and other farming machinery and implements. Furthermore, the division maintained 144 staff quarters (MAFFA 1996, 91). The available annual reports did not specify the actual conditions of the vehicles and other machinery. However, own observations made during the fieldwork, suggested that the conditions are generally reasonable. Calculating the number of established staff (154 in 1995), less than 2 officers (1.8)[63] shared one vehicle. This is certainly a very good ratio that many NARES in African countries could only dream of.

The relatively high standard of the infrastructure could be considered as a strength of the division. The high fluctuations in both budget and staff numbers, combined with the low level of formal qualifications, have to be seen as major weaknesses of the division.

5.4.3 Priority setting, activities and working approach

To determine extension priorities, the same procedure as for research priorities was applied. Both research and extension staff were requested to rate the influence of selected actors on the formulation of extension priorities. The results are depicted in Table 20.

Table 20: Actor influence in the formulation of extension priorities

Actors	Strength of influence as seen by	
	ED[1] (n=21)	RD[2] (n = 7)
Fiji Government policies	4.3	4.3
Extension	3.7	3.6
Donors and projects	3.4	3.5
Research division as a whole	2.8	2.8
Farmers	2.7	3.4
Private sector	2.7	3.7
Personal preferences of extensionists	2.5	2.2
Regional/intern. Research centres	2.5	2.5

[1] Extension Division, [2] Research Division,
Ranking scale: 1= none, 2= weak, 3= medium, 4= strong, 5= exclusive.

Both the RD and the ED rated the Fiji Government as the most important player. They equally agreed on extension in second position (3.6-3.7), with medium to strong influence. Donors and projects were seen closely in third position, as medium to strong actors (3.4-3.5). The RD as an actor, reached a medium role by both groups (2.8). Controversial, was the view on farmers and the private sector, that were given a rather strong role by research (3.4-3.7), while ED staff rated their influence as only weak to medium (2.7). The influence of personal preferences of extensionists was rated weak to medium by both groups (2.2-2.5). The influence of regional or international research centres was rated on the same level (2.5).

[63] Calculating with all staff (established and unestablished) the ratio is still 3.5. This is still a good value. Given the fact that many areas are flat, it would also be possible to reach farmers with bicycles. But no bicycles or motorbikes are available. In particular for short distances, and at times when funds are shorter, this would be a good, simple alternative.

The rating showed that the Government was perceived as the main player. The earlier rating of the Research Division on research priorities, yielded the same result. Using the ENGEL typology presented in the theory chapter 2.1, the Fiji AKIS could be classified as a 'policy driven' configuration. Recalling ENGEL's basic characterisation of policy led configuration, several aspects could also be observed in Fiji: the Government is the main source of finance for research and extension. Co-ordination is achieved via the existing hierarchical structures and policies. Industrial actors (and farmers) generally play a secondary role. The configuration is characterised by a rigid definition of tasks and limited flexibility.

These findings stress that there is a need to establish a transparent official procedure to determine extension priorities. Such an official procedure could increase the understanding of all actors and raise their motivation to implement and achieve these goals. Priorities that were determined in a more transparent process rather than being hierarchically imposed, would have better chances of becoming successful. A proposal, of what such a procedure could look like, will be made later in chapter 5.5.4.

Activities and working approaches of the division are described in two subsequent ways. In this chapter, some more general and descriptive aspects of the working approach are discussed. The presented findings are based on the follow-up questionnaire, supplemented by experiences and observations gained during the fieldwork. Furthermore, different working approaches and co-operational aspects are conferred with the help of a number of case studies of selected projects implemented by MAFF in chapter 6.3.

At first, the main sources of information used by extension staff will be reviewed. Table 21 depicts the findings.

The most important source of information for extension staff was own experience and knowledge. The second most important source were the Fiji farm management handbook and on-farm trials. Extension leaflets and handouts also played a major role. Occasional sources of information were, progressive farmers, subject matter specialists and training workshops. Technical books, personal contacts with researchers and extension colleagues ranked a little lower. Journals, papers, project experts and private sector actors were seen as rare sources of information.

The fact that extension officers relied more or less on themselves, has to be seen in the context of the fieldwork. Frequently out in the field, it was more difficult for extenionists to access other sources of information. On-farm trials

Table 21: Main sources of information used by the Extension Division

Information sources	Frequency (n=21)
Own knowledge, experience	3.0
On-farm trials	2.4
Fiji farm management manual	2.4
Extension leaflets, handouts	2.3
Progressive farmers	2.2
Training workshops	2.2
Subject matter specialists	2.1
Technical books, library searches	2.0
Other colleagues	1.9
Personal contact with researchers	1.8
Daily papers, journals	1.8
Project experts	1.7
Private sector, companies, traders	1.3

Ranking scale: 1= rare, 2= occasional, 3= common.

with farmers naturally were their best sources for new information. As main sources of written information, extension staff used only the official Ministry publications the Fiji farm management handbook (FFMH) and farmer leaflets. It was shown earlier that the FFMH, edited by EP&S, would require an update as it contained many outdated information. As a consequence, extension staff are not well up to date with the latest developments, in particular with new developments outside Fiji. This is further aggravated by the fact that very few scientific books or journals were read[64]. As most projects were attached to research, extension staff also had less exposure to foreign experts. This further limited access to new information.

Without any doubt, good extension work should be focused on farmers and their specific conditions and problems. This requires a good definition of the client group. As will be pointed out later in chapter 5.5.1 on farmers, the ED lacks a proper definition of its target group. There were a number of classification criteria that were used in the day to day discussions by extensionists (part-time/full-time, subsistence/commercial farmers, small/ medium/large farms), but none of these terms or categories were properly defined or used as a general rule. Consequently, each extension sub-office had its own list of farmers that were considered as their target group. This situation encountered during field work was also confirmed by the follow-up questionnaire. The number of farmers per extension area are depicted in Table 22. These numbers varied extremely from as low as 120 to 4,000. As a consequence, the ratio of farmers per extension officer varied equally greatly from 28 to 2,000. The average figures, with 187 as the rating by the group of middle management and 660 as the rating of field staff, appeared more realistic. Nevertheless, the ratings of both groups should match better and the discrepancy can only be explained by the very different estimates of the number of farmers per area. Using the total number of non-sugarcane farmers (65,000) according to the last Census, and the total number of extension officers in lower grades (124), the ration comes to 524. This ratio lies in between the two former estimates. This counter-check indicates that after all, the different estimates lay in the same magnitude.

Table 22: Ratio of farmers to extension officers

	Middle management (n=6)		Field staff (n=15)	
	Mean	Range	Mean	Range
Number of farmers per extension area	1880	700-4000	962	120-3000
Ratio farmers per extension officer	187	28-270	660	89-2000

To cross-check the above estimates, the extension officers were also asked to indicate in as far as they felt that the current number of extension officers were adequate to deliver a good service to farmers. Half of the officers (10) rated the ratio as adequate while the other half (10) observed a slight shortage. None of the officers considered the options severe shortage or too many extension officers. These findings suggested that the number of extension workers in relation to their client-farmers was medium to good. As calculated above, about 500 farmers per extensionist was certainly too large a number to

[64] This finding was also confirmed by the two extensionists in the training course. Only one of them ever used the library once in his 20 years of service at the Ministry. During the seven months that the research team was located in the library, not a single extension officer requested a literature search.

provide good individual advise to all farmers, but under practical conditions, only a small percentage of all available farmers actually seek advise or participate in extension activities. Thus, the number of extensionists appears sufficient to cover the demand of farmers.

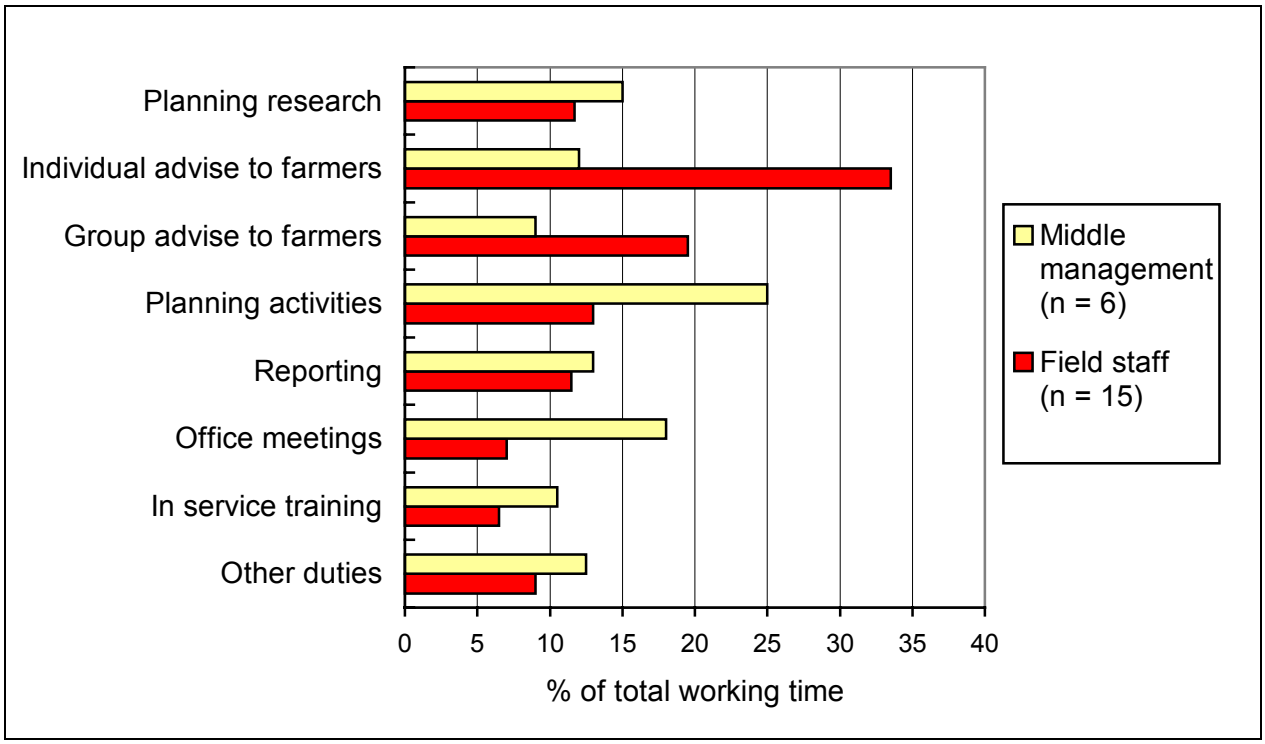
To determine which group of farmers benefited most, the extension officers were asked to rate out of 10 points which group of farmers was most active in requesting advise. The largest group was medium scale farmers with 42 %, followed by subsistence farmers with 30 % and large producers with 28 %. These results showed a clear bias in favour of large farms. Although large farms probably did not represent more than 10 % [65]of all farms, they obtained close to 1/3 of all advice.

Such a focus on larger farms is certainly no problem per se. But the approach has some risks. It is not certain that larger farms have the best productivity and can be considered as model farms for others. However, all too often this was done by extenionists. During the fieldwork for the RRA/PRAs, extension officers had a preference to introduce the research team with their 'biggest and most advanced' farms first. But copying those practices of big farms is usually out of the economic reach for medium or small-scale producers. Thus, it may be concluded here that extension had a tendency to promote the wrong model farms.

An insight into the work of the division is further provided by the activity profile of the extension officers. In the questionnaire the officers were asked to rate the time spent on various activities for an average month with the help of 40 points (1 point equivalent to half a working day). Figure 18 illustrates the findings expressed as a percentage of total time allocation. Field staff spent about 50 % of their time actually in the field, while this constituted only about 20 % for middle management staff. Regardless of the position, individual advice as method ranked much higher than group extension work and accounted for about 2/3 of all time spent in the field. This focus on individual advice certainly reduces the overall number of farmers that can be reached. It may also indicate that participatory extension tools, that are predominantly group-oriented methods, still only play a minor role in extension practice. As could be expected, middle management staff allocated about twice as much of their time to planning activities (25 %) than the field officers with about 13 %. Their co-ordinating and supervising roles explained this difference. Reporting duties required about 11 to 13 % of the time, with little differences between the management levels. Middle management spent about 18 % of their time in office meetings, while the field staff spent less than half of that figure. Important to note was the time for in-service training. Middle management spent about 11 %, while the time spent by field staff only came to slightly more than half of that level. This trend was already observed for the RD as well. Spending that much time on training was certainly a very positive aspect. This was an indication that the low level of qualifications was acknowledged by the Ministry and that attempts were made to reduce this weakness.

[65] Own estimate based on the National Agricultural Census 1991 (MPI 1992, 73).

Figure 18: Time allocation of Extension Division staff



Source: own data, follow-up questionnaire.

Other duties took up about 10 % of their time. This figure does not require further discussion. The above figure illustrated in broad categories how extension staff spent their working time. It did not yet say much about the methodology, or in other words, what and how things are done. A few aspects of these issues are discussed in the following paragraphs.

To gain a better idea about the main reasons for farm visits, the extension officers were asked to rate their reasons with the help of 20 points. The findings are depicted in Table 23 and expressed in percent. The first striking result was that the discussions about new or older recommendations only occurred in 22% of farm visits. In other words this meant that four out of five farm visits had other reasons. An explanation for this low rating could be seen in the absence or seeming absence of innovations. In several meetings, extension officers blamed researchers for not providing them with suitable new messages for extension. While this aspect was certainly valid to a certain extent, better two-way communication, would also require that extensionists search more actively for the existing literature to extract useful messages for farmers. This is still an activity that would require more promotion. Extensionists seemed to wait for researchers to become informed, rather than to inquire actively themselves about new information.

Table 23: Main reasons for farm visits

Main purpose of farm visit	%
Discuss, present new or older recommendations	22.3
Follow-up activity	27.1
Data collection	11.9
Visit demonstrations or on-farm trials	17.1
Distribute inputs or materials	6.7
Announce meetings, training or other activities	7.6
Other	7.6

The most frequent reason for farm visits was the follow-up of some earlier activity with 27 %. The next major reason, with 17 % were field demonstrations or on-farm trials visits. As such trials require constant observation and management this time allocation appeared realistic. Another main objective for farm visits was data collection with close to 12 %. Considered as the 'long arm of the Ministry', extension carried out or assisted in many surveys. Common reasons were national statistics or surveys to co-ordinate disaster relief measures after cyclones. The distribution of inputs or material was a minor reason for farm visits with 8 %. This was certainly a positive development, as such services should be provided by the market and not extension. In the past, in particular during the 'heyday' of the rice development project, extension assisted with the distribution of fertilisers and pesticides, provided tractor ploughing services and rice harvesters. Since the introduction of the new liberal policies in 1993, many of these services were closed down.

The announcement of meetings, or other training activities for farmers together with other reasons accounted for about 15 % of farm visits. This highlighted that these organisational duties can be very time consuming. This was felt in particular when transport means were unavailable, or farming communities were in distant locations. PRA activities and group extension work also required frequent preparatory visits to inform farmers about the activities to come.

In order to gain some insight into the technical questions extension have to solve during their work, the officers were asked to rate the difficulty of farmers' problems with the help of a 10 point system. The findings showed that the majority of farmers' questions (62.5 %) were rather easy and could be answered straight away. 19.5 % of the questions were trickier, but they could be solved with the help of other colleagues. 14.5 % of problems required the consultation of research officers to identify solutions. Finally, in 4.5 % of the cases, no solutions to the raised problems could be identified. This self-evaluation of extension officers seemed to indicate that they could solve matters in 95 % of cases. It would be interesting to know if farmers ranked the advice received as equally successful[66].

The last question investigated the way recommendations were discussed with farmers. It was of interest to see, if and how extension officers modified or adopted messages to suit them to specific farm conditions. The result was interesting, as more than three quarters of all officers (77.5 %) stated that they made such farm specific adaptations frequently. Only about one fifth (22.5 %) added such options after farmers had raised difficulties with the application of recommendations. Not a single officer stated discussing recommendations without specific adaptation. Satya Bahn Singh (senior extension officer based in Nausori) explained how he adapted a recommendation to specific farmer requirements:

> *"If we, for example, talk about chemical fertiliser, I first find out if the farmer has ever used it before. If, he has no experience, then I suggest starting with the smallest packet available at the MH* (annotation: supermarket chain) *and advise the farmer to apply it on a very small piece of land and to compare it with his*

[66] This question was very difficult to assess. Generally, farmers did not criticise openly. RRA 1 included a question on the quality of extension services. All farmers rated the services (out of politeness?) as very good.

usual practice. Once the farmer gains experience, I suggest increasing the area and the amounts to be applied."

The example showed that extension officers could deal with recommendations quite flexibly. The experience of the officer certainly played an important role. The above example quoted an officer with 20 years experience on the job. A younger colleague might not have had the experience to deal with recommendations equally flexibly. And one should not forget, modifying a recommendation too much or in the wrong way may result in undesired effects. Only experience can help to identify the range of acceptable modification. According to the follow-up questionnaire, extension staff seemed to be rather experienced in this respect[67].

5.4.4 Summarising conclusions

The extension division is a weak actor within the Ministry. First of all, this was visible in the lack of goals and a clear mission statement. The division must attempt to gain more profile. A clear set of goals and a mission statement should be elaborated on urgently.

The review of staff and budgets showed that the division was to a certain extent 'the play ball' of the Ministry. Both staff numbers and budgets showed very strong fluctuations over the years. A look back at the two hypotheses already applied to RD in the last chapter shall be made here:

H 3 Lack of funding or strong fluctuations in funding are a major reasons for low output and adoption of innovations.

H 4 A critical mass of well-educated staff is a prerequisite for effective development of innovation and their dissemination to farmers.

Unlike the RD which had a constant growth of budget, the ED suffered from strong fluctuations in budget. In this respect, the conditions formulated in hypothesis three were given. Thus, funding problems could be considered as a reason for the low output of the division. Looking at the divisions from the wider systems perspective, it is clear that the system output would depend on the adequate or balanced funding of both the RD and the ED. This has not been the case. As only the RD was well funded, the ED suffered from considerable fluctuations. This gives a very plausible explanation for the low output of the AKIS, thus validating the hypothesis.

However, other factors also play an important role for the output of the AKIS. Staffing and staff qualifications are important factors that need to be considered. These factors are considered in hypothesis four.

The qualifications of staff at the ED has to be seen as the other major constraint factor. To enable good extension work, qualifications of staff should not be far behind those of researchers. This, however, was not the case. Qualifications at the ED were much lower

[67] To allow a better judgement of extension approaches used, it would have been necessary to spend more time together with extension officers in the field and study their work in more detail. Such an approach was outside the scope of this thesis. LÜHE 1996 used such an approach to study the extension system in Benin.

than at the RD, and already qualifications at RD were considered as inadequate. The fact that, besides qualifications, the numbers of established staff fluctuated heavily (115-206) enforced the problem. Therefore it is well justified to speak of a critical shortage of well-educated staff in the ED. Consequently, the hypothesis could be considered also as valid.

Evident conclusions of the above analysis are that budgets in the Ministry require better co-ordination and orientation towards medium to long term objectives. Staff qualifications require improvement. For the ED this means that in particular middle management staff should be required to have at least a Bachelors degree or better a Masters qualification. The division should facilitate all opportunities for further education, promote overseas leave for study purposes and increase training opportunities through project linked activities. Medium to long term benefits would also improve through better curricula at the local college of agriculture (FCA). This might raise the entry qualification of staff at the Ministry. Job rotation of research and extension officers could also help to build linkages and enable better learning opportunities.

Another serious constraint for the ED is the lack of a sound system for the determination of extension priorities. A systematic analysis of farmers' problems and a profound screening for potential solutions and appropriate extension messages has not taken place. A model showing how that task could be undertaken, will be presented later in chapter 5.5.4.

The review of ED staffs' main information sources revealed that they lack up to date information. Extension staff relied too much on existing Ministry material. Officers would need to review international developments more closely and make better use of the existing library services. Extension staff need to acquire information more actively. This would also make their interaction with farmers more effective, as they could draw on a larger stock of potential solutions for discussions with farmers.

The review of extension activities and methodologies used, indicated that the division started to adopt some of the new methodologies promoted through donor projects. At the beginning of the research phase in 1993, the ED had rather poorly developed client-orientation and the methodology was mainly inspired by a top down 'transfer of technology' mentality[68]. However, the many training workshops held by technical assistance projects seem to have already borne some fruits. The follow-up questionnaire findings indicated that extension officers have learnt some lessons and know what a more client-orientated and participatory extension could look like. This finding was very encouraging and should be further consolidated.

5.5 Farmers, the knowledge users

The first section of this chapter describes some socio-economic characteristics of farms with the aim to develop a farm classification system. Particular emphasis is given to farmers' needs and problems. In the last section of the chapter, a proposal is made to how farmers' problems could be integrated into the priority setting of the Ministry.

[68] An example of this working approach will be provided in the first case study in chapter 6.3.1.

5.5.1 Towards user classification; some socio-economic characteristics of farms

According to the last agricultural census 95,000 farms operate in Fiji. The mandate of research and extension at MAFF are restricted to all non-sugarcane farmers. This group is comprised of approximately 65,000 farms (MPI 1992, 71). Compared with the mandate of many African NARES, this is certainly a rather small number, but the number is still much too high to take into account all farmers' problems individually. Thus, a problem of distinguishing between individual farmer's problems and problems that concern a larger number of farmers arises. It can be seen as a problem of prioritisation. Which of the many farmers' problems should be researched or addressed by extension. Commonly, NARES focus their activities on problems that concern a larger number of farmers. The practical problem is how to determine the common problems of these larger groups of farmers. Farm classification systems are often used to solve this dilemma. These systems are based on the working hypothesis that all farmers that fulfil the same criteria (e.g. farm size, agro-ecological zone, etc.) have similar problems and conditions for farming. These farmers in one group (or class) are then considered as likely to require the same solution (recommendation) for a given problem. Evidently, such systems are a strong reduction of reality, and the fewer classes there are, the stronger the reduction factor is. Keeping this limitation in mind, they still represent a means to structure problems and come to more manageable solutions. This was also the main reason why the reseacher started an analysis of Fiji farmers' problems stressing farm classification systems. The search revealed that no such standardised farm classification system existed. Most professionals in either research or extension used their own set of criteria to define farming classes. Therefore, the research team decided to start with screening potential criteria for useful farming systems categories. In an initial brainstorming exercise with a number of resource persons, the research team collected potential criteria. In the first round, the following criteria were discussed:

> *Farm size, cultivated land, agro-ecological zone, main commodity grown, type of settlement, total farm income, full-time or part-time farming, educational status and ethnic affiliation.*

The discussions revealed that the criteria were to a certain extent interrelated. But little was known about the real interrelations in the Fijian context. Most common practice was a grouping of farmers according to the main commodity marketed. However, it was felt that a single commodity based classification of farms did not reflect the diversity of farms sufficiently well. The key points for the selection of classification criteria were the practicality in terms of easy observeability in the field, and the question of the criteria enabling a relevant distinction in terms of farmer specific requirements for a given technology. After long discussions, the research team finally agreed to test the following three criteria during the first RRA:

a) agro-ecological zone (lowland, upland)

b) total resource wealth (low, medium, high)

c) type of settlement (village, individual settlement)

The first criteria distinguished between the more densely populated lowland areas with very flat topography, and the very hilly upland areas with less population and more forest cover. The second criteria divided the farms according to total income into three groups with low, medium and high income. The last criteria described the major type of land ownership and indirectly indicated the ethnic group. The ethnic Fijian farmers generally live in villages and own their land (mataqali land), while other ethnic groups (Indians, Chinese, and fewer Fijians) live on individual farms in settlements and lease their land.

To assess the suitability of these three classification criteria a number of farm characteristics were explored. The selection of variables included the three main factors in economic theory: land, labour and capital. Investigations tried to reveal to which extent these factors represented major constraints in the different farming systems. Table 24 lists the variables investigated during the three RRA/PRAs.

Table 24: RRA/PRA exercises and specific variables investigated

	RRA 1	PRA 2	PRA 3	presented here
Labour availability	x	xx		✓
Farm income	x			✓
Crop profitability		xxx	xx	
Farm management	x	xx	xx	✓
Attitude towards Innovation	x	xx	xx	✓
Cropping	x	xxx	xx	✓
Marketing	x	xx	xxx	✓
Livestock	x			
Problems	x	xx	xxx	✓
Depths of investigation: x = low; xx = medium; xxx = high.				

The first RRA had a very explorative nature and covered the largest width of variables. The following PRAs were then smaller in width, deeper in subject and more geographically focused. An extract of the findings is given in the following paragraphs. The complete findings are documented in separate publications.[69]

Before starting with the actual description of farms, it is essential to recall a few of the relevant weaknesses of the approach used. While analysing the farmer sub-system, theoretically, it would be most meaningful to know farmer's views as undistorted as possible. However, such a neutral perspective is difficult to realise. Various PRA tools helped farmers to express their own views. However, it needs to be added that some tools, in particular informal interviewing is always guided strongly by the interests of the person questioning[70]. Thus the farmers' perspective presented here could in fact be considered as

[69] The complete results of RRA 1 and RRA/PRA 2 are published in BACHMANN et al. 1997 a and BACHMANN et al. 1997 b. RRA/PRA 3 is published in BACHMANN et al. 1996.

[70] WATERS-BAYER (1994, 145) raises the question of ethics in rural research. She distinguishes extractive and enriching research. At the example of the Fulani dairy sector that is largely run by women, she shows that extractive research lead to market concentration, less flexibility and a loss of

a blend of perspectives of farmers and those of researchers and extensionists interested in working with farmers. This bias should be kept in mind for the assessment of the farmer sub-system.

5.5.1.1 Labour availability on farms

As part of their daily routine farmers executed a number of different activities. Table 25 gives an overview of these activities for a lowland settlement. Annex 1 depicts the situation in an upland settlement in the central division.

Farmers' time allocation on these various activities showed a large variation. Farmers in the lowland settlements seemed to be working slightly longer hours than their colleagues in the upland areas (around 55 hours weekly compared to 47 hours weekly). These times included marketing and collection of wild food sources. Farmers in average group worked somewhat less than farmers in advanced groups. Women spent less time on agricultural activities (in between ¼ to ¾ of the time of their husbands). Farmers worked six to seven days a week. They spent one or two days weekly on marketing (2-18 hours). The most common market days were Friday and Saturday. Farmers have quite different marketing strategies. While some sit at the market and wait until all their produce is sold, others market more regularly via middlemen or exporters.

Important differences existed in the extent to which farmers spent time on education (0 to 12 hours a week). It was found that advanced farmers did not necessarily study more than average farmers.

Other important activities are communal and religious activities. Farmers allocated between 5-15 hours a week to both of these. There were no prolonged periods of labour shortages during the year. The only exceptions were rice farmers who faced difficulty during the rice harvest periods. Some farmers occasionally hired casual labourers. Recruiting labour was not considered a major problem. In the prioritisation process of problems, farmers scarcely mentioned labour as a problem, and the few cases that did ranked it with low priority.

Conclusions on labour availability. A very large labour variability between individual farms could be observed. This large variability made it impossible to draw clear trends for labour availability on farms in relation to the three classification criteria. Family size appeared as the main factor that determined labour availability. Therefore, the three classification criteria did not appear as suitable categories to distinguish farms according to labour, or, predict farmers' choices for new technologies in relation to labour.

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control for rural women. Attempts to enable women to learn from each other and develop innovations on their own (enriching research) were not undertaken. This small example shows that the perspective of research may have a considerable impact on both ethics and design of innovations.

Table 25: Daily labour activity profile for farmers in lowland settlements Serua

Activity	Group	Mon.	Tue.	Wed.	Thur.	Fri.	Sat.	Sun.	Av. per day	Total per week	Total per year
Farming	Average 1	6	7	4	9	4	1	2	4.7	33	1650
	Average 2	6	7	5	5	5	2	2	4.6	32	1600
	Advanced	7	7	7	7	10	1	4	6.4	45	2250
	Women	4	3.5	3.3	2.7	3.7	1.5	0	2.7	18.7	935
Household	Average 1	1	1	0	0	1	0	0	0.4	3	150
	Average 2	2	2	2	2	1	1	0	1.4	10	500
	Advanced	1	1	1	1	0	1	1	0.9	6	300
	Women	4	3	3.3	3	4.7	3	3.5	3.5	24.5	1225
Meals	Average 1	3	3	3	3	3	3	3	3	21	1050
	Average 2	3	3	3	3	3	3	3	3	21	1050
	Advanced	2	2	2	2	1	2	-1	1.9	13	650
	Women	2.5	2.5	2.5	2.2	1.7	3	3.2	2.5	17.6	880
Relaxing	Average 1	2	2	2	1	0	3	5	2.1	15	750
	Average 2	0	2	2	2	2	1	6	2.1	15	750
	Advanced	3	2	2	2	2	3	-1	2.4	17	850
	Women	1.5	2.5	2	1.5	1.7	0	5	2	14.2	710
Marketing	Average 1	0	0	4	0	5	4	0	1.9	13	650
	Average 2	2	0	0	2	2	3	0	1.3	9	450
	Advanced	0	1	1	1	0	6	0	1.3	9	450
	Women	0.7	0.5	0.3	2.5	0.5	2.5	0	1	7	350
Shopping	Average 1	0	0	2	0	0	3	0	0.7	5	250
	Average 2	0	0	0	0	0	0	0	0	0	0
	Advanced	0	0	0	0	0	1	0	0.1	1	50
	Women	0	0	1	0.7	1.3	0.5	0	0.5	3.5	175
Religious	Average 1	1	1	1	1	1	1	3	1.3	9	450
	Average 2	1	1	1	1	1	1	6	1.7	12	600
	Advanced	1	2	1	1	1	1	-4	1.1	8	400
	Women	1.7	3	1.3	1	1.3	0.7	3	1.7	12	600
Communal	Average 1	2	0	0	0	0	2	2	0.9	6	300
	Average 2	1	2	2	0	0	2	0	1	7	350
	Advanced	0	1	0	0	1	2	1	0.6	4	200
	Women	0.5	1.3	1.5	1	0.7	1	0.5	0.9	6.5	325
Education	Average 1	1	1	1	1	1	0	1	0.9	6	300
	Average 2	1	0	1	1	1	2	0	0.9	6	300
	Advanced	2	2	2	2	2	1	-1	1.6	11	550
	Women	0.5	0.3	0.7	0.5	1.3	0.7	1	0.7	5	250
Sleeping	Average 1	6	7	7	7	7	7	8	7	49	2450
	Average 2	7	7	7	7	7	7	7	7	49	2450
	Advanced	8	6	8	8	7	6	-2	7	49	2450
	Women	8	7	7.4	7.5	6.5	9	7.3	7.5	52.7	2635
Wild food	Average 1	2	2	0	2	2	0	0	1.1	8	400
	Average 2	1	0	1	1	2	2	0	1	7	350
	Advanced	0	0	0	0	0	-2	3	0.4	3	150
	Women	0.5	0.5	0.7	1.3	0.5	1	0	0.6	4.5	225

5.5.1.2 Farm income and expenditure

Farm income was a very difficult question to determine. The proxy-indicators and wealth ranking procedures used, led to indecisive results. Income calculated on the basis of interviews in the first RRA did not always match well with the pre-selected three wealth groups. While farmers were very reluctant to disclose information on income, information on expenditures were disclosed rather openly. Calculated income ranged from 900 $ to 10,000 $ per farm. Income categories could be grouped as 1,000-1,999 $ (low), 2,000-3,999 $ (medium) and above 4,000 $ (high)[71]. However, this grouping represented ideal types. Several farmers in each group had to be considered as exceptions. Some farmers (in particular in the lowland areas) had substantial off-farm income. These part-time farmers with high total income often made low investments in agriculture compared to farmers that gained all their income from farming. This problem made it difficult to draw clear relations between income and farm investments. No significant differences in income between the various agro-ecological zones were observed. Equally uncertain were income differences between villages and settlements.

Expenditure for farm inputs was generally low. Middle and low group farmers spent up to 200 $ per year while expenditure on big farms reached 600 $ or more. Only a single farmer actually used an agricultural loan. A second farmer was still in the loan application process. Credit was generally limited to settlement farmers that were able to offer securities.

Conclusions on Income groups. The large variation in income between farms did not allow statements on the relation between income and the classification criteria, 'type of settlement', or, 'agro-ecological zone'. Investment in agricultural inputs showed a certain relation to farm income. High income group farmers invested more in farming. The practical difficulties with the wealth ranking procedures[72], however, led to the decision to distinguish only two income groups: average and advanced farmers. Low and medium income groups showed rather little difference in spending on agricultural inputs. For this reason they were combined to one group of 'average' farmers.

5.5.1.3 Cropping activities

The majority of farms cultivated in between 0.5 to 3 ha of land. Lowland farmers were better mechanised and used animal traction (rarely tractors), and thus, were able to

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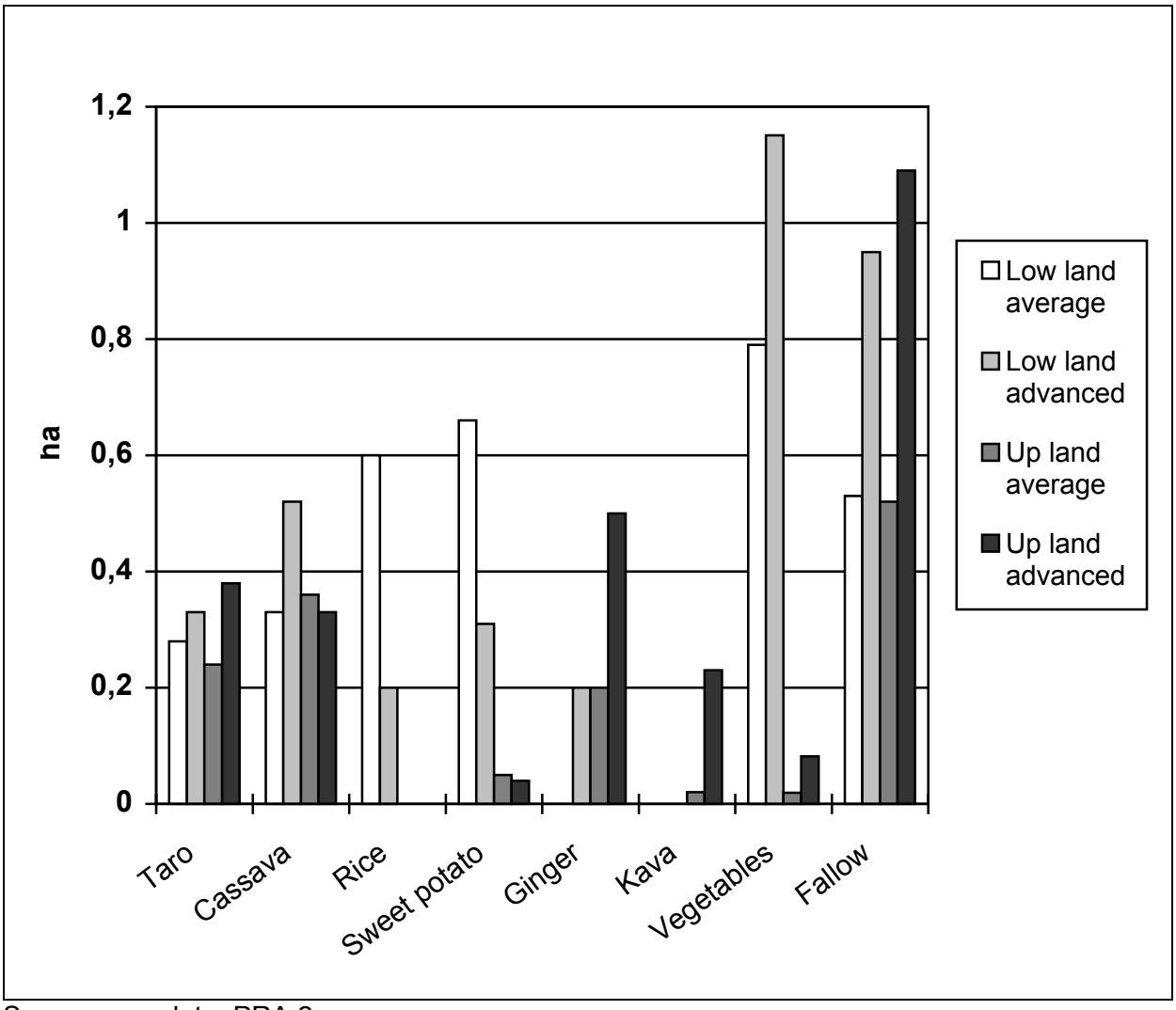
[71] In 1995 exchange rates were as follows: 1 Fiji $ = 1.15 DM or 0.71 US $. Calculated farm incomes were comparable with incomes in other professions. A housemaid in the capital Suva earned around 2500 $ a year, a factory worker 3-5,000 $ and a civil servant in middle management position 7-9,000 $.

[72] In the first RRA the extension officers made the ranking of farmers into the three income groups. The wealth criteria used were: size of the house, quality of furniture, and visible agricultural investments. Extension officers had big problems to use 3 groups and felt that many decisions were very subjective. Therefore, in PRA two and tree only 2 groups were distinguished. Rather than using income and wealth as indicators, ownership of expensive agricultural inputs (e.g. tractors, no. of pairs of bullocks, etc) and the actual level of use of agricultural inputs were used as criteria to distinguish farmers. Furthermore, farmers were invited to group themselves according to these criteria. This approach proved both easier to apply in the field and the information received were more consistent.

cultivate larger areas (2-3 ha), whilst upland farmers hardly used ploughs and cultivated in the range of 1-2 ha. Advanced farmers cultivated about 50 % more land than farmers in the average group.

The main crops grown are illustrated in Figure 19. Taro was grown in all areas as an important staple food and cash crop that achieves high prices. Cassava was the main staple crop. Sweet potato was mainly cultivated as a subsistence crop but in the lowlands it also played a role as a cash crop. Rice was almost only found in the lowland areas. Many farmers grew rice for home consumption because the prices are too low to market the crop. This was also the main reason why advanced farmers did not cultivate rice. Ginger is an important upland cash crop. Kava is the traditional upland cash crop and national drink. The production of vegetables had expanded considerably in the last decade and constituted an important cash crop in the lowlands. Amongst the advanced farmers some cultivated more than 1 ha of vegetables.

Figure 19: Cropping pattern by area and farm type



Source: own data, PRA 2.

Farmers practised several crop rotations for different blocks depending on the soil and topography. Common rotations were:

- Taro > cassava or vegetable > fallow.
- Taro > vegetable or rice > sweet potato > fallow.
- Ginger > taro > cassava > fallow.

To determine the cultivation intensity and amount of fellow land was very difficult. A number of different PRA tools were used but some of the results remained contradictory. A central problem was the fact that farmers had no accurate idea of their farms and individual plots. A plot size estimation game showed that most farmers overestimated the sizes of their plots.

Field size estimates ranged from an under-estimation of 70 % to an over-estimation of up-to 400 %. Most common were over-estimates of 30 to 50 %. Big plots were estimated somewhat more accurately than small plots. Consequently, farmers' information on the size of their farms needed to be reviewed very carefully. The same problems applied to the mapping exercises, where farmers drew sketches of their farms. Plots in the uplands had very irregular shape, and in addition with the slope, were difficult to estimate. Distinguishing fallow and natural bush was another difficulty that added to the problem. However, keeping the difficulty in mind the results suggested that farmers kept between 20 to 50 % of their land as fallow to restore soil fertility. The typical fallow vegetation was grass or light bush in the upland villages, where longer periods of fallowing were recorded. To gain some insight into soil fertility, yield measurements were taken. Farmers showed problems in understanding the meaning of 'yield'. It was very common for them to confuse the size of the tubers with yield. They expected to harvest a certain number of tubers of a certain size, but they did not consider how much land they required for growing. However, most farmers, and in particular the women had quite a good idea of how much they harvested in their respective sales units (e.g. bundles, dozens, bags, cartons etc.). For the rapid yield estimate, three to five plants of taro or cassava were dug out at random and then the average planting densities were measured. With the help of the tuber weights and the planting distances, yields were calculated.

The yields measured were higher than expected. Cassava yields ranged from 9[73] to 59 t/ha. Taro yields ranged from 25 to 28 t/ha. These yield estimates exceed considerably the average yield figures given in the Fiji farm management handbook[74] (cassava 20-23 t/ha and taro 9-15 t/ha). This indicated that farmers managed to obtain good yields with their current farming practice. Some samples even exceeded yields achieved on research stations[75]. Comparing the yield level for cassava with the world average (9 t/ha), yields

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[73] A farmer in Vunisodo had a low yield of 9 t/ha due to very wide spacing of the crop. The tuber size was very good and therefore the farmer was satisfied with his 'yield'. As he had access to more land than he could cultivate, he did not consider the lower yield per area as a problem. The production was satisfactory for him. Pointing to the fact that a higher yield per area might also mean less work (less area to cultivate), he picked up the idea and promised to try it out.

[74] Production figures in the Fiji farm management handbook (cf. MAFF 1994) are based on field and research station findings.

[75] Here the question may be asked: what can they still learn from research and extension? Regarding their traditional root crops, farmers certainly have a very high level of cultivation expertise.

achieved in Fiji may be classified among the best in the world (cf. REHM and ESPIG, 1984, 47).

Overall, yields in the upland areas seemed higher than in the lowland areas. However, the variation between measurements observed, did not permit to identify a clear trend regarding yield and type of settlement or yield and income groups.

Conclusions on cropping activities. Cropping activities showed a large variation between farms. Differentiating between average and advanced farmers appeared justified. The latter usually cultivated larger areas. Also, cropping patterns between up- and lowland farmers differed substantially. This affected the type of crops grown, fallow and soil fertility management, and the degree of mechanisation. A clear influence of the type of settlement on cropping activities, was less evident.

5.5.1.4 Conclusions on farm classification

The results of the RRA/PRAs allowed only a limited answer on the validity of the classification criteria. The main reason, had to be seen in the large variability between farms. However, a few tentative conclusions shall be presented here.

The agro-ecological zones upland and lowland, showed a rather high number of differences between the zones that appeared as certain. For this reason this criteria appeared as suitable. The wealth criteria, with the three wealth groups, proved very difficult to work with in practice. Farmers were reluctant to disclose income information, and investment in agriculture apparently did not depend on income only. Separating only two groups of average and advanced farmers proved easier and seemed to accommodate differences between farmers sufficiently well. Instead of 'wealth', 'progressiveness' would be a more appropriate title for this criterion. Regarding the last criteria type of settlement, the observed differences were less evident. Differences related to a certain degree to ethnic affiliation, but these also overlapped with wealth group effects. Therefore, the criteria did not appear as useful independent classification criteria.

Consequently, the two criteria agro ecological zone (upland/lowland) and progressiveness (average/advanced) were considered as the most suitable classification criteria. Two agro-ecological zones multiplied by two progressiveness groups, create four farming system classes. Considering the diversity encountered at the farmers' level, it may be asked if this diversity can be represented sufficiently well in only four classes. The answer remains difficult. On the one hand, more classes enable to address more factors separately, but on the other hand, more factors make it more difficult to distinguish these in the field, and more factors also reduce the overall lucidity and manageability of such a system. Considering the small size of the Ministry in Fiji and the limited resources available, the later aspect gained in importance.

Recalling the purpose of a classification system, structuring the many different farmers' problems, and, facilitating the return of recommendations, it is evident that in particular, the diffusion of recommendation is a process that has to attempt to acknowledge the existing farm diversity. If the process of innovation development works correctly, the end results should offer something that fits at least roughly to the needs of farmers in the different classes. The remaining fine-tuning to the individual situation of a given farmer

could be seen as a process of the farmers' own experimentation that could, where necessary, be further facilitated by extension officers[76].

For this reason, the research team decided that the two criteria would be a reasonable starting point for a classification system. It was considered necessary that the usefulness of the criteria should be further investigated by additional research[77]. The last sub-chapter will take up the question of farm classification again, and combine it with the findings on farmers' problems.

5.5.2 Farmers' ways to acquire skills and information and attitude towards innovation

The common way for farmers to learn agricultural skills during their youth, was through the teachings of the father and elders of the family. All farmers interviewed, acquired their agricultural skills this way. This generation linked knowledge transfer is not free of problems. The case of the two upland settlements, Mataikadawa and Vunisoco, revealed the problematic nature. In the remote location Mataikadava, family ties were strong, and children remained in the location. Elders had a very profound agricultural knowledge including diverse agroforestry and soil conservation practices, and passed this on to the youth. Vunisoco, however, is a more recent settlement closer to the capital Suva, where many farmers originated from the outer islands group of Lau. Coming from the small atoll islands, these farmers had no experience with the mountainous rainforest vegetation on the main islands, thus, their traditional knowledge was of little use in the new environment. They had to learn again how to cope with the new environment.

Among sources of new information, most farmers ranked the agricultural extension service as the best source. Only one group in Serua mentioned lack of agricultural advice as a problem. This surprisingly very good result may be explained in the first instance by farmers' politeness. Another reason may be that the RRA/PRAs were conducted in areas that have good extension coverage. But extension coverage should not be played down. The islands are well administrated, and there are certainly no 'white spots' left, where extension activities have not taken place. Though the extension service was well known by all farmers, knowledge exchange between both groups was rather one sided. Farmers stated to have very few possibilities to take influence on the technology generation process, or, to articulate their problems.

The second best sources of information for farmers on agricultural innovations, were other farmers. Ranked third were the agricultural programmes in the radio. Other sources of information, like newspapers, magazines or the market place, were not mentioned frequently. In addition, the weekly marketing day was mentioned as an important source

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[76] GÜNDEL (1998) describes the process of adapting a 'rough or semi-ready' recommendation to the specific needs of individual farmers. She points out that a recommendation must support the necessary flexibility, to enable farmer specific adaptation.

[77] In this respect the experiences gained with the use of above criteria could be further analysed. Besides the use of explorative survey tools such as PRAs, formal surveys with a higher sample size would be suitable to validate existing findings.

of new information. This gave farmers an opportunity to discuss novelties with other farmers, traders and consumers.

Farmers' learning from other farmers was consequently an important issue in the innovation process. The key activity seemed to be observation. Farmers observe their colleagues and copy practices they consider interesting. This copying process may be more or less accurate. A farmer in the first RRA was an interesting example: The farmer (high income group) built a piggery for 30 sows based on his own observations during a farm visit in New Zealand. He did not take any plans. He reconstructed the stable based on his observations and discussions with the farmer in New Zealand. He also copied the materials (concrete, corrugated iron sheet roof, etc.) and the feeding and cleaning management system. At the time of construction (10 years ago) he could not get specific advice by MAFF extension, as they were unfamiliar with the size of the enterprise. During the use of the stable, the farmer realised that several aspects of the stable were not ideal for the conditions in Fiji (in particular the expensive construction). However, he could not afford any further modifications. This example shows the importance of observation in the behaviour of farmers. It also shows some of the risks. Farmers had difficulty to assess the long-term viability of investments. This may also be an explanation why so few farmers invested larger amounts in their farms. They have difficulty to assess the associated risk.

When farmers were asked if they experimented with new technologies they all first denied the questions. Probably, with research station trials in mind, they replied that they did no such experiments. After rephrasing 'experimenting' to 'trying out new practices, or, making changes to current practices', they began to understand better. However, they still had difficulties with the concept. Concluding from the discussions, it seemed that farmers do three things: observe, reason and act. They observe the process, try to understand what is happening, and based on their experience act accordingly. From their point of view there is no neat theory building and hypothesis formulation that are consequently confirmed or rejected through a research trial. They do not have the time and space for such experiments. A complete failure cannot be afforded. A farmer is interested in the success of his efforts. Therefore, whenever something is tried out, he observes the process very carefully and changes factors as soon as he thinks it may be necessary. Comparing new technology with his own experience, he can then judge if things are working better or not. This approach contrasts radically with the scientific approach whereby factors are kept constant and variation is screened out as far as possible. In contrast to scientific trials, farmers' management could be seen as a permanent ongoing experiment. He adapts permanently to the various outside factors that may be changing. This requires constant reasoning and decision taking[78]. This also explained to some extent the fact that the majority of farmers stated that they experimented rather little with new technology. Farmers have enough trouble to run their farm, and therefore, they are reluctant to take additional 'challenges' on board[79]. This attitude seemed particularly common in the

[78] STOLZENBACH (1994, 157) examined farmers' experiments in Mali. He calls farmers' way of working: reflection-in-action. He sees an overlap of reflection and action as an ongoing-process.

[79] But no case is without exceptions. The before mentioned pig farmer also experimented with crops. Advised by extension to plant new cocoa seedlings, he planted almost half of his land with this perennial crop. Only a few years later prices for cocoa collapsed and at the time of the survey it was

average farmer groups. The advanced farmer group appeared slightly more open towards new ideas. Most frequently, farmers mentioned trying out new varieties or experimenting with fertilisers. Asked about their criteria in technology evaluation, farmers again had difficulties to reply. On this abstract, general level farmers could not reply. They 'felt' if something worked or not, but it was very difficult for them to desegregate feeling into reasons or criteria. What turned out on this general level, was that farmers preferred easy, workable solutions. In terms of crops this meant easy sowing or planting, good natural growth and disease resistance. In terms of labour input not the total amount of time was most relevant, but rather the physical hardness of the work was reflected. The physical, less hard less complicated option seemed to be preferred. When asked more specifically regarding certain crops, farmers could express their evaluation criteria much better. This shall be further illustrated in the example of tomato cultivation. Different groups of farmers were asked to rank tomato variety characteristics according to their preferences. The results are depicted in Table 26.

Table 26: Farmers' ranking of tomato variety characteristics

Evaluation criteria for tomato varieties	Farmer groups		
	Average	Advanced	Women
Market demand	1	1	1
Shelf – life	2	6	7
Ease of raising	3		3
Labour requirement	3	6	8
Taste	4	4	9
Ease of harvesting	4	4	2
Fruit size	4	4	11
Disease and pest resistance	5	2	4
Availability of seeds	6	5	5
Yield	6	3	10
Cost of seeds	7	4	5
Input cost		4	6

Several findings were of interest. Depending on the criterion selected, the groups had different ranking preferences. Most important to all groups was the market demand or price that could be achieved at harvest. This choice can be explained by the strong price fluctuations from as low as 20c to 2$ /kg. Prices are only good in the early and late parts of the season. During the main season, prices are forced down. For this reason farmers tried to sell early or late and looked for possibilities to spread the harvesting period as long as possible. This was also the reason for the high ranking of shelf- life by the average farmer group. A variety with good shelf life helps farmers to sell earlier or later.

Advanced farmers already had a different perception. For them disease and pest resistance ranked second and yield third. This could be explained by the fact that they earn their money via quantity and thus have a bigger interest in yield. Women, generally responsible for the harvest, considered ease of harvesting as second most important. Input costs were of more concern to advanced farmers (as they use them more often) than average farmers. Of particular interest was the fact that average farmers (rank 6) and women (rank 10) attributed very low priority to the specific yield of a variety. This finding showed that the common practice of researchers to screen variety trials according to yield as the single most important criterion, is not necessarily in line with farmers interests for new varieties. This PRA, was the first time

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even considered uneconomical to harvest the crop. Obviously, not all farmers can afford to experiment on a large scale on their farms. But this also protects them to a certain extent from making mistakes.

actual farmer preferences in respect of a single crop were assessed in Fiji. The participating researchers were quickly impressed by the wealth of information and the surprising results that were gained. Some even felt embarrassed for not having done similar research earlier. Ranking exercises for all crops grown in Fiji would represent an interesting possibility to better focus the search for innovations.

In Fijian villages, the traditional chiefs may have an important influence on the uptake of new technologies. Two villages in the Navua District illustrate the case. The first village Nangarawai, is a rather remote village that had received road access a few years ago. The village chief had a very open and friendly character. The social ties in the village were very good and the village had a large community hall and a joint van for transports. The houses looked prosperous with many flower gardens next to the 'bures'[80]. The village had tap water, fish ponds, improved pastures, produced vegetables for the market, and had even installed recently flush toilets for all houses. The second village Kalokolevu is located closer to the main coastal highway with good road access. However, the chief was an introverted, difficult person. The communal activities in the village were poor and there was no joint community hall. Several young people mentioned that they wanted to leave the village. The central village lawn appeared neglected. The standard of housing was low, and little modern technology was visible. No modern farming practices were visible in the vicinity of the village. These two examples were probably somewhat extreme cases, but they illustrate the existing spectrum and influence of traditional leadership very well.

To gain an idea about the potentials for future innovation uptake, farmers were interviewed about their future plans for their farms. The majority of farmers were very satisfied with their present situation[81]. They had no specific plans for the future development of their farms. One explanation for this 'lack of plans' could be seen in the fact that farmers' basic needs were well satisfied and consequently there was little urgent need 'to change something that apparently worked well'. Another explanation might be seen in the limited supply of innovations by the Ministry. Farmers had the impression that there were no attractive alternatives to what they already did. As a future plan, a few farmers mentioned the wish to improve their houses or the education of their children. The only exceptions of farmers with concrete plans, were two who had applied for agricultural loans. This was not surprising as detailed farm development plans are required as part of the loan application scheme for agricultural credits at the Fiji Development Bank (FDB).

Implications for MAFF

The question about farmers' information sources revealed the important role of the Ministry. Extension officers ranked number one. This is certainly a good indication that extension is reaching farmers. The obvious problem seems to be the lack of relevant innovation. The recommendations supplied are apparently not relevant enough for farmers. The rather limited overall degree of farmers' experimentation can be seen as an indication of this. Other farmers as sources for new information can not compensate this

[80] Fijian word for house.

[81] In this respect see also following chapter 5.5.3 on basic need satisfaction.

lack of relevant innovation. The remoteness of the islands and the limited exposure to other farmers (only on market days) means that there is rather little to learn from other farmers. Every farmer in the village is doing more or less the same thing. There is little to see that is both better and works. The media plays only a minor role for farmers. Another reason may be that no farmer specific publication exists. All existing media provide only a very limited range of agricultural information. A quarterly journal written in easy language and well illustrated with interesting examples from the Pacific region, might be the right means to circulate more farming ideas.

The example of the tomato variety ranking highlighted that farmers have very specific interests in particular crop characteristics. Only if innovations that meet these characteristics are made available, will farmers be motivated to make changes to their farming systems. As shown above, farmers carry on as usual, as long as this is not happening. This should not be interpreted as that farmers are not being willing to make changes. In chapter 4.2 it could be shown that Fiji farmers responded very quickly to the new export opportunities for taro when the neighbouring country Western Samoa was struck by taro blight that wiped out their production. Farms make use of relevant opportunities. The Ministry must learn to address this need more effectively.

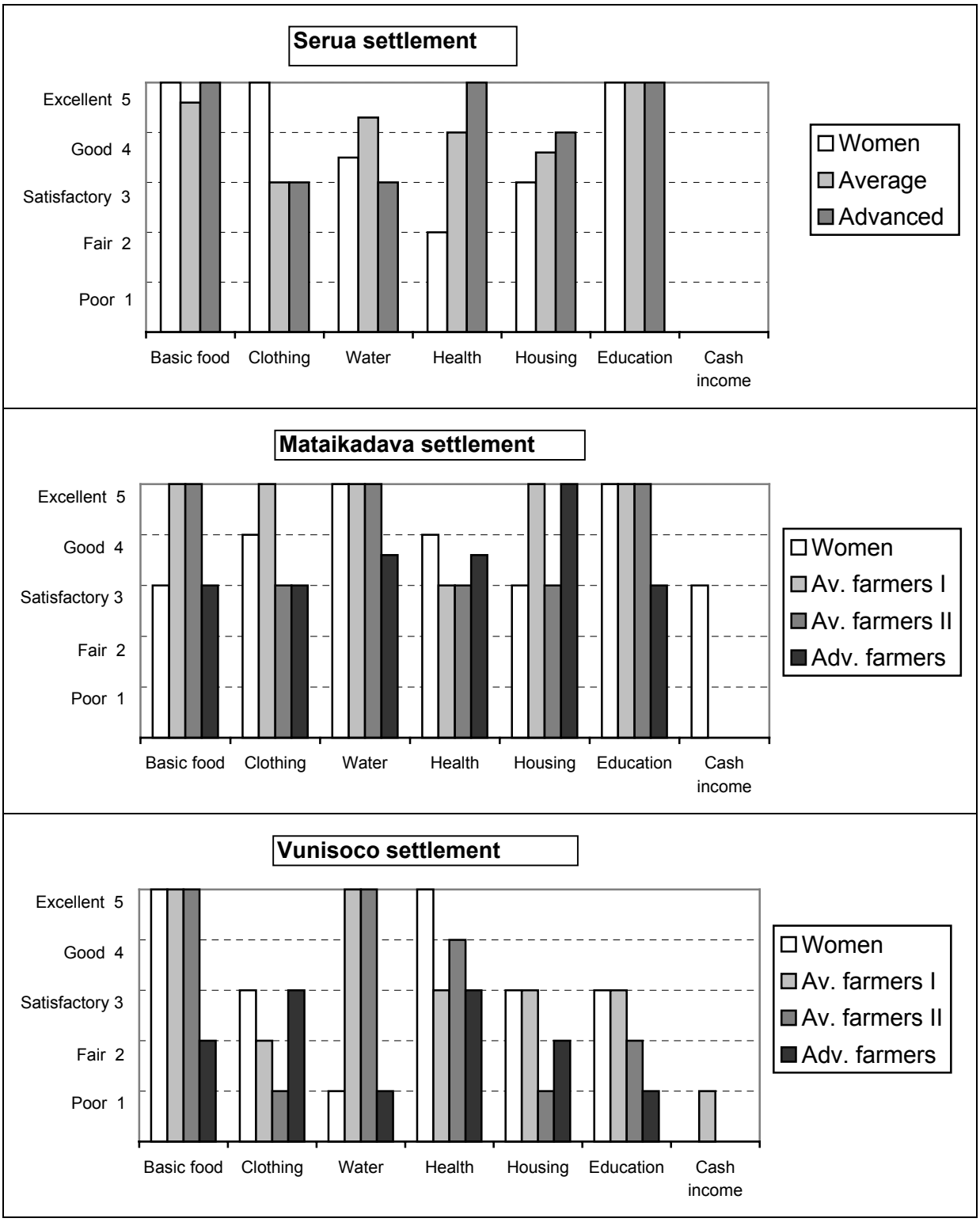
5.5.3 Basic needs satisfaction and farming problems

Determining farmers' needs or problems is a difficult problem in itself. The problem starts with the question: What are needs or problems? A farming family may need many different things for life. Only a few needs may be directly related to farming. For this reason it was decided to look at both aspects: farmers' basic need satisfaction, and their specific farming problems. Recording both aspects helped to better understand the overall situation of the farm family and to assess the nature and scale of problems.

Figure 20 provides an overview of farmers' basic needs satisfaction in three settlements. The situations in the two old settlements Serua and Mataikadava could be considered as very good while conditions in the more recent settlement Vunisoco were less favourable. All farmer groups indicated that they were satisfied with the current quality of life. Some considered their conditions even as excellent. Regarding food, almost all groups ranked their present situation as excellent. Compared to other developing countries Fiji is certainly in a very fortunate situation. Farmers do not face major problems to produce sufficient food for subsistence. There is certainly no problem of food scarcity or hunger[82]. This makes life to some extent 'easier' and reduces immediate pressures to sustain a living. Water also is generally available in abundance. Most villages and settlements have tap water. Except Vunisoco, where some households still used water from a surface creek, water was ranked from satisfactory to excellent (3-5). Somewhat lower (3-4) but still in the range of satisfactory to good was the situation for clothing and housing.

[82] On the contrary, Fiji already faces similar problems to industrialised countries with rising levels of people overweight, malnutrition, high fat and sugar consumption and related diseases e.g. diabetes, and heart attack (cf. SCHULZ 1992,17).

Figure 20: Basic needs satisfaction in selected locations



Source: own data PRA 2.

A little more controversial was the situation regarding health.

In Serua the women considered the situation only as fair whilst the men regarded it as excellent. In the other two settlements the groups ranked health from satisfactory to excellent (3-5).

Education also scored very high. Most groups considered it as excellent[83]. Only in Vunisoco, did the people complain about the distance to the next school. All farmers interviewed were literate and about one third had even attended secondary school.

Once again, the income ranking created difficulties. All groups were reluctant to rank their cash income and only two finally gave a scoring. However, farmers indicated verbally that they considered their cash income as not satisfactory and that they would like to earn more money.

The ranking showed that farmers' basic needs were largely fulfilled. This is certainly a positive finding. From the perspective of a change agent, however, it also has some undesired aspects. As most farmers are basically content, there is little need to change things - in particular not quickly. This lack of pressing problems probably creates a less favourable climate for developing innovations.

But moving from this general view to the real farming problems, the situation looked somewhat different. An overview of problems is depicted in Table 27.

In Serua farmers ranked the following problems as most important: lack of machinery (in particular for ploughing: bullocks, implements, tractors), high costs of inputs, and excessive rain combined with inadequate drainage. Less important problems were: lack of advise, availability and quality of fertilisers, pest and diseases and shortage of land.

At the end of the priority list were availability of casual labourers and land rent. Marketing seemed to be a major problem for average farmers, while the advanced farmers ranked it low. In the upland settlements, problems were quite different. In Vunisoco problems were more general, less linked to agriculture. Key problems were poor conditions of access roads, water access and low income. Main agricultural problems were lack of equipment, difficulty to clear forests for farming and marketing of produce. In Mataikadawa the main problems were: too few taro planting material due to the taro beetle, and wild pig and cattle damage due to poor fencing. Medium problems were: the cassava white fly, flooding and poor drainage, lack of tools and shortage of manpower. Minor problems were: financial constraints, weather and difficulty of land clearing.

Comparing the problems of the three settlements revealed a few issues. There were no common problems in all three settlements. However, a number of problems were common in at least two settlements (e.g. high input costs, fertiliser, lack of equipment) while some problems were purely location specific (e.g. access road, water -Vunisoco; rice threshing - Serua). Problem perceptions of the different groups corresponded only to a certain degree. In between a quarter, to half of the problems corresponded among the various groups of each settlement. The ranking of problems also indicated some parallels. Among the top four problems, one to two problems corresponded between the various groups of the same settlements. Only in a few cases, did top ranked problems of one group be found to rank much lower by other groups of the same settlement. Hence, it may be concluded that the different groups shared to a certain degree the view on common problems. However, the overall high variability on problem perception was still striking. The groups generated more different problems than common problems.

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[83] This finding is also confirmed by the high literacy rate of 91,6 % in Fiji (COLLARD, 1998).

Table 27: Farmers' problem ranking in selected settlements

Vunisoco settlement			
Women	Average 1	Average 2	Advanced
1. Little farm equipment	1. Low cash income	1. Poor water quality	1. Poor roads
2. No tap water	2. Lack of good farming knowledge	2. Poor roads	2. Education of children
3. Poor roads	2. Poor roads	3. Few farm tools	3. Water shortage
3. Hard to clear forest	3. Marketing of produce	4. Delivery to market	
3. Taro beetle	3. Price of fertiliser	5. Availability of seeds	
4. Lack of planting material	4. Lack of equipment, tools, bullocks		
4. Hard to get to market	4. Shortage of labour		
4. Hard to find jobs			
4. High input costs			
4. No electricity			
Mataikadawa settlement			
Women	Average 1	Average 2	Advanced
1. Too few taro suckers	1. Drainage	1. Financial constraints	1. Taro beetle damage
2. Poor fencing	2. Water supply	2. Shortage of man power	2. Hard to clear new land
3. Cassava white fly	3. Flooding	3. Poor fencing	3. Poor drainage
4. Wild pig damage (up to 15%)	4. Planting materials	4. Taro beetle	4. Damage to crops by stray animals
5. Occasional flooding	5. Farming tools	5. Crop damage by cattle and wild pigs	
6. Too few pair of bullocks	6. Land clearing	6. Cassava white fly	
	7. Health (transport to Suva)	7. Changing weather	
	8. Education (transport)	8. Poor drainage	
	9. Price fluctuations	9. No shelter	

Serua settlement		
Women	Average 1	Advanced
1. Tractor, land preparation costs	1. Lack of machinery for land preparation	1. Price of inputs (fertiliser)
2. Extension advisory service	2. Difficult to hire tractor	2. Price of pesticides
3. High rice production costs	3. Cost of farm inputs	2. Poor drainage
4. Low price of rice	4. No extension service visits	3. Cost of tractor hire
5. Too wet	4. Marketing	4. Poor fertiliser quality
6. Expensive Agro – inputs	4. Availability & price of seeds and planting materials.	5. Lack of advise
7. Expensive & scarce labour		5. Poor germination of seeds
8. High rice threshing cost		6. Availability of labourers
		6. Lack of rice harvesters
		7. Marketing of produce

The cases where two average groups in the same location could be compared showed no better correspondence of problems. An explanation for this high variability may be seen in the very broad nature of the question used in the PRA exercise: Think about your farms. What are your main agricultural problems? This question was so open, that naturally many different matters could be raised. But even daily or seasonal peculiarities may induce farmers to articulate certain problems. Such a case occurred in the first RRA

with excessive rain and associated drainage problems. On the two rainy days of the survey, the farmers mentioned the problem more often and discussed it in more detail than during the dry days.

The situation changed when the problem ranking was done with a more narrow and concrete topic. In PRA 3 problem ranking was done for problems related to vegetable production only. The results are displayed in Table 28.

Table 28: Problems related to vegetable production by farmer group and location

Naduri		
Women	Average	Advanced
1. Water source is far 2. Low soil fertility 3. Lack of knowledge 4. Poor seeds quality	1. Seeds are not available when needed 2. Input prices are high 3. Marketing 4. Middlemen dictate low prices 5. Water source is far 6. Diseases	1. Marketing 2. No tractor 3. High cost of agro input 4. Virus in watermelon 5. High cost of papaw seedling
Barara		
Average	Advanced	
1. Flooding 2. Expensive fertiliser 3. Marketing 4. Lack of water 5. Seed storage 6. Middlemen give low prices	1. High land rent 2. Marketing 3. Diseases 4. Mixed seeds in packets 5. High price of chemicals 6. Supermarket seeds are unreliable	
Siminilaya		
Average	Advanced	
1. Marketing 2. High chemical costs 3. High seed costs 4. High fertiliser costs 5. No irrigation system 6. Poor seed germination	1. High input cost 2. No fixed market 3. High market fees 4. Low prices on all vegetables 5. Poor irrigation services 6. Land rent is high 7. Market competition with sugar cane farmers	
Dubalevu		
Women	Average	
1. Low return of farm produce 2. High input costs 3. Damping off in tomatoes 4. High seed costs 5. Irrigation	1. Marketing during main season 2. Expensive input costs 3. Poor land preparation 4. Poor quality seeds 5. Water	

The problem perceptions of the different groups matched better. In between half and three quarters of the problems corresponded among the various groups of each location. The ranking of problems also indicated more parallels. Among the top four problems, one to three problems corresponded between the different groups of the same location. Similar to the general ranking, the results of the womens' groups and the average and advanced

groups did not differ substantially in their problem assessment. These findings underpinned the trustworthiness of the ranking results, as the different groups did not contradict each other.

After this topical problem ranking, the three most important problems were analysed in more detail. As an example Table 29 summarises the causes and solutions identified in relation to the problem 'high agro input costs'. Looking into the causes of the problem, revealed some of the 'underlying' problems: no fallow practised; low soil fertility; no organic fertilisers etc. These causes provided an opportunity to better understand the key problem and also highlighted potential options to solve the key problem. The following discussion about solutions provided first indications in which direction farmers and MAFF staff saw potential solutions. Some farmers' solutions to the problem, were, in fact expectations of the Government to make changes to policies: introduce subsidy, MAFF to supply seeds and chemicals (cheaper) and introduce price control. Other solutions indicated agricultural option: e.g. practice crop rotation, green manuring. The suggestions of researchers and extension equally included policy options e.g. liberalising the market; agronomic options e.g. the use of organic manure, apply integrated pest management (IPM), or social development options e.g. buy in bulk through co-operatives.

Table 29: Problems, their causes and solutions

Causes	Problem	Farmers' solutions	Ext./Res. solutions
No organic fertilisers		Practice crop rotation	Increase yield through small scale farming practices.
No fallow practised		Green manuring	Use organic manure.
Heavy duty on imported items		Introduce subsidy	Apply IPM
Few suppliers only	HIGH AGRO INPUT COSTS	MAFF to supply seeds and chemicals	Buy in bulk through farmers co-operative
Low soil fertility		Good cropping practices	Liberalise the market
Sold by private companies		Reduce quantity	Improve farmers cash-flow problems
No subsidies		Introduce price control.	
Inputs are all imported			

The high number of solutions to a single problem illustrated that there may be different strategies to solve a problem. It also showed that it might be necessary to address several points at the same time in order to solve the problem. Possible areas for intervention are not only agronomic, but may also be on policy level or involve socio economic aspects (e.g. founding of co-operatives). Agronomic solutions might require additional research e.g. green manure, socio economic problems might be areas where extension could provide direct assistance without the need for prior research e.g. co-operative.

Summarising, it may be concluded that the assessment of farmers' problems is a complex issue. Problems have to be seen together with their causes and potential solutions. A basic

farm classification system is necessary to structure the large group of farmers into meaningful classes with 'similar problems'. At this stage it seems necessary to take a look back at the original working hypotheses made in the first chapter. Regarding farmers' problems and their interaction with MAFF the following hypotheses were formulated:

H 1 In small island countries farmers' problems can be addressed comprehensively and in a comparatively short time.

H 2 Analysis of farmers' problems will help to develop sound extension and research priorities.

The first hypothesis could not be confirmed. At the beginning of the study it was thought that in a small country like Fiji a comprehensive review of farmers' problems would be possible in a short time. But the large diversity encountered in the field soon made it clear that a comprehensive review would be much more time consuming. Thus, even in small island countries, socio economic and agro ecological factors may create a huge diversity that is not far from that in many much bigger countries. Therefore, the hypothesis has to be rejected.

The second hypothesis could be confirmed. For the areas investigated, the problem analysis and better understanding of farming systems made it easy to formulate a specific set of research and extension priorities. These were published in the PRA field reports[84]. With the help of the following model for integrating farmers' problems into the AKIS, it should be possible to revise research and extension priorities on the national scale.

5.5.4 A model for integration farmers' problems into the AKIS

In the chapter 2.2.1 a cyclic sequence of six main AKIS functions was presented: need/ problem identification, knowledge generation, knowledge operationalisation, knowledge dissemination, knowledge utilisation, and finally evaluation. In this chapter it will be shown how the first step of need/problem identification can be broken down into various operational steps and how these are connected with the other AKIS functions. An illustration of the model is depicted in Figure 21.

The starting point of the sequence of steps is located in the top right corner. The circle, 'need /problem identification', is extracted from the cycle at the bottom to symbolise the breakdown into operational steps. The steps are shown in boxes in the middle. The circles on the left of the boxes symbolise the key actors that play a role in each step. The size of the circles symbolises the importance of actors. The steps are connected with arrows to indicate the direction of the process. At the end of the steps, the arrows feed back into the cycle of the AKIS functions.

The main content of each step is as such: The first step represents the actual process of discussing problems with farmers. The PRA tools tested during the fieldwork appear very suitable for this purpose. This would ensure that farmers can express their views, while researchers and extensionists remain in the background and simply facilitate the process.

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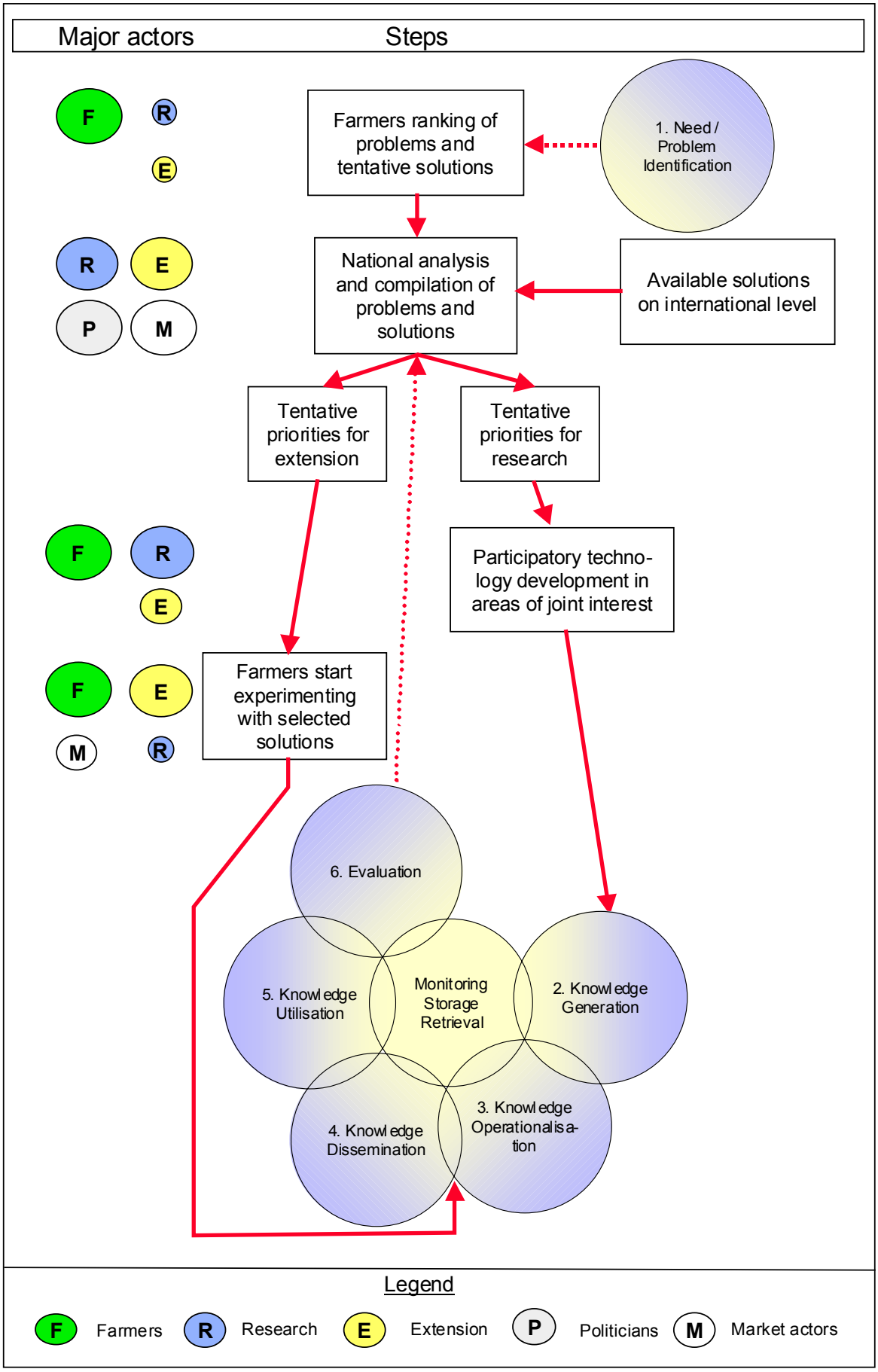
[84] cf. BACHMANN et al. 1997 a and b.

Figure 21: Model for feeding farmers' problems into the AKIS



Source: own design.

The process could start with a first look at basic needs, followed by the screening of main agricultural problems. To structure the discussions and to avoid responses that are too general, it would be recommended to suggest central problem areas for analysis (e.g. crops, livestock, marketing, etc.). Then, problems should be ranked and a small selection of major problems (3-5) should be analysed in detail with causes and potential solutions[85]. The selection of farmers and locations should be structured by the farm classification system elaborated earlier. This would include two agro-ecological zones and the separation of farmers in two groups according to progressiveness[86]. Coverage of 10 to 20 % of the locations in the main areas of intervention of the Ministry should provide a sufficient sample. The aim should be a representative selection of locations to ensure that the problems of the majority of farmers will be recorded. The final sample size would also depend on the Ministries' ability to deploy staff.

In the second step, the information would be compiled on a national level. The frequency with which problems were raised would provide a good overview about the real priority problems at the farmers' level. Compilation and analysis would be an important role for research and extension. Results would have to be compiled for all farming systems classes separately. This would result in priority problem lists for all farm classes. The tentative solutions collected at farmers' level, should then be compared with available solutions on the international scale. This enlarged set of problems and solutions, should, then provide the basis for determining research and extension priorities. In this process farmers' priorities should be compared with the existing priorities and policies. A joint Council of all divisions of MAFF would be necessary to discuss the findings and agree on a tentative list of research and extension priorities. At this stage, policy and market actors could also contribute to the discussions. This would help to accommodate all actors' interests as far possible.

The last step, would be the compilation of the national results, discussing tentative priorities with farmers again. No such exercise was as yet included in the field work trials. However, it seems that a PRA exercise with presentation of results and solutions and an open discussion would be the appropriate means. This would offer farmers an opportunity to comment on the suggestions made. At the same time, it could be the starting point for further co-operation. According to their interest, farmers could participate in the further technology development process for new research priorities, or farmers could start to experiment with the selected recommendations offered by extension. Depending on the branch extension or research, the respective divisions could then take control. In particular for extension, market actors could also play a growing role in the future. As the screening of farmers' problems showed, many problems do not necessarily require research. Options for development may have to do with better marketing, processing or exporting of farm produce. The better problem analysis could provide indications for private sector actors to place investments.

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[85] RAUCH (1996, 21) points out the importance of solutions. Development agents should add their views on potential ways to solve problems. Target groups should not be left alone in the discussion of problems and solutions. In this respect, a joint effort of all actors to look for solutions provides the best changes for success.

[86] These criteria could be used to start up the process. If the criteria proved insufficient, additional criteria might be added on in due course.

In the model these further developments are symbolised by the arrows that feed back into the cycle of AKIS functions. Participatory technology development feeds back into knowledge generation, while farmers start experimenting with selected solutions feeds back in between knowledge operationalisation and knowledge dissemination. Once the full cycle is completed for a certain innovation, the evaluation results could be fed back into an update of the need identification and start-up a new national problem compilation.

The implementation of the model in practice would provide indications in which, at intervals, an update of such a national problem census would be necessary. At this stage it could be estimated that this might be necessary in 3-5 year intervals.

Implementing the above model would represent a considerable challenge for MAFF. The model would represent a big step ahead in terms of farmer participation. In the actual situation, where no farmer structures or organisations exist, the full initiative to implement the approach would be required by MAFF. The methodology used for this study, participatory action research, might be a suitable way to accompany this introduction process. Implementing the model could thus become an important learning cycle for the Ministry. This would provide an excellent opportunity for Ministry staff to further raise their qualifications.

5.6 Linkages and information flow between the main actors

To reach the goal of developing and disseminating an innovation, the actors in a knowledge system have to perform a number of tasks (see system functions chapter 2.2.1). There are various ways to divide these tasks between the different actors. Some actors will be assigned to research, and some will have the job of extension, which are the key players in the system. Certain tasks will have to be carried out jointly by the two or more parties, with varying input from each group, depending on the nature of the task. But no matter which actor or group of actors performs the task, a good degree of co-operation will be necessary. Thus, to cooperate, the parties have to be linked in some way to one another. In this sense 'linkages' describe the organisational set-up or structure used to facilitate co-operation and the necessary communication or exchange of resources.

The existing linkages between the main divisions in the Ministry are examined in the first section. A closer look at the information flow between the main players will be given in the second section.

5.6.1 Existing linkage problems

A workshop was considered the most suitable means to gain a good insight into existing linkage problems in Fiji. The workshop was held in the Southern Cross Hotel in Suva in November 1994 and it was organised by the Soil and Crop Evaluation Project (SCEP), a donor funded project with the purpose to assist MAFF in the process of improving its crop research and extension capabilities.

A total of 35 participants of all Divisions of MAFF attended the one-day workshop[87]. Four working groups were set up to analyse the topic with the help of the following main question:

Are there linkage problems between the various groups responsible for developing and transferring technology?

As a further guideline, the groups were asked to examine linkage problems with particular reference to the following tasks[88]:

- Diagnosing farmers' problems
- Design of a research program
- Generate technologies
- Consolidate technologies
- Disseminate information and knowledge
- Approve and release technologies
- Multiply improved genetic material and duplicate technology packages
- Deliver technologies
- Evaluate technologies

The results of each group were visualised on pinboards and discussed in the plenum. The summary of the four group works is presented according to the above guidelines below[89]:

Diagnosing farmers' problems

Extension was considered responsible for this task. If a problem was encountered, extension staff discussed the issue informally, firstly, with other colleagues, and secondly, with research staff. Then it is passed on to research. An important complaint of extension was that it took too long to get a response from research. Research defended their position with the difficulty to allocate research priorities to such requests and the general difficulty to identify quick solutions. Joint visits to farmers by both research and extension staffs were uncommon. Only one group highlighted the need that the farmers themselves should be involved in problem identification. There was a feeling of lack of co-ordination between research and extension, because there was no joint investigation of problems or evaluation of activities and no joint listing of priorities.

Design of a research program

Research programs were exclusively designed by researchers for on-station trials. Extension staff was not involved in this design process. A few mentioned that the diagnosis of problems should be done in conjunction with research and extension. However, some researchers considered that there was not a big need for extension to be involved. Another linkage problem raised was that research and extension meetings did

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[87] The composition of workshop participants is shown in Table 5 in chapter 3.3 on p.41.

[88] This list of tasks is extracted from the ISNAR research reports (EPONOU 1993, 19) and was presented earlier in chapter 2.2.1.

[89] The workshop programme and detailed group results are documented as a SCEP project report (SCEP 1994).

not achieve the aims of incorporating the views of the extension staff into research programmes. The majority felt that extension staff should have some input into the development of a research programme. Another key linkage problem discussed was that staff from both divisions were too busy doing their own work to talk to each other effectively.

Generate technologies

All groups agreed that there was an almost exclusive reliance on research to generate technologies. There was practically no involvement of either extension staff or farmers in this process. Researchers tended to focus on commercial crops with little emphasis on semi-commercial and subsistence farmers.

Consolidate technologies

While all groups agreed that there should be a good co-operation in relation to this task, it was identified that their was a lack of definition of which roles that each division should play. Extension staff was occasionally involved in the identification and layout of sites, but there was no real involvement. This led to a lack of ownership and the fact that little ended up happening in the field. All groups expressed the need that both extension and research should be actively involved in the consolidation of technologies.

Disseminate information and knowledge

Several groups highlighted, as an important problem, that there was no technology output and little new information to extend. Extension indicated a reluctance to extend incomplete packages and research, on the other hand, complained that there was no feedback from extension staff on the success of technology packages. A lack of training on this issue was seen as the main reason for this problem. Some groups reasoned that a technology package by itself was not sufficient. A system of extension attached to it would be lacking; e.g. field days, demonstrations. Extension further revealed that there was no easily understood technical information available. Others added that radio programs were not an effective means of extension and that the programs were rarely evaluated. It was agreed that the bi-directional flow of information between research, extension and the training and communication unit (TC&S) was inappropriate.

Approve and release technologies

One group remarked that the wrong recommendations were being used. Another group thought that all groups should be involved in the process of technology approval. It was agreed that at present only research was taking the major responsibility and that extension was not formally involved in the task. Extension officers were only expected to adopt and recommend the recommendations. It was felt by some, that this process should be a management decision. Once a technology was described in the Fiji farm management manual, then it was considered as approved. However, the actual process of how this currently happened, was not transparent to anyone.

Multiply improved genetic material and duplicate technology packages

Some comments were made that there was very little new information worth extending or multiplying, that it was furthermore expensive and the co-ordination on the tasks was poor between all divisions. Other groups questioned the division of tasks and attributed

the role to indicate needs for multiplication to extension, while research should be responsible for the actual implementation of multiplication.

Deliver technologies

The delivery and evaluation of recommendations was considered interrelated. The groups felt that there should be a structured system whereby the process of technology delivery could be reviewed. Currently, there was no such system in place to obtain feedback or to evaluate the uptake of technologies or their effectiveness in the field. Most groups expressed the view that extension, research and farmers should be involved in the transfer of technology. There was no way of knowing if technologies were being delivered or not.

Evaluate technologies

The groups stressed again the lack of a feed back mechanism and that extension, research and farmers should be involved in this task. There was a perceived need to have an agricultural economist to do some economic evaluation of the benefits of the technology package. It was rated that the current input of EP&S was not being used in the most appropriate way and that the section needed to be more consulted in the technology transfer process.

Analysis of workshop results on linkage problems

The comments of the groups revealed very broadly that the Fiji AKIS was in a desolate condition. The openness to report such negative facts may appear as surprising, in particular as all levels of management participated in the workshop. Apparently no problems (or only minor facts) were hidden or left unspoken. This showed a willingness to admit mistakes and engage in a sound process of reform. The participatory set-up of the workshop and the discussions in small groups probably created the positive atmosphere, which enabled such profound reflections[90].

In an attempt to summarise the key problems raised, it may be said, that already at the starting point, farmers' real problems were not properly identified. Whatever problems were identified by extension, these faced difficulties in finding consideration by researchers. Consequently, research designs remained dominated by researchers and the topics focused on their research station biased perceptions of farming problems (commercial crops). These apparently did not match well with the real farming problems. Therefore, it was not ensured that the technology generation process was geared towards promising ends. The necessary consolidation process of new technologies was omitted. This in turn led to the fact that technologies were approved by research without a real validation of these technologies in the field. Dissemination of technologies was then hampered by several factors. Firstly, the overall output rate of innovations was very low. Secondly, the promoted technology packages were at least partly inappropriate. Thirdly, it was not clear to which group of farmers the technologies might be suitable. Finally, the extension approaches used seem unsuitable and poorly managed. Furthermore, it appeared that only information was disseminated by extension, as co-ordination problems between research and extension hampered the multiplication of necessary genetic materials.

[90] The prospects to receive donor assistance to address existing linkage problems certainly also created a good motivation to analyse the situation properly. It might even be the case, that for this reason, some participants exaggerated existing deficits.

Without proper monitoring of dissemination results, a meaningful evaluation of the overall process remained impossible.

The short summary illustrates the many linkage problems that cause the inefficiency of the system. The comments of the workshop furthermore indicated that there was, as yet, no culture of collaboration or joint system perspective. Each division's outputs were not considered as being part of an exchange relationship in service provision. The different divisions were not really aware of the need to work together. This was evident through the lack of role definitions and the fact that the different actors blamed each other for linkage deficits.

This attitude is devastating in a system context where all collaborating parties may benefit. This attitude may also explain why other outside actors were not noticed as potential partners for co-operation. Not noticing other actors also makes it impossible to gauge the potentials that other actors might offer in relation to improving one's own outputs. And there are many more actors that are relevant for developing agricultural innovations. In the Fiji context that could be particularly policy makers and donors, private sector and market players such as importers, exporters or processing industries and also educational institutions.

A cause for linkage problems could be seen in MAFF's management. This was specified as a lack of procedures, particularly enabling procedures and directives. From own experience with collaboration with MAFF, the researcher rated the lack of follow-up as the most important missing procedure. Innovation development requires many iterative steps or in other word cycles and loops to complete the necessary tasks. A key management problem is that tasks are started-up, but as soon as problems occur or other issues require urgent action, activities are paused or stopped. Works are not resumed, as follow-up mechanisms are not in place.

Comparing Fiji with other cases

ISNAR has investigated NARES in seven study countries. The following common linkage problems were identified: missing tasks, missing linkage mechanisms, duplication of effort, non operational linkage mechanism and ineffective linkage mechanisms (EPONOU 1993,17)

Comparing these problems with the Fiji workshop results many of the problems raised fit under the above ISNAR categories:

Missing tasks. A clear definition of roles for all tasks is lacking. Farmers' problems are not fed into the system. Multiplication of genetic materials is not assured.

Missing linkage mechanisms. No formal linkage structure is in place. No officers (e.g. subject matter specialists) have a clear mandate to linkage roles.

Duplication of effort. This seems a minor problem, as both divisions follow their own agenda with very little overlap. Duplication of efforts is rather a problem of repetitions

over time; e.g. researchers repeat the same trials time and again, only because original results were never properly documented or staff have changed positions[91].

Non operational linkage mechanisms Existing meetings between the divisions do not achieve intended results. Although research and extension are based jointly on some of the stations, too little real co-operation seems to take place.

Ineffective linkage mechanisms. Where existing linkages work, the results are not implemented. Recommendations are ignored or not followed-up.

The fact that the problems identified in the Fiji AKIS fit so easily in the ISNAR categories, indicates that the problems are well comparable to situations in other countries. This was also confirmed by an IRETA study that investigated the NARS in 5 Pacific Island countries (KERN 1994, 2-29). All countries were visited for the study and a total of 83 resource persons (mainly national Ministry staff), thereof 24 in Fiji, were interviewed. Many problems were similar throughout the five nations. The main problems identified were fully in line with the results of the Fiji workshop: weak structures of NARS and NAES, communication and information flow deficits, lack of sound monitoring of programmes, very weak linkages between actors, in particular between the key players research and extension and from them to farmers and policy makers. Some causes for the situation were seen in the prevalent public service rules that were considered as anti-productive. In addition, human relations problems, motivation deficits and apathy towards change were identified.

5.6.2 Information flow

During the first workshop on linkages, information flow problems were already mentioned as an important factor. A follow-up workshop was considered the most suitable means to gain a better insight into existing information flow deficits.

The aim of the workshop consisted of four tasks. Investigate information flow, create awareness among MAFF staff member on the potential of participatory methods and identify further training requirements in the above two topics. The workshop was organised jointly by the PRAP P11 teamleader Dr. Mechthild Kronen and the researcher. SCEP and IBSRAM attended with contributions. The workshop was held at the main research station in Koronivia in September 1995.

A total of 39 participants attended the workshop. The focus was on MAFF staff (27) and project experts (6). All MAFF management levels and the different divisions were well represented. In addition 3 representatives of FCA and USP were invited in order to include actors from the education sector. Furthermore one donor representative and two observers of regional organisations attended the workshop.

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[91] Personal communication by the biometrician of the PRAP Programme Dr. D. Morton 12.4.1994. The low rate of documentation of research findings is caused by several factors. Poor analysing skills, poor report writing skills and difficulties to interpret findings. As literature searches are not done systematically, many trials investigate research questions that are already well documented in other countries.

Five working groups were set up to elaborate different views on the topic. The composition of the working groups was pre-set. This consisted of trying to put together MAFF staff members according to similarities in working fields, and to evenly distribute project personnel as well as staff from external organisations. According to the majority of participants in a given group, these could be classified as top management, research, extension and two groups as cross-sections.

The workshop dealt with two main topics, for each of which one day was allocated. The first day examined the current information flow and MAFF's organisational interaction with other actors. The second day investigated in particular the information flow and information needs between farmers and MAFF with particular reference to data collection methods. First results of the researchers training course on participatory methods were presented and discussed together with other new local experiences with survey methods (RRA, household surveys and formal surveys). In this section mainly the results of the first day will be reviewed.[92]

Workshop results

Information flow was analysed in two ways. First, the groups worked on information flow within MAFF using such visual methods as flow charts and venn diagrams. Second, the groups were asked to visualise the Ministry's interaction with other actors using venn diagrams.

The flow chart diagram of group 4 is depicted in Figure 22. It gives a very good illustration of the current information flow at MAFF. Formal information flow is shown in full lines, while informal information flow is represented in dotted lines.

The chart shows clearly that information flow runs largely along the hierarchical structure in the Ministry. Information flows in a rather straight line from the lowest grade of Senior Agricultural Assistant (SAA) up step by step intermediate grades (Agricultural Technical Officer (ATO)-> Senior Agricultural Officer (SAO)-> Principal Agricultural Officer (PAO)) until it reaches Director level. Via Deputy Permanent Secretaries (DPSO and DPSS) information finally reaches the Permanent Secretary (PS). Information flows are bi-directional so that information may flow up or down the stream of hierarchy. The chart resembles a classical linear organisation. Looking closer at some details, several deficits and inconsistencies become apparent.

There is no direct information flow between the intermediate levels of research and extension; formal links are limited to the top of the hierarchy at director level only. This may be seen as a main reason why information flows are underdeveloped.

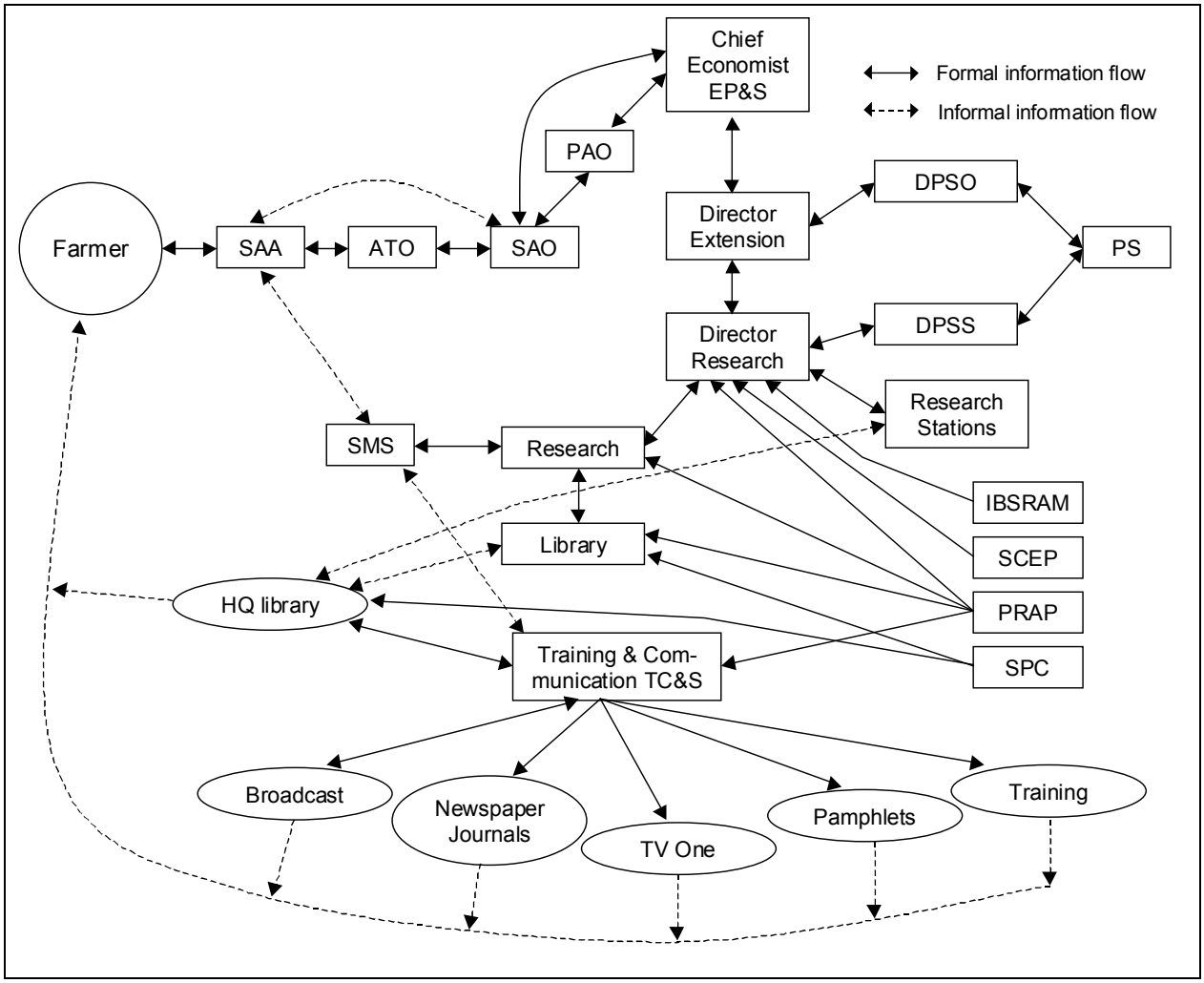
The contact to farmers is build via the above executive chain. It is important to note that only the lowest grade officers, the ones with the least professional experience, are responsible for communication with farmers. From the chart it appears as if the chain is attached only to EP&S, but it is clear that extension has the same structure and the larger number of officers. While EP&S staff mainly collect information from farmers and feed it into the system (predominantly up-ward flow: prices, market information), extension is

[92] The entire results of the workshop are documented in a project report PRAP P11 (1995).

supposed to provide farmers with the latest recommendations (predominantly down stream information flow).

An important fact that was already noted in the linkage workshop is that research had no direct contact to farmers. This means that all information they receive is second hand (or if all hierarchy steps are counted at least 7th hand).

Figure 22: Model of information flow at MAFF



Source: Information flow workshop Koronivia, group 4 result.

The only information exchange seems to be via Subject Matter Specialists (SMS) on an informal basis to SAA level. This is certainly a key deficit, as field extension officers should have good direct contact to SMSs.

The Training and Communications Section (TC&S) is cut off from information. It has no direct information exchange with either research or extension. Only informal links seem to exist to SMSs and a single link to the PRAP information service (P9) project. Therefore, it may be wondered where they receive their information for further dissemination to farmers. The dissemination function, however, seems to be operational with information flows via several channels (broadcast, newspapers, journals, TV, pamphlets and training) to farmers.

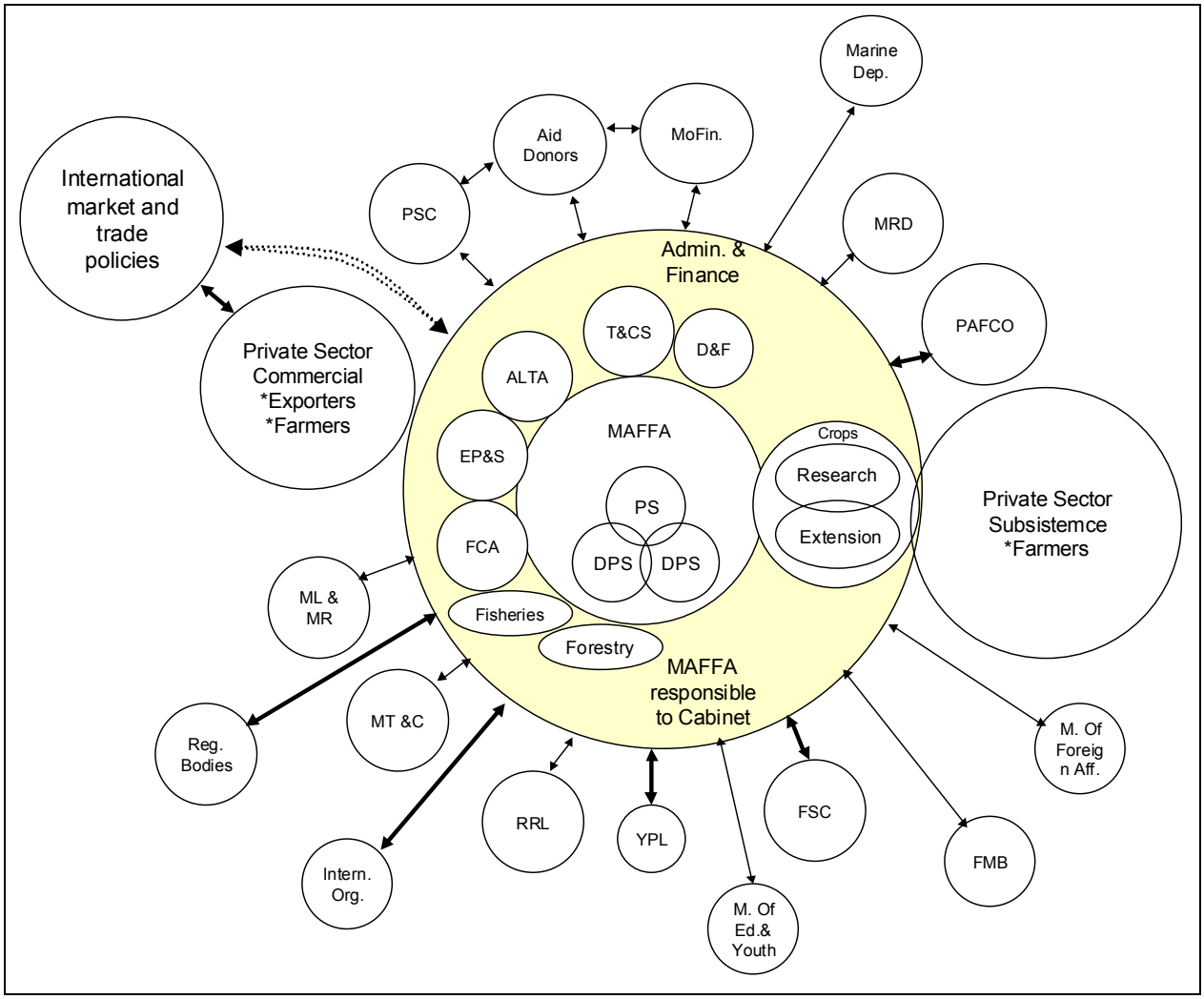
Another weakness may be seen in the fact that all donor projects (SCEP, IBSRAM, SPC, PRAP) are only linked to the Director of research. In this configuration, knowledge and advice from projects benefits only one division, while the others are neglected. Further aggravating is the fact that information flows are indicated to be one way only. This implies that projects appear as 'teachers', rather than as partners with equal feed back and joint learning interests.

The libraries as important sources of information remain largely unused. There is no information flow to extension. This indicates that extension relies exclusively on research for new ideas. Research obviously use the library more, but as the analysis of the RD in chapter 5.3.5 showed, the researchers make to little use of existing literature.

The above chart permitted a very good look at the internal information flows at MAFF. In an attempt to widen the analysis of information flows, MAFF's interaction and information exchange with other actors was examined. All groups were asked to draw venn diagrams of their organisation and its interaction with other players.

The two most interesting charts are depicted in Figures 23 and 24.

Figure 23: MAFF and organisational interaction: management group view



Source: Information flow workshop Koronivia, group 2 result.

The chart of the management group shows a strong focus towards the cabinet (grey shaded circle). MAFF is seen as a closed body that is responsible towards the cabinet. In the center is MAFF top management with the Permanent Secretary and his Deputies (DPS).

Attached to this management circle are all divisions. This representation comes very close to the official hierarchy. Interestingly, crop research and extension are seen as overlapping, thus indicating good interaction. This view was not shared by the other groups. Outside MAFF are a large number of actors with which the Ministry is in contact. Closest are the relations to farmers and the private sector. These are split in a larger group of subsistence farmers and a smaller group of commercial farmers, exporters and traders. International markets and traders are seen behind the private- commercial exporter circle and linked with dotted lines only. This indicates that the Ministry has no good personal contacts to and understanding of outside markets and relies on the experience of local exporters that have practical trading experience. Further outside are all other Fiji Government Ministries that maintain links to MAFF. The most important one here is the Ministry of Finance, linked to Aid Co-ordinating Office and the Office of the Prime Minister (PSC). These Ministries often comment on the Ministry papers presented in Cabinet or tabled at Parliament.

The second venn diagram was prepared by one of the cross sectional groups. It shows a completely different view than that of management.

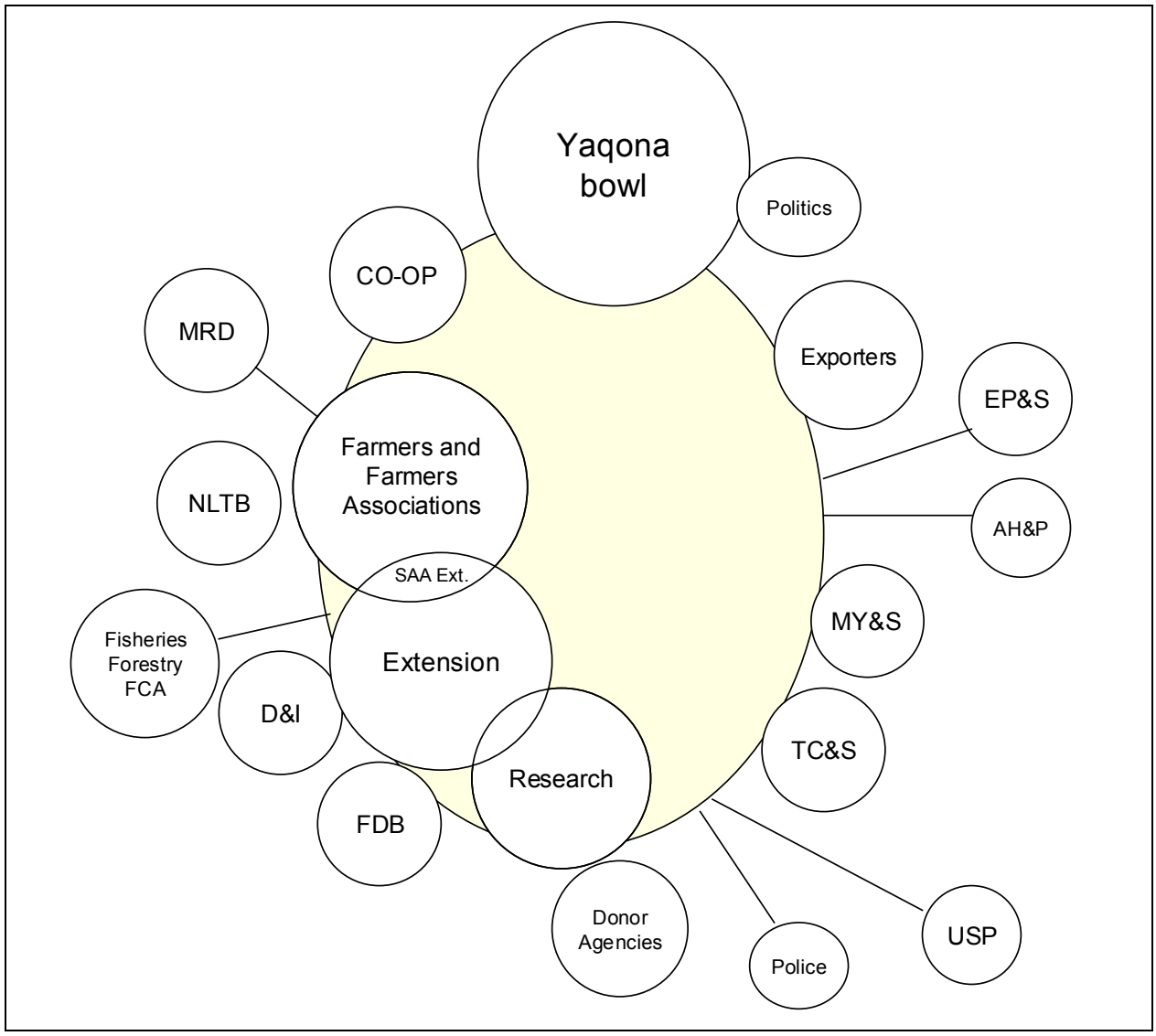
MAFF is not seen as a closed body and all divisions are positioned independently. Top management is not even included as a separate player. The extension division is seen as the largest MAFF entity in the center. Attached to extension with a small overlap is the farming community with farmers and farmers' associations. Interaction is enabled through SAA staff members. Research is smaller and has a little overlap with extension. Thus a certain degree of interaction is given. Donor projects are attached to research. The key feature in the chart is the yaqona bowl. All major actors are linked on an elliptical chain to the yaqona bowl. The yaqona bowl represents a symbol for communication and discussion (round table). As the traditional drink[93] and ceremony, yaqona is the starting point of all social interactions in the Fijian society. Next to the bowl are politics, which shows their strong dependency on traditional customs. Other MAFF sections are attached closely to the chain (TC&S, D&I), while EP&S, AH&P are a step outside, indicating that these are less involved in field work. Another important actor, the Fiji Development Bank (FDB) is in contact with extension. The bank provides loans to farmers.

Discussion of workshop results

For all workshop participants it was a striking recognition that there were so many different perceptions of information flow and interaction. Within this diversity, however, two main directions could be identified.

[93] Yaqona is prepared out of the roots of a local plant. The drink is prepared in a large wooden bowl and its preparation ceremony is a prerequisite for all social events. The drink contains a narcotic substance that makes the consumer feel sleepy if larger amounts are consumed. Yaqona consumption is very frequent in daily life, even in Government offices.

Figure 24: MAFF and organisational interaction: cross sectional group view



Source: Information flow workshop Koronivia, group 5 result.

First, there was the perception of management with the rather ordered and hierarchical understanding of information flow. This was visible at the example of the executive chain in the information flow diagram and again in the interaction diagram of management. The second direction was the view from within the hierarchy. Here, the various groups elaborated very different pictures, each mainly determined by the closer environment of each division. This could be seen very well in the yaqona bowl chart. But this influence was also visible in the management chart: management felt a direct responsibility to the cabinet through its frequent interaction, whereas the other groups did not have direct contact to the Cabinet and therefore did not include it in their representations.

This obvious mismatch of perceptions was felt as a concern by MAFF management. The Director of extension Mr. Samisoni made the point: *"Five perceptions – and all are correct. Management expects all levels of the structure to have the same knowledge and understanding of policies. Apparently, this is not so. It seems that information flow is poor."* The Chief Economist Mr. Taukei had a similar understanding and concluded: *"The consistency of policy interpretation and understanding of operational norms from top*

management level to the lower levels within MAFF furnishes some areas of concern. Overall there is a lack of total objectivity in policy implementation amongst the down-line functional divisions within MAFF. This may be suspected to affect the quality of service output and performance"(PRAP P11 1995, 35).

Members of the other groups of these 'down-line functional divisions' saw the problem in the opposite direction. Instructions and policy goals were considered as not clear. There was not sufficient explanation as to why things were supposed to happen in a certain way. If attempts were made to forward difficult matters to management, feed back was not forthcoming. Some groups felt that too much information with too little relevance was circulating up and down the hierarchy[94].

These problems are well known in organisational theory. MINTZBERG (1992, 232) describes that bureaucratic organisations have a tendency to centralise decision making to such an extent, that the concerned staff have no or very little influence on the decision making process. This means, that the decision making managers do not possess the necessary information of the real situation at the base. Medium hierarchical levels, that might still posses this information, generally do not have sufficient influence to modify or adapt decisions made at the top. Their only function lies in the transfer of decisions from the top to the next lower hierarchy level in basically the same way only with a different minuteness of detail.

For the communication in the opposite direction, the case is reversed. Information has to be compressed from one hierarchy level to the next, so that the organisational top management receives a short and precise summary of proceedings at the base. Difficulties do occur whenever non-routine problems are encountered – as happens quite frequently in extension practice. These cases cannot be simply compressed and therefore have to be transmitted unfiltered to the next higher hierarchy level. Due to the limited physical capacities on higher levels, this leads to bottlenecks that may result in the fact that decisions are made very quickly, irrespective of the problem nature, or that wrong decision are made or that problems are not dealt with at all (cf. MINTZBERG 1992, 248).

Comparing MAFF with the MINTZBERG characterisations above, the parallels are obvious. It may therefore be concluded that MAFF suffers from the typical diseases of bureaucratic organisations everywhere in the world.

However, taking the different perceptions of actors in the system serious, it must be concluded that there is no such thing as a standardised system configuration that best fits the needs of all departments. Depending on the position of the observer within the system, a completely different picture exists and may be valid. This implies that from the point of view of optimising information flow and interaction, that a hierarchical configuration cannot provide adequate results. It reduces direct information flows and increases, at the same time, the chance of information distortions. In this line of reasoning the connection between information flow and organisational configuration is apparent. Indeed, the

[94] According to the researcher's own observation, many of the internal documents circulated in the Ministry were heavily standardised papers (e.g. fixed report formats, tables, closed questions). Staff even joked about these formats and reports. A good example is the 'standard excuse' found in many documents: too much or too little rain. The weather is blamed for almost everything and this excuse is readily accepted by superiors without any further explanations.

subjects are difficult to differentiate. Considering linkages and information flow as interrelated, a strategy to improve linkages could also assist to improve information flow problems.

The main conclusions of the workshop were summarised in a plan of action to be implemented in the following 12-18 months after the workshop:

- Strengthen information exchange on all levels in the Ministry, in particular horizontal exchange between the divisions and sections on all hierarchical levels. This should be achieved with additional training. Informal linkages should be encouraged and with the help of test cases it should be shown how multi-divisional groups could better work together.
- Investigate information requirements in all divisions and reorganise information exchange accordingly. In this context it should be investigated how existing libraries, databases and information networks could be integrated better and used more effectively[95].

One group that worked on the policy guidelines for the action plan suggested the following philosophies to guide the process:

- bottom up approach,
- closer to the customer,
- bias for action, and
- aim towards self mobilisation.

[95] This activity comes close to what Engel describes as creating information exchange protocols between different actors. In a new publication ENGEL and SALOMON 1997 put together a comprehensive toolbox to facilitate network building. Several tools address in particular the subject of information exchange (cf. B3 Info-source-use exercise, B4 linkage matrix, B7 communication analysis). A recent brochure of GTZ (1997) also illustrates a set of tools that may be used for this purpose.

6 Improvement of the AKIS: some possible solutions

The description of the main AKIS actors and their interrelation permitted the identification of a number of problems in particular in the working methodologies used, linkages and information flow. This chapter will take a look at different attempts undertaken, to improve the AKIS and solve some of the problems identified.

The first section provides an overview of different donor projects and their strategies to overcome some of the linkage problems. The second section confers training experiences with participatory methods, and investigates the potential for institutionalising participatory methods within the AKIS. In the third section, four case studies of donor projects are used to illustrate and evaluate different old and new approaches in promoting agricultural innovation. The last section explores the possibilities of platforms as means to reorganise the AKIS and promote innovation development and diffusion in Fiji.

6.1 Addressing linkage problems

6.1.1 Measures of various donor projects

MAFF management and experts of donor projects were concerned about the magnitude and seriousness of problems encountered in the linkage workshop (chapter 5.6.1). Further aggravating was that priority problems were not clearly expressed. However, a few areas were assistance should start up were still identified at the end of the workshop. It was concluded that donor projects should facilitate activities that promote collaboration between research and extension. Projects should assist in raising awareness of each actor's role, and also assist to create an atmosphere that favours the adoption of new ideas. Furthermore, projects should assist in developing human resources, provide funds for activities such as appropriate publications assist in the establishment of a technology transfer unit and conduct training in linkage issues.

In the months following the workshop, strategies were refined and the first activities were begun. In particular the experts that attended the workshop fostered dialogue with their donors and MAFF. These negotiations were bilateral and focused on how each donor could best place his assistance. Co-ordination between donors was not formalised, but it nevertheless worked. The smallness of the location assisted this process.

This informal 'coalition of projects' had put together a bundle of many different single and also joint activities to address the linkage problems identified. The diversity of activities undertaken are best illustrated by a short description of the projects and their focal areas of intervention:

SCEP was one of the front runners for improving linkages. Originally conceived to assist in crop related fertilisation issues, the project soon expanded its services into research and extension management training, focused on improving linkages by starting-up many joint activities, promoted PRA techniques, assisted technology transfer in selected cases and provided training on all these topics.

IBSRAM was a research focused project that investigated erosion control on sloping land. The project promoted new research methodologies and attempted to involve farmers

and extension in the search for innovative solutions. The project organised several PRAs and assisted in training activities.

GTZ was active in biological control of pests and diseases. Research and extension co-operation in this area was promoted on a regional scale together with SPC. In Fiji one focus of the project centred on vegetable production in the Sigatoka Valley. Research and extension interaction was supported. Research was trained in identifying biological control measures while extension was assisted in extension approaches (e.g. mass media campaigns)[96].

The **Pineapple*** project facilitated research, extension, production and marketing of pineapples. The key feature of the project was the vertical integration of various actors, from farmers that were organised in a co-operative, to MAFF and to traders and exporters in Fiji and overseas.

The **PRAP** programme, in its first phase focused on research, shifted emphasis in the second phase towards the consolidation of research findings and extension of findings. This implied a stronger consideration of a system's perspective and linkage issues by all PRAP programme components. As a regional programme, PRAP was not only active in Fiji, but also in 7 other countries. This of course, limited the time experts could spent in each country. The specific focal areas of each project were:

The **Farming Systems** (P1)* project supported participatory technology development for agroforestry systems. Technology development involved the triangle farmers, research and extension.

The **Vegetable Seed** (P3)* project facilitated the availability of vegetable seed and planting materials and strengthened in particular MAFF linkages to the private sector.

The **Information Services** (P9) project strengthened the role of agricultural information centres. Improving access to information and assisting staff in writing appropriate publications (e.g. farmer leaflets) were main activities in promoting better information flow within and between the various countries.

The **Agricultural Rural Development** (P11) project was designed to shift the programme balance more towards extension and to assist in better linking the various actors. Participatory methodologies and management training were the main activities of the project. The PRA training course conducted as part of the researchers own field research and presented in the following sub-chapter was financed and supported in the framework of this project.

The remaining components (Coconut Hybridisation P2, Sweet Potato P4, Taro Beetle Control P5, Biometric Service P8, Tissue Culture Service P7) represented either services (P7, P8) or rather classical research linked on-station projects (P2, P4, P 5). Their impact

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[96] In 1994 SPC-GTZ conducted two workshops. The first on rapid rural appraisal (RRA), knowledge attitude practise (KAP) and agricultural economics. The second on extension campaign planning, message design and materials development. Both workshops were well documented (cf. SPC-GTZ 1994 a and b).

* These 3 projects are described in detail as study cases later in chapter 6.3.

on linkages was small. Their main contribution may be seen in reducing the problem of 'limited technology output' by providing innovations and improved genetic materials (coconut, sweet potato) and better multiplication methods via tissue culture.

This long list of projects illustrates that considerable resources were mobilised to address the problems identified. Each different project attempted to address some of the existing linkage problems. This was important in order to avoid duplication of efforts. This was also necessary in respect to the rather small Fijian Ministry. Co-operating with such a large number of projects reached the limits of The Ministry's absorption capacity[97].

Due to the involvement of so many players, discussion on the best approach to follow, were frequent. However, the recommendation to create a formal linkage unit to facilitate technology transfer, was quickly abandoned. Past experiences with such a unit established through the rice development programme in the late 1980s were mixed (cf. EYZAGUIRRE 1996, 69). Similar experiences were made by ISNAR that investigated the reorganisation of research and extension systems for several countries across the world (EPONOU 1993, 17).

These considerations were the main reasons for the adoption of an informal approach. Instead of building another formal unit, it was considered the best option to create project specific multi divisional task groups. It was hoped that in this way a large number of informal linkages could be created that could last beyond the life of the projects. In other words it was hoped that informal linkages would become a strong asset for the future work of the Ministry and that these might have more sustainability than formal (but ineffective) structures. It was further thought that this was the quickest way[98] to promote co-operation between the various divisions, clarify roles between them and reduce existing tensions. It was also seen as an advantage that in this way a larger number of MAFF staff would be trained, than if only a few staff in a new unit would be trained to resume this task.

6.1.2 Impact of the measures to reduce linkage problems

During the workshop on linkage problems in late 1994 a large number of problems were identified. It was evident that not all of these problems would be solved in a short period of time.

To facilitate a good comparison of the new situation at the end of 1997 with the problems identified during the first workshop, the researcher extracted a selection of problems and included these for assessment in the follow-up questionnaire. Researchers, extensionists and experts were asked to rate the progress made with three options: (1) no difference, (2) moderate - some improvement and (3) good improvement. The results for linkage problems are depicted in Table 30 and the results for technology development and dissemination in Table 31.

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[97] Several project required counterparts and office space that actually became a scarce factor.

[98] The official Fiji Government bureaucracy turns at a very slow pace. Working in the EU Delegation, the researcher experienced that even simple project proposals took more than 2 years to pass all administrative hurdles.

Table 30: Linkage problems: Improvement 1997 versus 1994

Problems as seen 1994	RD (n=8)	ED (n=21)	Experts (n=5)
No common goals	2.6	2.0	2.6
Insufficient meeting opportunities	2.4	1.6	2.7
No transfer mechanisms between RD and ED	2.3	1.8	2.1
Difficulty to raise problems during meetings	2.3	1.6	2.3
No clearly defined roles between RD – ED	2.1	1.9	1.5
Lack of knowledge of what the others do	2.1	1.8	1.9
Staff uncommitted and lazy	2.1	1.8	2.3
Lack of agreement on evaluation criteria	2.0	1.6	1.8
Lack of guidelines, responsibilities	2.0	1.8	1.5
Lack of economic advice	2.0	1.9	1.8
No formalised structure to assist linkages	1.9	1.6	1.3
Low managerial qualifications	1.8	1.8	1.5
RD and ED information breakdown to TC&S	1.6	1.6	1.7
Overall average	2.1	1.8	1.9

Scale: 1= no different; 2= some improvement; 3= good improvement.

Table 31: Improvement of technology development and dissemination

Problems as seen 1994	RD (n=8)	ED (n=21)	Experts (n=5)
Insufficient technology output	2.4	1.8	1.5
Too strong an emphasis on commercial crops only	2.4	2.2	1.5
Too little farmer participation in technology generation	2.1	1.6	2.0
Too little involvement in technology consolidation from extension and farmers	2.1	1.8	1.8
Procedure for multiplication of genetic materials unclear	2.1	1.2	1.8
Insufficient feedback of technology performance in the field	1.9	1.9	1.8
Unclear process of approval and release for new technology	1.9	1.6	1.3
Poor monitoring of technology adoption by farmers	1.9	1.7	1.3
Poor evaluation of the overall process of technology generation and dissemination	1.6	1.9	1.3
Overall average	2.0	1.7	1.6

Scale: 1= no difference; 2= moderate, some improvement; 3= good improvement.

All three groups acknowledged a moderate improvement of the linkage problems (1.8-2.1). The ratings of the RD and experts showed some parallels. The best improvements (2.4-2.7) were stated regarding the problems of 'no common goals', 'insufficient meeting opportunities' and 'difficulties in addressing problems during meetings'. RD staff saw also some progress (2.3) in the transfer mechanisms between RD and ED. The least improvements (1.3-1.9) were acknowledged regarding the problems of 'low managerial qualifications', structure to assist linkages and the 'RD and the ED information breakdown to TC&S'. Furthermore, experts stated rather little improvement (1.5) in the role definition between the RD and the ED commenting on the lack of guidelines and responsibilities. ED staff with an overall average of only 1.8 rated progress lower than the other two groups. All items were classified similarly with less variation (1.6-2.0). This may indicate that improvements at the ED were less pronounced.

Improvements in technology development and dissemination showed similar trends. The RD rated the overall improvement as moderate (2.0), followed by the ED with a slightly lower rating of 1.7. The experts, were more critical of the overall improvement giving it only a 1.6 rating. Research indicated the best progress (2.4) in relation to the problems 'too strong emphasis on commercial crops' and 'insufficient technology output'. The other groups did not confirm this view. The ED still rated technology output only moderate (1.8), and also the experts considered both points still as more serious problems (1.5). While the RD and experts identified some improvement on the procedures for multiplication of genetic materials, ED staff rated this problem as unchanged (1.2).

The perception on the approval and release for new technologies was controversial, as well as the monitoring of adoption and the overall evaluation of the process of technology generation and dissemination. RD staff rated all, except the last item, with moderate improvement. The experts, however, rated three areas as practically unchanged (1.3).

The differences between the RD and the ED are also noteworthy. Overall, researchers rated the progress at their division higher than the extenionists for their division. Two reasons may explain these differences. First, researchers are more exposed to donor projects and thus have more access to training. Second, as highlighted in chapter 5.3.3, the general level of qualifications is higher at the RD. For theses reasons researchers seem to be more successful in acquiring new knowledge and skills.

Reviewing all findings together indicates that some improvements in the AKIS have taken place. The first workshop on linkages revealed that there was very little co-operation between the various divisions at MAFF and the knowledge of the role and function of each other had been very limited. Meanwhile, interaction and awareness has grown. In this respect it is now certainly more valid to speak of an AKIS, as the actors are more aware of each other's roles and perceive themselves more as being part of a system with a joint goal. This is an encouraging result. The magnitude of change, however, still remains modest. In some areas almost no progress was stated, whereas in other areas more achievements were reached.

Evaluating the improvements made so far remains a difficult task. Considering the many deficits identified in the beginning, the progress reached may be appraised as acceptable. Developing and disseminating innovations can be a very time consuming task, and in this respect, three years is not a very long time. Breeding a new variety of crops may easily require a timeframe of ten years. Thus, several aspects will probably still require much

more time before substantial improvements can be achieved. In this respect in particular, the stages of technology consolidation, dissemination, monitoring and evaluation should be noted. All these areas were rated as still being underdeveloped. But this is not surprising, as the number of solutions and promising innovations is still low, there is less need for activity in the areas of consolidating or monitoring adoption.

In this context a wider understanding of innovation is important for MAFF. At present, research and extension at MAFF are too limited on the rather classical agricultural domains of crop and livestock production. The socio economic areas (e.g. marketing innovations, new types of co-operation, joint ventures with the private sector, better links to food processing) are far too underdeveloped. In particular in these areas innovations may be developed and promoted in a much shorter time. A reorientation in this direction was part of MAFF policies (chapter 5.2.1), but so far it is not expressed adequately in staff allocations and tasks. To improve the output of innovations, a shift in this direction is required.

Regarding the question of linkages between divisions, a look back to the working hypothesis on the intervention strategy is necessary.

H 6 Linkage problems within small organisations may be overcome by supporting participatory methods to promote informal modes of communication and co-operation. These informal modes may bypass existing institutional or hierarchical barriers.

It was thought that the increased use of participatory methods would stimulate such informal linkages, and that for this reason no specific new 'linkage-unit' would be necessary. In retrospect, this hypothesis appears only partly valid. Linkages have improved, but only slightly. The potential impact of participatory methods to improve informal linkages and bypass institutional barriers was overestimated. This may be interpreted in the following way. Participatory methods remained, to a considerable extent, limited to training activities of projects. These activities were short and probably not sufficient enough to establish good and lasting informal linkages. Furthermore, informal linkages cannot fully compensate a poorly functioning hierarchical system. Both systems are interrelated. Informal linkages can improve information flow, but they have less impact on resource allocations. However, in small organisations sound resource allocations, in particular operational funds and staff are crucial for achieving a high organisational output. Thus, it may be concluded that informal linkages can have a positive effect on the overall output[99] of the organisation, but the internal efficiency of the organisation largely determines the final level of output that may be reached.

Based on these experiences, it seems necessary to establish a linkage unit to promote the co-operation between the various divisions at MAFF. The main functions of such a unit could comprise:

- Co-ordination between all divisions of the Ministry.

[99] In this context output could be defined as the number of innovations developed that reach a significant level of diffusion.

- Central information centre for all information relevant for innovation development and diffusion processes (e.g. analysis of problems, results of technology generation, technology consolidation, dissemination; monitoring and evaluation of adoption).
- Promotion of participatory methods and approaches.
- Co-ordination of resources.
- Co-ordination point for private sector initiatives and donor assistance.

The main function of the liaison unit would be to further improve the linkages between all divisions. The unit could provide a more formal framework to facilitate co-operation and exchange of resources between the divisions. In such a more formal setting, the unit could also contribute to the improvement of the internal information flow in the Ministry.

With respect to the AKIS functions introduced in chapter 2.2.1, the unit would take up the central function of an information centre for monitoring, storage and retrieval of all information relevant to the knowledge system. This is of particular importance, as this kind of 'grey' information is often not published and difficult to access. The information would become available to all actors, instead of remaining 'hidden' in various actors' filing systems. In this respect the unit could complement the existing agricultural libraries in their role as 'formal' information centres.

The unit could be seen as a further step to improve the overall output of the Ministry. It remains to be seen if such a step would be sufficient. EPONOU (1993, 17) points out that the worldwide success of such linkage units was mixed. After all, innovation generations are an open-ended processes and can only be planned within certain limits.

6.2 Training participatory methods

The analysis of working approaches at the RD and the ED and the results of the linkage workshop revealed a clear lack of participatory methodologies in the Ministry. This was considered as a main bottleneck for the successful work of the Ministry. As already discussed in chapter 5.5.4 , positive effects of participatory methods were expected in particular through the better integration of farmers' problems into the priority setting of research and extension. It was equally expected that participatory methods would lead to improvements for linkages and information flow (cf. chapter 6.1.2). Thus training of MAFF staff in participatory methods was seen as an urgent prerequisite to improve the quality and output of the work of the Ministry.

This chapter describes the researcher's training course on participatory methods for Ministry staff. Special attention is given to the difficulties encountered in the learning and training process. The training course consisted of three cycles that build on each other. Each cycle is discussed in a separate section. The success of the training measures and the question to which extent participatory methods could be institutionalised within the Ministry is discussed in the last section.

6.2.1 First training cycle

Planning

The course started with introductions and a discussion on the expectations of all trainees. With four trainees (1 RD, 2 ED, 1 EP&S) and the researcher as 5th team member, the group had a good working size and made it possible to address individual questions very well.

The qualifications of all team members showed much resemblance. As their main agricultural education, all team members had attended a 3-year course at FCA in Fiji. Then they joined the Ministry for their further professional career. The two extensionists, 40 and 45 years old, and the RD staff member 43 years old, all had worked for the Ministry already for more than 20 years. The youngest team member (25 years old) from EP&S had graduated from FCA in 1991 and then worked on a cane farm. Two years later he joined the Ministry. Both extensionists had spent a half-year overseas in Japan in a training programme on rice production, the younger of both also training on mechanisation in Thailand. The RD team member attended a training course in Australia, while the youngest team member had no overseas experience so far. The two extensionists had worked in different locations each, but always on crop production related programmes. The RD team member started his career on animal production and later specialised in information management in the research library. The economic planner was still in a training stage at the Ministry and his main function was agricultural liaison officer with IRETA. From these initial presentations, a sound experience of the team members on Fiji agriculture could be expected.

The didactic concept of the course was focused on learning by doing. In this respect the researcher tried to keep teaching elements to a minimum. Short technical inputs on the subject or task were followed by group works to solve the tasks. The preparation and implementation of the RRA and PRAs followed a structure of 16 steps proposed by NAGEL et al. (1989, 7):

Step 1:	Defining the core problem
Step 2:	Defining output, purpose and users
Step 3:	Defining research topics and research questions
Step 4:	Making the research plan
Step 5:	Defining and grouping variables
Step 6:	Defining data evaluation categories
Step 7:	Defining (proxy-) indicators
Step 8:	Defining the survey units
Step 9:	Defining data collection methods
Step 10:	Defining the sample
Step 11:	Pretesting the survey design
Step 12:	Training for survey execution
Step 13:	Planning and organising the survey
Step 14:	Implementing and controlling the survey
Step 15:	Analysing and presenting data
Step 16:	Utilising data

These steps were used to further structure the description of activities and results of the training course.

Planning

Using the tool of a problem tree to identify the core problem was accompanied by a few initial difficulties. Condensing thoughts on a single card and structuring these in causes and effects was felt as a difficult task.

The definition of output, purpose and users with the decisions on what to research, why and for who was grasped quickly and created no major problems.

The definition of research topics and research questions was perceived as a rather academic approach. The team members were used to work only on a few problems at a given time. These were dealt with rather intuitively. Structuring a rather complex problem as the one they selected for the RRA 'insufficient knowledge of farming systems' made structuring an important task.

Creating the following plan of operation, however, was very easy. All members stressed that they appreciated using cards and the matrix approach to decide on activities and the respective responsibilities and time setting.

Due to shortage of time, only 9 days were available for the preparation of the field phase. The group omitted the step of defining and grouping of variables and went directly into the formulation of the interview guidelines. Prior discussions with other experts revealed the point that many MAFF staff have considerable difficulties with preparing and implementing even simple formal surveys. For this reason it was decided to keep the first RRA rather formal. This meant that a good number of closed questions were formulated. These were supplemented by open questions and sections with keywords only to enable discussions with farmers and explore the topic. Therefore, the number of tools used was rather low: formal interviews, semi- structured interviews, observation and farm/field walks. The discussion in the team also showed that most members had a preference for closed questions, as they felt somewhat uneasy with open questions and engaging in explorative discussions.

At this stage the team decided to present the questionnaire and survey design to other interested user groups in the Ministry. The presentation provided the first chance for team members to demonstrate their presentation skills. Using media such as overhead projector, flip chart and pin boards as well as speaking freely to a larger audience quickly turned out as areas that required further attention for training of all team members.

Implementation

The team used one day to pretest the approach in the field and a second day to analyse the field test. Everybody enjoyed working in the field and the day analysis was used to improve the questionnaire and cut its size.

For the implementation of the RRA the team spent 3 days in the field. The researcher was surprised by the enormous diversity of farms that made it rather difficult to identify trends or patterns. The team members, however, considered the farms visited as 'normal'. While the formal sections of the questionnaire turned out easy, the usage of the interview guidelines caused problems. Often the team members proceeded in the same style as with

the more formal questions and did not engage in detailed discussions. Quite a few of the key words remained unfilled as the team members were unable to summarise the discussion findings or simply no discussions could be invoked in the first place. Two main explanations for this deficit were identified: First, there was a lack of experience in dealing with open questions. If a farmer found it difficult to reply to a certain key word, they continued with the next topic too quickly instead of rephrasing the question or trying to find another starting point to the question. Second, the researcher rates the very similar knowledge profile of farmers and the team members as a main reason. As the phenomena observed on the farms were 'too natural' or 'too well known' for them, they had much less incentive than the researcher to question the phenomena observed. Overall, the team felt that a wealth of information was collected.

Immediately after the field phase the team decided how to analyse the information and write-up the findings. After this step the team split in two groups. For a duration of one month the researcher worked in Germany, while the Fijian team continued in Koronivia. Both parties were working on the same steps. The objective of this section was to gain some additional insights into the abilities of the team members to work individually and unsupervised, their problem solving capacities, and analysing skills in combining different questions for drawing conclusions. For this reason the guidelines for analysis of the questionnaire included some open space for interpretation.

Analysis

The local team extracted the data as far as possible into hand written tables. This approach was selected, as only one team member was familiar with spreadsheet databases. Each team member was responsible for one area. The researcher compiled all data with spreadsheets.

After the four weeks of separate work, joined work resumed with a comparison of findings. Several strength and weaknesses could be identified:

Strengths: The motivation of all team members was high. Each team member prepared a report. The findings were extracted into tables and the applied basic statistics (totals, averages, percentages) were well calculated. The team also attended together with other MAFF staff a 3-day workshop on PRA that was moderated by Jules Pretty[100].

Weaknesses: The reports were very short (2-5 pages) and grammar and expression mistakes were frequent[101]. More important, a lack of basic scientific principles was observed. A proper description of the basic facts was lacking. Probably due to difficulties in summarising and expression, the reports did not describe the actual findings but rather each individual's general knowledge on the topic. The team members had problems to decide which facts were important and should be mentioned and which facts could be omitted. The open space for analysis remained unused. To give an example of this open space, the plot sizes for all crops grown and fallow areas were collected. At this stage the reseacher expected that several subtotals and combinations or relations of variables would

[100] This workshop stimulated many discussions on what RRA and PRA are. This also made preparations in cycle two easier, as some basic principles of PRA were already known.

[101] All team members had to express themselves in a foreign language. This made reporting more difficult. KIEVELITZ and FORSTER (1994, 62) talk in this respect of a "filter of foreign language".

be calculated and interpreted e.g.: total cropping size, total farm size, relation of fallow to cropping area. However, not a single of such indicators was calculated. This highlights the weakest area. With the exception of the team member from the Research Division, who managed to state a few conclusions, the other members completely omitted an interpretation of findings. They did not feel confident to draw conclusions.

For the further write-up of the findings the team developed a new technique. All members of the team sat around a single PC and discussed the findings. One team member typed the proposed formulations, while the others watched suggested phrases and added comments or corrections. Using these techniques the team managed to write-up a full report within two weeks. It needs to be noted that these group sessions were particularly tiring and the reseacher had to resume a very active role (intensive moderation of discussions, regular summarising, suggesting formulations, etc.) to promote the documentation of findings.

The findings were presented to MAFF management and interested experts on a half-day workshop at headquarters in Suva. Good visualisation of the findings with large posters and pin boards allowed a vivid discussion. This type of presentation was a novelty in MAFF and was well received. With some training on presentation skills, the team members already had made strong progress in this area.

Evaluation

The first RRA cycle closed with an open discussion and a short feedback questionnaire. The team members made the following suggestions for the next round:

- More preparation time should be used prior to the field phase.
- The number of research topics and research questions should be reduced.
- More attention should be given to explain the methods and terms used.
- More time should be allocated for the field phase and the survey locations should be changed.
- Skills for analysis and report writing should be improved.

These suggestions appeared as all very important and it was decided to consider them for the next round. A few more methodological aspects and points of observation of the reseacher need to be presented here.

The speed of learning and participation in discussions varied from team member to team member, but could be rated overall as quite reasonable. All team members made visible progress during the training period.

A matter more concerning was the low level of analytical skills. Although these also improved during the joint analysis phase, the researcher felt that they were still not adequate. Thus, it became obvious that the working hypothesis H 5 made earlier ‘participatory methods are rather easy to learn tools’ could probably not be maintained without further differentiation. The point will be taken up again after the next cycle.

For the specific case of RRAs or PRAs, interdisciplinarity and a clear specialisation of the team members is an important ingredient to gain a deeper understanding of the matters studied. Although from different divisions (research, extension, economic planning), the team members appeared little specialised on specific subjects. The technical knowledge

on agriculture was very similar for all of them[102]. This, however, is a situation that cannot be changed in short term and PRA training had only a minor influence. Consequently, it was recommended to MAFF that staff members should be given any possible support for training and additional studies to gain more specialisation and 'profile'.

The survey preparation steps used in the first cycle appeared as suitable and helpful in structuring the tasks. Therefore, it was decided to use them again for the next cycle.

6.2.2 Second training cycle

Planning

After a few days break the new cycle started. This time twice as much time was used for the preparation and also the days in the field were doubled from 3 to 6. Because the course followed largely the same sequence as in the first round, the description here will not include all steps, but focus on important changes and the new aspects that emerged during the cycle.

As a general observation it must be said that the local team performed all steps much better than in the first round. As the topics were already more familiar, specific deficits could be given more attention and the team members could raise the areas where they still felt most weaknesses.

Somewhat problematic was again the tool of the problem tree. In particular the step to agree on a core problem was felt as most difficult.

Defining and grouping variables was done in this cycle done for the first time. This exercise helped a great deal to discuss the scope of the PRA. To reduce the volume of the work and to enable more depths, the number of research topics was cut by half. All team members found it very useful to apply this process of defining and screening variables.

The next step, defining data evaluation categories was considered rather academic. Anticipating what categories might be useful to analyse the future information was perceived as very difficult. Only the team member from research managed to formulate a number of potential hypotheses. The problem can be seen as a problem of abstract thinking[103]. The team members had problems to express their expectations on how phenomena might be related in the field. Finally, it was agreed to revisit the question in the analysis stage.

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[102] Some reasons may be seen in the educational system. FCA offers a rather general agricultural course with few opportunities for specialisation. Enrolment in a masters course (e.g.) at USP is difficult for staff, as they have to bare the costs. Besides rare opportunities to participate in overseas training courses, or co-operation with projects, few opportunities for adult education and professional training courses exist.

[103] For a long time the discussion centred on the question of what is a hypothesis. When the researcher provided an example the trainees understood the example but still found it difficult to abstract from the example and apply the concept to another area. Even several examples did not help to really resolve the problem of abstraction completely.

Strong emphasis was placed on the step of defining data collection methods. A good number of tools described frequently in literature were used: annual and seasonal calendars, historic development, matrices and ranking, mapping, farm walks, focussed observation, problem ranking. And a few tools were developed by the researcher together with the whole team: enterprise profitability assessment with gross margin group discussions, matrix on fallow length and rapid crop yield estimates[104]. The graphical tool, described in the methodology chapter of this study, to depict the relation between research questions and tools helped notably to explain the concept of triangulation and to guide the later analysis. In the training stage all members quickly understood the various tools.

Implementation

Working with this mixed set of tools made the fieldwork very interesting and all parties were very motivated, relaxed and attentive. Farmers quickly understood the various tools and participated lively. Working with three different farmer groups separately (women, advanced and average farmers), created additional excitement and enriched the information obtained.

During the application, not all methods proved equally easy to use. Relating to the experience of the team members, these methods may be grouped in three categories of difficulty:

Very easy: seasonal calendars, time charts, mapping, farm walks, transsects, observation

Medium: ranking exercises, matrices, rapid plot size and yield estimates

Demanding: topical group discussions, gross margin exercises

Two factors played an important role for the difficulties encountered: Facilitation/ moderation skills and routine in dealing with figures. Regarding the tools in the easy category, activities started to move on their own and farmers participated without a need for much facilitation. The tools in the medium and demanding categories, however, required more active facilitation/moderation. With this skill, the team members were still rather inexperienced. Uncertainty in leading group discussions and teaching rather than facilitation could be observed at times.

A lack in routine in making calculations or dealing with figures was the reason why ranking exercises were perceived as more difficult[105]. These problems could also be felt with the plot size and yield estimate tools, where calculations had to be made on the spot in order to discuss the results with the farmers. Particularly with respect to cross-margin calculations this problem could be felt. This tool requires a good basic knowledge of farm economics and production figures[106]. Without such a basic framework in mind, it is rather

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[104] The tools are described in detail in the field report on the PRA (BACHMANN et al. 1997 b).

[105] Very few calculations were made by mental arithmetic. A pocket calculator was used for every simple calculation task. This slowed down work and made the task look more tedious.

[106] Extension workers in many developed countries rely, to a large extent, on figures for both production and profitability issues. Such a framework of basic figures is a good tool to gauche farms in relation to other farms and to derive conclusions for the best possible advice to be given. Given the fact that Fiji needs to raise its international competitiveness, productivity issues will become more important and MAFF staff will need to work on this topic.

difficult to rate the accuracy of contributions made in gross margin discussions and the final results are likely to be inaccurate. This is exactly what happened during a few exercises in the field. As the team members lacked such a basic framework on production or profitability figures for Fiji, some of the results obtained were out of proportion or inconsistent[107].

Analysis

The analysis was grouped in two sections again. After the period of separate analysis the following observations on the results of the team could be made.

The quality of reports had improved considerably. All team members had prepared a typed report. The reports were more detailed and longer (9-18 pages each). The readability was considerably better. Some figures were presented as tables and one team member even prepared a series of charts.

Compared to the first cycle, where the descriptions in the report did not match well with the field data, the basic findings of the fieldwork were well described here. The presentation of findings followed the sequence of tools used.

Weaknesses were still found in the step of aggregating the finding from the level of individual tools to the level of research questions. The description covered one tool after the other, but the links and cross-checks between the tools that are necessary to validate the information and to form a final answer for each research question was lacking in most cases. A few conclusions were made, but these again, were mainly on the level of tools. Conclusions for research topics or recommendations for the overall survey were not made. Another weakness was that unclear or contradictory information from different groups was not described as such. The information was either omitted completely or only that part of information, which was perceived as more common was presented. Given the fact that reality often is contradictory, this strong filtering risks cutting important information.

These points highlighted a more general underlying problem. None of the team members had a real scientific education. The FCA diploma is more equivalent to a technical school degree and still below a scientific degree such as a Bachelor or Masters degree obtained at a university. Abilities such as working independently, planning and conceptual thinking or problem solving capacities are not promoted sufficiently during such a technical college course. The lack of this scientific base was certainly one of the important reasons why the team members had difficulties with the tasks of combining various sources of information and drawing conclusions.

The further joint analysis focused on reducing some of the above weaknesses. Emphasis was placed on drawing conclusions on all research topics and formulating

[107] A crucial aspect here is that experience with figures and facilitation skills are both equally important. It is a task of the facilitator to question any figures that seem unrealistic and pass them back to the group for further discussion. With such a good moderation, farmers will be able to correct figures during the discussion process. During the field work, this proved particular true in the case of the advanced farmers groups, that showed a better understanding in financial matters and often discussed longer and corrected figures more often in the process.

recommendations. The more difficult tools were discussed in detail, calculations were revised where necessary and some training on economics was given.

For the final write-up the team used the team write-up approach again. Three weeks were required to complete the report. These group sessions were again long and tiring. This stimulated reflections on how report writing could be simplified. This will be discussed in the evaluation section.

The findings were presented to MAFF management and interested experts on a half-day workshop at the main extension offices in Nausori. The audience was large with a good number of extension staff present. Again the team members managed to further refine their presentation skills and a very vivid discussion followed the presentation. The findings were valued as very useful and this recognition from senior management staff and other experts created a big boost for the morale of the team.

Evaluation

Analogue to the first cycle, the second cycle closed with a short evaluation questionnaire and an open discussion. Comparing the two cycles, the team members commented that they considered the new cycle as both "*more interesting*" and "*more specific*". It was also seen as "*a lot easier as it was a follow-up*."

The understanding of the various steps applied can be rated as reasonable to good. Comments ranged from "*yes, and can realise their importance*" to "*basically yes, but need more practise*". Some steps required more consideration, while others took less. All steps were considered as useful as they "*support each other"*.

The overall time allocation was considered "*just okay*" or "*good for novice practitioners"*.

The volume of research topics covered was considered as rather high again. As reason it was explained that "*we had more sub-research topics and variables, which was still again a lot of work* ".

Individually, the confidence to work with the approach was not yet high. "*More experience"* and external support was required as one team member mentioned "*I still need the assistance of a facilitator*". As a team they already felt stronger: "*team work helped in gaining experience and confidence"*. And on the ability to carry out a PRA survey as a team, one team member expressed confidence "*certainly yes, we will give it a go"*.

Suggestions for improvements of the last cycle included a number of issues: deeper consideration of systems research aspects, more field work and again inclusion of village settings, training on report writing, computer classes and exposure to other countries.

These comments of the team members do not require further elaboration. It was clear, however, that not all suggestions could be taken up. The main consequences drawn for the last cycle are summarised here:

- A criticism raised during the presentation of results on the workshop was that the surveys were too long and did not qualify as 'rapid'. Excluding the double time for analysis, both cycles had required about 6 to 8 weeks. This was certainly much longer

than the kind of simple surveys the Ministry had implemented previously. Therefore, it was decided to focus on rapidity and complete the next survey within three weeks.

- In the first two cycles considerable time was allocated on report writing. As it was evident that staff would not have that much time in their daily work, it was considered important to look for ways to shorten report structures and to identify a more simplified way of documenting findings.
- For the selection of a suitable topic, it was decided to work in close co-operation with PRAP P3- Vegetable seed – located in the Sigatoka valley. The PRA should assist in solving a problem related to the project activities.
- Regarding the PRA toolbox to be used, it was considered best to use tools where the team still had some difficulties. More emphasis should be attached to the question of adapting tools to specific requirements.
- To gain some insight into the abilities of the team members to train other MAFF staff members, it was decided to involve the research and extension staff of the local office more closely and train them in the PRA tools to be used.

6.2.3 Third training cycle

Planning

For the definition the core problem a new method was used. Similar to the assessment of farmers' problems in the last PRA, the team made a brainstorming session together with two resource persons and collected a list of problems. These problems were then discussed and ranked according to importance. Some of the problems were later reformulated into research questions. This procedure proved much faster than the work with a problem tree and the team members preferred using this approach. For providing the direction of the survey, the method appeared equally useful.

While the first two cycles examined the farming systems as a whole, the new PRA focused on just one aspect: farmers' seed requirements and preferences. This narrow focus permitted a very detailed look at the matter and it facilitated concentration for everybody, as fewer aspects had to be considered. Another consequence was that the formulation of research topics and research questions was easier.

The team worked out the research plan and then drafted the organisation of the survey (steps 4 & 13). The organisation of the survey was then finalised together with the field staff in Sigatoka. A decision on survey units (step 8: various farmer groups) and samples (step 10: no. of villages / settlements) were also taken at this early stage. Visualising the results on cards facilitated this step considerably and some more time could be saved[108].

The definition of variables was combined with the definition of tools. Working on those two steps in parallel made the process more creative. The team members could contribute from both ends: on the one side thinking about potential questions and on the other side reflecting about the tools and what information these tools could provide in answering

[108] On the previous surveys these details were clarified mainly by telephone. Difficulties to get the right people to agree on the activities, making the arrangements with farmers etc. proved time-consuming. Finally, one team member still had to visit the stations to get all details confirmed.

questions. This made it easier for the team members to contribute ideas. A reason may be that this approach required less conceptual thinking. One reason certainly was the increased familiarity with tools and the planning process as such. As all steps were well known and their purpose was clear, it become easier to change the sequence or try out modifications. The steps of defining data evaluation categories and proxy indicators were dropped as these proved difficult and little rewarding in the last round and it was expected that they would add little in this new explorative phase.

Implementation

The fieldwork of the last PRA ran very smoothly and the atmosphere was the best of all cycles. The different farmer groups participated very actively and the days were very lively. The work was divided in four sub-teams and in each sub- team a mix of 2-3 extension and research staff participated. On the first day the team members facilitated the tools and explained them to the participating staff. On the following days, staff took over and facilitated the exercises while the team members play a more observing role.

It was again interesting to observe that the tools more or less worked by themselves. The new staff copied the skills very quickly from the core team members and managed to facilitate the various tools correctly. The difficulties encountered with the tools were similar to the ones observed in the last round:

Very easy: observation, seasonal calendar, tastes ranking.

Medium: problem ranking, matrices variety ranking, semi –structured interviewing.

Demanding: gross-margin exercises.

To explain the difficulties, the two factors determined in the last round (facilitation/ moderation skills and routine/experience in dealing with figures) also played the major role this time. Regarding the tools in the easy category, activities started to move on their own and farmers participated without a need for much facilitation. The tools in the medium and high categories, however, again required more active facilitation/ moderation. Here farmers had to think harder to reflect about their situation and this slowed down discussions. In this situation, moderation skills were required to keep the discussions going: e.g. providing examples, offering knowledge inputs, summarising findings or questioning facts. The team members had again improved somewhat in this area, however, weaknesses were still observed. This was also the case for the local staff that participated. However, the fact that now 2-3 staff members assisted in each group work led to spontaneous co-facilitation/moderation. They helped each other out and that greatly improved the quality of the moderation, made the sessions richer and livelier.

The second factor, lack in routine and experience in dealing with figures and making calculations, also played a significant role. It could be felt to some extent in the ranking exercises, however, co-moderation also helped here. But in particular with respect to cross-margin calculations the old problems could still be felt. This highlights an important area were further qualification of MAFF staff will be required.

At the end of each field day, all participants gathered in the conference room of the research station to discuss the findings of the day. This was very important to enable the exchange of experiences between the various groups. On the last evening a short

evaluation questionnaire was distributed. The outcome is discussed below under the evaluation heading.

Analysis

In this cycle no separate analysis steps were used. The findings were compiled by the whole team within only three days and presented in another half-day workshop.

To achieve this speedy analysis the team split in sub-groups, each working on the results of a single tool. The individual findings of each tool were then compiled into large tables to allow for a comparison on all levels (single locations, farmer groups and overall)[109]. Other tools not in the matrix format (e.g. key problems, their causes and solutions) were attached in groups on the wall of the office to allow a visual overview and to enable reading them quickly in sequence. This compilation process was rather easy for everybody involved, as it had been practised also in the prior cycle.

Then, the whole team discussed the data for each tool. These discussions proved at times quite difficult. While the findings were often rather conclusive on the level of a single location, findings between locations or farmer groups often varied in a number of cases. This made the identification of trends and conclusions more difficult. One reason for the difficulty may be associated to the many 'anonymous' figures in the table. Reality suddenly was compressed to a bulk of more or less conclusive figures. At this stage again facilitation of the discussion became very important. Each of those 'inconclusive' figures had to be traced back to its location and context. This made the figures even more real. Looking at the specific location, the tool and the group, thinking about the overall context, helped to decide if something was a special case, or only a minor deviation from the overall trend (e.g. if women ranked lack of water number one problem and men only number five it had to be decided if this was a serious or minor difference of opinion). In this respect a good number of cases were rather straight forward and conclusive, but quite a few cases remained where this was not as easy. In these cases, the group had to make a decision. This certainly also contained a degree of subjectivity. However, this was the only way to condense this enormous amount of qualitative information to a manageable amount of results. This step of decision making was an area where the team members faced some difficulties.

Group decisions and findings were documented immediately. To reduce the volume of the report, the description of the basic data was reduced to a minimum. Only important aspects were described in a few sentences. This was then followed by the conclusions and recommendations. Using this approach the report had only about ¼ of the length of the previous reports. This size seemed more appropriate; both in terms of time requirement for report writing as in making it easier for the readers.

The final presentation of results to MAFF management and interested experts was again a well-visited event. In the meanwhile the team members had reached a very good level of presentation skills and managed to speak very openly. This also added to a good reception of the findings and several management staff expressed that they were surprised about the

[109] In addition marketing data were cross-checked with the interview of middlemen and merchants and dealt with separately.

quality of information that could be generated with PRA tools. Thus, the workshop helped to convince quite a few rather sceptical staff of the utility of participatory methods.

Evaluation

The evaluation of this cycle was done after the completion of the fieldwork and included a short questionnaire that was distributed to all staff (16 persons including core team) who had participated in the fieldwork.

The new participants learned how to apply the tools very quickly. One good reason may be that the majority of them (9/13) had already participated in an earlier PRA training course run by SCEP. A small group (3) even mentioned that they had already started to integrate some tools into their routine work.

A question regarding the difficulty of the PRA tools used, revealed the same grouping as for the last PRA.

All participants enjoyed working with different farmer groups. While group work was familiar for them, subdividing farmers in advanced and average groups as well as working with women separately was a novelty to them. A few mentioned explicitly that this subdivision contributed very much to gaining a better understanding of problems.

To gain an idea of to which extent conceptual aspects of PRA were retained, the participants were asked to define the term ‘triangulation’. Half of the participants (8/16) were unable to say anything. The other half at least partly understood the concept. Thus, weaknesses in conceptual thinking, as found in the previous cycles, also manifested themselves in this larger group.

The participants showed good confidence in applying PRA tools, and a small group were already able to give good examples of how they could use PRA tools in their daily work. All participants were interested in more training on participatory methods.

Overall, the training results reached were somewhat below the initial expectations of the researcher. However, they indicated that the direction was right and considerable training successes were visible. The good atmosphere that the PRA tools created definitely was encouraging. All participants were convinced of having learned something useful that they could apply in the future.

A few more aspects discussed during the final presentation of the report shall be mentioned here:

- The volume of the research topics and the more flexible handling of planning steps were considered as ideal in this cycle.
- While the first two cycles were considered as too long, the completion of this cycle within three weeks demonstrated that the method could be applied rapidly. It appeared feasible that a PRA carried out in only 1-2 locations and well focused in its topics could even be carried out within a week.
- The new report structure was considered as easier and more adapted to MAFF staff. However, reporting was still seen as a rather demanding task. Therefore, more experimentation in this area was considered necessary.

6.2.4 Review of the training process

Assessing the success of training courses is no easy matter. It should be noted that any judgement on the training performance is only subjective. To reduce this element of subjectivity, different perceptions are used here. At first, the own perceptions of the team members are discussed. Then, this is compared with the perception of the researcher. In addition, the views are matched with the experience made by other experts[110]. A factor that makes these comparisons more delicate, are the different cultural backgrounds[111]. In this respect, it is important to stress that there is no right or wrong perception. Seen by itself each perception certainly is justified, and viewed in comparison, they provide a more complete picture of reality, or more prudently, of what reality might look like.

The training success is viewed according to its short-term and medium term achievements. Short-term achievements refer to the knowledge and skills learned in the course. The medium-term achievements examine the progress made after two years.

The above aspects are considered in the following evaluation. The first sub-chapter examines the training results reached immediately after the training. The second sub-chapter investigates the situation two years later.

6.2.4.1 Evaluation after the completion of the training course

Alike the evaluation in the previous cycles, a feedback questionnaire was used to collect the views of the team members on the overall success of the three training cycles. In Table 32, the team members rated their abilities before and after the course on a scale of zero to five. Zero corresponds to no knowledge or skills where as five corresponds to an excellent level.

Overall, a marked improvement in all skills could be observed. As highlighted in the previous evaluation sections, the team members were improving very well from cycle to cycle. For most of the criteria listed, the team members rated their abilities prior to the training course as poor to fair (1-2). Experience with matrices was rated as the lowest item with only 0.5, while the presentation skills were already considered as medium.

After the training, most abilities were ranked two to three points higher in the good to excellent categories (4-5). The criterion with the best rating was ‘use of RRA/PRA tools in the field’ while the lowest rating was attributed to ‘literature search’[112]. Overall the differences were rather small and the range between the lowest and highest value only just exceeded one point. Excluding the minimum and maximum values, this suggests that all abilities are on a similar level with little deviation in the category ‘good’.

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[110] This is a small group of 6 experts from different projects (P1, P3, P10, P11, SCEP) with whom the researcher exchanged experiences frequently.

[111] The different cultures involved here are on the one side the ‘Fijian’ culture, that is already a mixed society with ethnic Fijians and Indians just to name to two major groups. On the other side the reseacher and experts come from the ‘European’ culture, but at the same time also belong to different countries with their own traditions (Germany, France, England, Australia, New Zealand). In this respect cultural biases should not be seen as a problem, but rather as an enriching element that promotes joint exchange and learning.

[112] A literature search was done only once in the long preparation for PRA 2. This certainly explains the low rating.

Table 32: Improvement of abilities during the training course

Abilities	before	after
Familiarity with visualisation methods	2.3	4.3
Organise a survey (plan of operation, etc.)	1.5	4.3
Carry out a literature search (key word definition etc.)	2.3	3.5
Modify RRA/PRA tool to suit a problem situation best	1.0	4.3
Use of RRA/PRA tools in the field	1.3	4.8
Use of matrixes	0.5	4.3
Apply ranking procedures	0.8	4.3
Analyse information collected in field survey	2.3	4.0
Compile summary tables of information collected	1.8	3.8
Interpret survey information	2.3	4.0
Drawing and formulating conclusions	1.5	4.0
Report writing	2.3	3.8
Present information at meetings	3.0	4.5
Knowledge on farming systems in Fiji	2.3	3.8
Confidence to train other staff in above techniques	1.3	4.4
Overall average	1.7	4.1

Ranking scale: 0=no knowledge, 1=poor, 2= fair, 3=medium, 4=good, 5=excellent.

These ratings, that represent the average of all team members, are somewhat misleading as they provide the impression of very limited differentiation. The actual existing differences came out clearer with two further questions on what worked best and what was most difficult.

Under what worked best the team member from the RD mentioned "*visualisation, data analysis and report writing"*. The two extensionists wrote "*the RRA/PRA tools in the fieldwork with farmers"* and the "*problem analysis done in the field"*. The team member from EP&S preferred the "*working with matrices"* and the "*presentation of information"*.

As most difficult the RD staff member specified the "*organisation of the field activities"*. The two extensionists mentioned "*gross margin analysis with a lot of figure work"* and "*to put those facts and findings in writing in a proper manner"*. Similar the EP&S staff member wrote "*analysing the information collected in the field"*.

These statements showed individual differences better and indicated an influence of the work place. The two extensionists had difficulties in analysis and writing, while the RD staff member found the organisation of field activities more difficult. This indicates that the team members had more difficulties in those areas where they still had the least exposure and practise.

Comparing the team members' assessment of the training course with his own observations, the reseacher largely agrees to the above self-assessment. In respect of the ranking results presented in Table 32, a judgement appears more difficult. Here, a certain overoptimistic assessment of the abilities appeared to be the case, considering that these were rated as good to excellent. The researcher would rather rate these a full category

lower in between medium to good. This view was also supported by the other experts with whom the researcher discussed the training process in Fiji[113].

The team members' abilities may be summarised in terms of strengths and weaknesses as such:

Strengths: Organisational skills, field use of tools, practical implementation, presentation and visualisation skills.

Weaknesses: Conceptual thinking, analytical skills, interpretation and report writing.

QUINNEY (1994, 87) made similar differentiated experiences with PRA trainers in Sudan[114].

To judge the implications of these findings, it is important to recall the intention of the PRA training course. Designed as a 'train the trainer' course, the idea was that the team members would play an active role in training other staff at MAFF to achieve a rapid spread of the methodologies. It was further assumed that the increased application of PRA tools by researchers and extensionists would lead to better understanding of farmers problems' and consideration of those problems in the process of innovation development and diffusion[115].

The final validation of the success of the training at this stage seemed premature. The researcher discussed the findings with the PRAP P11 Teamleader and two other PRAP experts. In these discussions the following preliminary conclusions and an approach for further action emerged:

- The period after the training course was considered too early to draw definite conclusions on the suitability of the approach.
- The 'train the trainer' course was seen as partly successful. The emphasis on 'partly' resulted from the fact that none of the team members really qualified as a trainer who would be able to design and conduct a course on his own. This was also best expressed by one of the team members: "*Personally, I feel we should be still attached to PRAP personnel at times. ... if there is more opportunity for us to learn more, then again it should be considered in order to build up more confidence to execute training.*" Furthermore, PRA training was also no longer considered the prime issue. Because

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[113] Whose reality counts? The difficulties of judgement have to do with the cultural factor mentioned in the introduction. The question is: What rating scale is appropriate? Qualitative categories like 'good' or 'excellent' offer a wide range for interpretation. Furthermore the cultural context has an effect on the scale to be used. Viewed only in the context of Fiji, the researcher would agree that the team members certainly qualified as good to excellent compared with their colleagues at MAFF. However, seen on a 'European' scale, compared to working requirements at NAERS institutions in Europe, the rating of their abilities has to be lowered.

[114] She worked with local PRA trainers that used a standard PRA package for a longer period of time. When the trainer group was faced with the task to modify and adapt some tools to the requirements for participatory monitoring and evaluation, the group encountered considerable difficulties.

[115] Participatory methods were equally seen to play a vital role in this process of innovation development and diffusion (e.g. participatory technology development, participatory monitoring and evaluation, diffusion of innovations in a more participatory, advisory way rather than transfer of technology through extension).

other projects had also been doing courses on PRA, it was estimated that more than half of all MAFF field staff had received at least some basic training on the methodology.

- Regarding the weaknesses of staff identified during the course, it was felt that they might represent a constraint for the effective use of the methodologies. Difficulties in planning, evaluation and documentation of activities might still prove a serious obstacle in improving and speeding-up the process of innovation development and diffusion. As the training efforts were very high up to the end of the course, it was now considered necessary to reduce the emphasis of project activities in Fiji and permit MAFF to gain some experience on its own. Developments at MAFF should be further observed to identify to what extent the staff, now trained in these methods, could use them in their daily routines. This, in turn would provide indications as to how well the methods would be used and become institutionalised within the Ministry. A decision on further measures should then be taken in due course.
- To support the training process, it was decided to develop a manual for participatory methods to assist all Island countries taking part in PRAP[116].
- PRAP P11 decided to recruit one of the extenionists of the team as project counterpart for Fiji. The other team members returned to their divisions.
- A working group was set up to further promote and overlook the use of participatory methods in the Ministry.

Shortly after the course, the researcher returned to Germany. Further process was then followed mainly via reports and email. The next chapter highlights these details.

6.2.4.2 Longer term training impact two years later

In 1996 and 1997 several donors continued to support work with participatory methods. According to the experts that participated in the follow-up questionnaire, 6 short RRAs/PRAs were implemented at different locations. Four other workshops, which also made use of some participatory methods, focused on strengthening planning and management capacities at research, extension and top management level. These activities provided some further training opportunities for MAFF staff.

To assess the progress of the team members in their abilities in using PRA tools, a list of basic PRA principles by SCHÖNHUTH and KIEVELITZ (1994, 7) was used in the follow-up questionnaire. Once again, the team members were asked to rate their own abilities on a scale of one to five. These results were compared with experiences that other experts made in training MAFF staff. The findings are compiled in Table 33.

These findings are very similar to the first assessment directly after the training. This is most evident in the equal overall average rating (4.1) of all questions. The team members

[116] The manual has been published in the meanwhile as a multimedia toolbox: PRAP P11 (1998): Participatory Learning and Action - PLA tool kit for the South Pacific.

rated their abilities overall as high in the category 'good understanding'. The fact that the categories are not identical makes the direct comparison a little more difficult[117].

Very interesting to note, however, is a shift in some of the abilities. The team members now rated the planning and concept related criteria 'triangulation, appropriate tools and adapting tools' as the areas with best understanding. The more field related skills such as 'learning in the community, visual sharing and avoid biases' fell a little in behind. This may indicate a progress in learning. The more difficult parts of conceptual thinking and planning took more time to be understood and absorbed. The field skills, which were learned quickly in the beginning, rather consolidated than improved further. This may also be explained by the fact that field application of PRA tools remained rather limited, as will be shown later[118].

Table 33: Rating of abilities of MAFF staff in PRA principles

Key principles	PRA team (n=4)	Experts (n=5)
Appropriate instruments	4.5	2.5
Triangulation	4.3	2.6
Adapting instruments	4.3	2.2
Sequencing	4.0	2.7
Visual sharing	4.0	3.2
Avoid biases	4.0	3.2
Learning in the community	3.8	4.1
Optimal ignorance	3.8	2.5
Overall average	4.1	2.9

Scale: 1= concept/ method not understood;
2= incomplete understanding, still major difficulties;
3= reasonable understanding, assistance required;
4= good understanding, little assistance required
5= full understanding, can work independently.

The expert rating results confirm the researchers own observation made during the course very well. The field abilities such as 'learning in the community, visual sharing and avoiding biases' were rated as stronger areas, whereas the abilities related to developing concepts and planning 'appropriate tools and adapting tools, triangulation and optimal ignorance', were rated as weaker abilities. Overall, the experts rated all abilities in the medium category 'reasonable understanding, still assistance required'. This is a full point lower than the self-rating of the team members and confirms the earlier observations made by the reseacher. Regarding the general abilities of MAFF staff, the experts equally confirmed the observations made earlier. 'Speed of learning' and 'self confidence' were rated as good to excellent, while 'report writing skills' were rated as poor and dealing with figures and calculations was seen as satisfactory (see Annex 3).

The above rating results of the team members and the experts do not match completely. The team members rate their abilities higher than the experts. This is certainly a normal behaviour. As differences in perception always exist, a final clear-cut answer cannot be given here. However, the following lessons can be drawn:

[117] The new formulations were used, because they covered the essence of PRA principles more precisely. The first set of rating criteria was wider; covering more general training aspects, while the new set used here focused more on core PRA principles.

[118] More details are provided in the following chapter 6.2.5 on the institutionalisation of participatory methods.

The working hypothesis H 5 formulated at the beginning of the research phase 'participatory methods are rather easy tools that can be learned quickly', has to be considered as a too simplified assumption. While it proved correct, that in particular PRA field tools were learned quickly, it was also shown that the approach required conceptual and planning skills which caused considerable difficulties at the beginning of the training. After 2 years of further exposure to the approach, these abilities also had improved. This showed that training participatory methods has to be considered as a long-term issue. Several factors such as the intensity of the training, opportunities to practice the new skills, availability of backup training support and favourable institutional support determine the speed of learning. Overall, a timeframe of at least two to five years appears as necessary to ensure that the training measures are successful. Consequently, integrating participatory methods in an organisation cannot be achieved in a short time, but represents a challenge that requires long term attention.

A good indicator for the success of training is also the rate of application of the training contents in practice. The use of participatory methods at MAFF will be examined in the following chapter.

6.2.5 Institutionalisation of participatory methods

The question of institutionalisation of participatory methods is of crucial importance in the evaluation of the various support measures undertaken. Therefore, these aspects were given ample room in the follow-up questionnaire. The main indicator for the success of newly introduced methods is their rate of application in daily work. For this reason MAFF staff were asked to state to which extent they make use of PRA tools in their work. The results are presented in Table 34.

Only one Officer in each group stated that they did not use PRA tools at all. The majority in each group (50 % RD and 67 % ED) stated that they used the methods very little. 38 % at research and 28 % at extension indicated that they used participatory methods regularly.

Table 34: Use of participatory methods

Frequency of PRA use in %	RD (n=8) in %	ED (n=18) in %
Not at all	13	6
Very little	50	67
Regularly	38	28

The fact that about 1/3 of the staff already used PRA tools regularly indicates quite a success. This shows that the process of institutionalisation is on its way. The fact that about 2/3's of the staff seldom use the tools, however, also shows that the process is still vulnerable and that it will still require some time before the process will be consolidated.

A more sceptical view on the level of practice of participatory methods at MAFF was raised by the experts: "*very little* (usage)", "*only a small percentage*" and "*only approached by a small number of people who have been actively involved in the past and ongoing activities, hardly by policy or decision makers*". More optimism was indicated by the following reply: "*very little, but struggles on!*"

This trend was also visible in the answers to several other questions. Table 35 presents the use of participatory methods at selected application fields by research and extension. Overall, the rating showed for both divisions that the new methods were applied only 'at times'. The category 'participatory follow up activities' was ranked the most applied option (2.6) by the RD. This indicates that some degree of on-farm research and testing is now ongoing. The highest rating (2.8) at the ED was attributed to 'identification of farmers' preferences and attitudes'. The low rating of 1.4 for 'technology validation' by the ED and the higher rating by the RD (2.3) gave an indication that co-operation between the divisions in this field of work is still weak. It may also be an indirect indicator that the numbers of research programmes that have reached this stage is still low.

Table 35: Use of participatory methods in selected application fields

Activities	RD (n=7)	ED (n=19)
For determining priorities with farmers	-	2.5
General data collection, statistical purposes	1.6	2.0
Identify farmers' preferences and attitudes	2.4	2.8
Participatory follow-up activity	2.6	2.0
Technology validation, testing	2.3	1.4
Overall average	2.2	2.1

Scale: 1= rarely; 2= at times; 3= moderately often; 4= often; 5=very often.

The question of institutionalisation of participatory methods was examined in three ways. First, the question to which extent participatory methods were practically institutionalised within MAFF, was posed to the PRA team members and the experts. Using a ranking scale with four categories (not at all, partly, medium and fully) the PRA team members and experts were asked to rate the degree to which participatory methods were accepted and institutionalised in the Ministry. The team members opted equally for medium and partly, while the experts all ranked the process as only partly achieved. Thus, these ratings corresponded well with the findings of the above question of frequency of PRA use.

Secondly, a theoretical concept of PRETTY and CHAMBERS (1993, 13) was utilised to review the degree of institutionalisation. The concept puts forward that three conditions must be met to achieve a sustainable institutionalisation of participatory methods: active participatory field activities, interactive learning environment and institutional support. The team members, experts and management were asked to indicate to which extent these conditions were fulfilled in Fiji. The results are presented in Table 36.

Table 36: Framework conditions for participatory methods

Conditions	PRA team (n=4)	Experts (n=5)	Management (n=2)
Active Participatory field activities	3.0	2.6	3
Interactive learning environment	2.0	2.4	3.5
Institutional support	1.0	2.2	3.5
Overall average	2.0	2.4	3.3

Scale: 1= poor; 2=marginal; 3=partly; moderate; 4=good; 5=fully met.

The results showed a controversy. While the team members considered the conditions as, overall, only marginally met, management[119] considered the conditions as moderate to good. The experts' rating was closer to the rating of the team members and ranged in between. While all groups shared a similar view on the PRA field activities (2.6 –3), the main differences were seen in the interactive learning environment and institutional support. Both were considered as moderate to good by management, while the other groups rated them as marginal or even poor.

It remains very difficult, to judge which perception comes closer to reality, but the views of the PRA team and the experts appear more substantiated when considered in the context with the third group of questions on institutionalisation. The three groups were requested to list the concrete consequences to which the introduction of participatory methods had led so far.

The team members replied to all options with a clear "no" or "nothing that I know of" and added "there is no effect as MAFF is still adopting old methods and policies. There is still no (PLA) unit to date".

Both management members left the question blank. This could be interpreted as an indirect admission that there were no consequences[120].

The experts made more detailed comments in respect of each question that are listed below:

- Official document to accept participatory methods as Ministry working tools:

"There have been policy changes which have re-emphasised on commodities." "No, see CDF[121]." "The main consequences was the introduction of some simple tools, which remain under-utilised".

- Revised research priorities:

"No". "*The priorities remain the same, but these are better understood and with stronger consensus*".

- Revised, new extension recommendations, priorities:

"No". "*The priorities remain the same, but these are better understood and with stronger consensus"*. "*Yes there are efforts to implement further training for all staff; to perform rural development work accordingly"*.

- Higher adoption rates of recommendations by farmers

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[119] Due to the very low number of respondents (2) these data have to be interpreted with caution. They may represent individual opinions rather than the view of management. Nevertheless, two out of seven management members provide a partial picture at least. Furthermore, the low participation in the questionnaire speaks for itself; it points towards the low priority attached to the question of participatory methods and organisational reform by management.

[120] It could also indicate that they simply do not know anything about the consequences. This, however, would not be a good indicator for good management either, as managers should be well informed about all relevant activities going on in their organisation.

[121] The new Commodity Development Framework (CDF), now requires the formulation of development plans in the format of the Logical Framework (In German known as ZOPP: Ziel orientierte Projekt Planung or English: Target Oriented Project Planning).

"Few recommendations". "No glue, must ask extension staff". "Waibau and Nadi[122] *yes".*

- Shifts in MAFF policies

"Zero". "Definitely no, the contrary". "MAFF did not follow recommendations, e.g. on seed quality".

These comments may be grouped into three categories. The first group stands for no impact (e.g. *no, zero*). A certain disappointment could be felt in their comments. The second group could be labelled unsure (e.g. questions left blank, "*no glue*"). The third group saw some impact in specific areas. This impact was seen rather on a field level than at a policy level.

These different perceptions indicate that the process of institutionalisation participatory methods is certainly not homogenous throughout the Ministry. This may explain to some extent why some people saw progress while others did not.

However, a major reason for the rather limited institutionalisation of participatory methods must be seen in the weak support or in other words passive role of management. On the one hand the approaches were not hindered or blocked, but on the other hand these methods did not obtain sufficient active support or encouragement. It is not sufficient to provide an opportunity for experimentation with participatory methods. The space for experimentation is only used by a few staff. To ensure full-scale use of the methods, it would be necessary for the methods to be promoted more actively and integrated into the existing work plans and job descriptions of staff.

Overall, it may be concluded that participatory methods now play a small, growing role within MAFF, but clear official policies are still lacking. One consequence of the lack of policies is, it could be said, that participatory methods are still in an experimental stage. The experiment is ongoing, but although several results are available, no decisions for the future of the experiment have been made. Unless promoted more actively, it remains uncertain if participatory methods will fully become regular working tools within MAFF. Considering the fact that the initiative for participatory methods was largely donor driven, there is a considerable risk that the efforts will not be sustainable, once donor assistance has been be terminated.

6.3 Comparison of working approaches: selected study cases

This chapter looks at the Fiji AKIS with the help of a few practical project examples. The cases illustrate examples of projects that were implemented by MAFF in co-operation with different donors. A selection of four cases are described according to the following structure: brief history, project goals, research and extension approaches, farmers' participation, configuration of actors involved, and finally a comparison of results achieved and main weaknesses. The lessons from these examples together with an attempt to summarise AKIS-relevant features are outlined in the last section.

[122] Two locations on the main Island Viti Levu in Fiji.

6.3.1 Sigatoka Valley Rural Development Programme (SVRDP)

The Sigatoka Valley Rural Development Programme (SVRDP) was a large scale integrated project funded as a loan by the Asian Development Bank (ADB). The project began in 1987 but was terminated before the completion date of 1990. The project was designed in the mid 1980s when national policies focused on import substitution and increased production. This, together with export of surpluses, was expected to produce an impact on macro policy level (e.g. food self-sufficiency, balance of payments). The development goals of the project were:

- increase crop production for import substitution and
- increase rural incomes and standard of living (TAUKEI 1993, 119).

To achieve the above goals the project made large investments within the rural area of the Sigatoka Valley. Focal activities were irrigation and drainage development (bore holes, pipes, sprinklers) for vegetable production and improvement of the transport infrastructure with rural access roads. The activities were implemented by a consultancy bureau. In addition MAFF was involved with the provision of a number of agricultural support services:

- Marketing and cold storage,
- Machinery and equipment,
- Agricultural inputs and credit,
- Research and extension.

With this entirely top-down and 'green-revolution' type of design, the project ran into numerous problems during its implementation. Prior to the start, the hydrological studies for the borehole drilling were inadequately carried out. Many sites could not be used, and consequently, the area to be irrigated was much smaller than originally planned. Road construction was delayed, leading to excessive cost at the expense of marketing measures.

The involvement of farmers during the design and implementation phase was minimal. The area is populated by two main ethnic groups: native Fijians and Indians. Both groups have very different cultures and farming systems. While Indian farmers operate more as individuals with stronger market-orientation, Fijian farmers are more community- and subsistence-oriented. These fundamental differences were not considered. The extension strategy consisted of a single package that favoured a minority of resource rich farmers. These progressive farmers were used as demonstration model farmers. However, these model farmers failed to generate the anticipated 'spin-off' of technological benefits to neighbouring farmers. Extension was busy with delivering inputs, rather than providing sound advice and explaining to farmers what were the function of all components of the package and why all combined inputs were necessary. Hence farmers adopted bits and pieces of the package that they felt were of relevance and affordable. Consequently, yields under farming conditions were low and the ambitious project production targets could never be met (TAUKEI 1993, 122).

Farmers' experiences in producing vegetables in the area, in particular their knowledge of marketing problems were completely ignored. Project storage facilities contributed little to reduce seasonal market gluts. Fresh vegetable and fruit exports proved very difficult to

promote. Quarantine regulations of importing countries and basic produce quality standards for export could not be met.

Not achieving targets, and pressure from the ADB, increased respect towards the timetables of implementation. This further re-enforced top-down decision making and geared implementation towards quicker results. The issue of sustainability was forgotten. The large-scale design of the project with the high number of key actors (ADB as donor, MAFF as implementing agency, experts for management and implementation, separate Government Ministries involved for ground water studies and road constructions, and finally provincial administrations and beneficiaries) created major co-ordination and communication problems.

In the design stage, research was not consulted sufficiently. The technology was transferred from the 'international shelf' without being tested properly by researchers for its adaptability to local conditions. Therefore, many of the recommendations did not work in the new environment. Crop diseases caused considerable losses. The timeframe of the project did not allow for long-term research strategies to identify solutions to these field problems. With the strong focus on increasing production, research only followed strategies to increase yields of crops. Low input strategies and emphasis on quality rather than quantity were not considered. The configuration of this case study corresponds very well with ENGEL's description of a policy driven configuration (chapter 2.1).

The organisational culture was strongly biased in favour of the common civil service and Government administration protocols, and left little space for the rural communities to express their needs. Existing community structures were not integrated. Instead, new water- user groups were created. As this was done in a rather authoritarian way, and membership criteria favoured richer farmers, tensions grew within and between the communities, as not all villages benefited equally from the irrigation infrastructure measures.

The many problems encountered during implementation seriously undermined the financial viability of the project, and it had to be terminated in 1990 due to funding constraints. Since then, MAFF has been trying to make use of the existing infrastructure, and develop a new approach in order to reach the original goal of developing the area into the 'salad bowl of Fiji'.

The SVRDP is a typical case for the work and approach of MAFF up to the early 1990s. An even larger rice development programme, financed by ADB and Japanese aid, followed the same blue print approach with an equally poor outcome.

These types of projects and the associated thinking and mentality are still common within MAFF. This could be felt in the discussions with field staff during the fieldwork for this study. In this context it is evident that considerable time is required until new approaches become institutionalised and readily applied.

The following case studies show different aspects of such new approaches and discuss the success of this 'fresh wind'.

6.3.2 Vegetable seed and planting material (PRAP P3)

The project, vegetable seed and planting material, was the third project (P3) in a series of 11 that form the Pacific Regional Agricultural Programme (PRAP). The Program was initiated in 1989 and went into a second phase from 1994 to 1998. The first phase focused on agricultural research and technology development. Phase II projects were expected to finalise research activities, field test them and initiate extension activities in the countries.

Phase I P3 was entitled 'development of vegetables, grains and pulses'. It was expected to recommend varieties, collaborate with and distribute screening tasks among national collaborators, and address regional problems of seed production and supply. Implementation showed that this formulation encompassed an almost unlimited number of crops to deal with[123]. and thus the project title was rephrased to 'seed and planting material' for the second phase. It was agreed that the project would work with 22 crops, grouped into 3 categories[124]. With varying emphasis on the 3 categories of crops, the project was expected to produce the following results:

- Suitable cultivars recommended and made available.
- Improved supply of overseas seeds facilitated.
- Sufficient supply of in-country produced seeds facilitated.
- Seed quality improved (EUROPEAN UNION, 1994, A 4).

The overall approach of the project could be characterised as supply-oriented. It aimed at improving the supply of seeds available at NARES [125] and in particular in the shelves of private seed vendors. This should give farmers a better choice (more varieties with different characteristics) and quality (e.g. high germination, timely availability etc.) of seed. Thus, the main target groups of the project were research and private seed companies and vendors. Besides the supply of seed and planting materials, the project assisted the classical research domains of on-station trial design and analysis.

Co-operation with extension remained limited. The main activities were demonstration plots of promising varieties. Furthermore the project co-operated with extension for the organisation of occasional joint field trips. As farmers were not considered the primary

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[123] Decision-making is a difficult process in the Pacific. Decisions for PRAB were discussed at the annual meeting of the Regional Advisory Board (RAB) that was consisted of the Directors of Research of all countries. As 8 countries forwarded their needs and problems, the project was soon overloaded with tasks. In Pacific culture, where conflicts and offending other parties (counties) is avoided at all price, priority setting becomes an almost impossible task. Mandates grow rather than reduce and become focused.

[124] The main problem was that all countries had different priority crops and no stakeholder was willing to drop one's country interest. Readers may still consider this number as much too high. However, at the time, this formulation represented a big step ahead. The number was reduced from "unlimited' as not clearly specified, to only 22 crops with further restrictions for the mandate for each crop category. This 'success' was possible with the help of PRA ranking tools applied during the log-frame workshop for the project.

[125] This seed and planting materials were distributed for research test trial purposes. It should help the countries to identify the best varieties for their local conditions. The quantities were too small to provide materials for extension or for sale to farmers. It was left open to NARES to organise a local multiplication of the materials or purchase them from overseas.

target group, project findings were not analysed towards formulating appropriate extension messages. Results were documented in internal project papers or research papers, but these were not translated into extension materials for field use. However, the project invested some efforts into improving farmer - researcher - extension linkages. PRA activities helped to understand farmers' priority problems related to vegetable farming[126]. This granted very useful criteria for screening of new varieties. It showed in particular that farmers consider a large number of criteria, among others crop yield, often only of minor importance. This was an important learning process for researchers and motivated extension staff. These exercises helped to contribute towards a modification of existing working routines. Outside these PRAs, the project had no immediate direct impact on farm level. It remains to be seen if farmers will make use of a wider supply of vegetable seed in the future.

The project was very successful in linking MAFF with private partners and professional seed associations in Asia. It managed to get local vendors in Fiji in touch with a large number of suppliers overseas. Thus, one of the strengths of the configuration of actors in the project was the integration of the private sector.

One particular weak point emerged, namely a lack of seed legislation and strict quarantine restrictions. While the project managed to identify procedures for faster exchange of genetic materials, proposed seed policy changes got stuck in Government bureaucracy. This is a clear indication that the project lacked support on policy level.

Another weak aspect was the lack of a systematic monitoring system. While research variety trial routines were followed up quite regularly, no monitoring on a farmers' level (e.g. adoption rates) was initiated. Some monitoring of the seed supply situation on the market was undertaken, but no data on project effects and market developments were collected (cf. LEMONIUS 1997, 5). This makes an assessment of the overall impact of the project very difficult.

A retrospective view of the main project achievements and their impact one year after the official hand-over of the project is given by the project expert Dr. Steven Preston[127]:

> *Fiji MAFF is playing a more active/positive role in vegetable variety testing, and knows how useful this is to other countries in the region. In this, the Fiji MAFF is interacting well with the Asia and Pacific Seed Association (APSA), which helps arrange seed samples for trial. SPC/MAFF/APSA are developing this into a regional function. Fiji Quarantine has a better understanding of seed imports and I think this has opened up a lot of seed imports (especially pasture seed). The leading seed importer in Fiji has a much wider range of overseas seed sources in stock. Seed importers in other countries have better information on alternative seed sources, and some have introduced new varieties from new sources. (These have usually not been widely tested - the lack of systematic testing remains a problem). Some leading seed importers are active in a regional seed group, and the prospect of National Seed Councils, in which the seed importers will play their*

[126] Some of these activities were carried out jointly by the project and the researcher. Some results at the example of tomatoes were discussed earlier in chapter 5.5.3.

[127] Email correspondence 6.2.1999.

part, is much stronger. There is some discussion about seed policies and a draft seed policy document is being reviewed. Slowly, the benefits will be seen by farmers and consumers. But the range of locally produced off-season vegetables available in Sigatoka market (for example) is virtually the same as it was before the project. However, a wider range of varieties, including new varieties are available (in Suva at least) and it is now only a matter of time before the farmers find better varieties amongst these.

Little more can be added to this statement. The main benefits can certainly be seen in drawing MAFF's attention to the private sector and building links with major players in overseas seed market. This also strengthens Fiji's role in becoming a hub for seed and planting materials to the surrounding small island nations. However, farmer and extension relations remain underdeveloped.

6.3.3 Agroforestry and farming systems (PRAP P1)

The agroforestry and farming systems project (P1) is also a component of the PRAP. The project was staffed with two experts, the team leader based in Western Samoa and an assistant based in Vanuatu. The team leader co-ordinated the activities in Fiji and visited the country several times a year. Thus, the project is an example of more limited external input in terms of advise, and consequently, more direct responsibility lying in the hands of the MAFF counterpart staff of the project.

In the first phase of PRAP (1990-94) the project started working with alley cropping systems, mainly with on-station research trials. During implementation more traditional agroforestry systems and grid planting patterns were studied. In the second phase of the programme (1994-98), emphasis was shifted towards better regional research networking, increasing farmer participation and extension of results. In the last phase (1999) capacity building of local collaborators with participatory methods and extension were further strengthened.

The project purpose, as defined in the latest phase, was to increase the adoption of sustainable smallholder crop production technologies[128]. This purpose should be attained through the following results:

- to improve food crop productivity and systems sustainability,
- to develop technologies appropriate to resource poor farmers,
- to encourage farmer participation in the technology generation and transfer process,
- to enable training in farming systems research and extension methods, with emphasis on agroforestry systems, and
- to complement and support other project and NARES efforts to achieve the above objectives[129].

[128] Email correspondence from Dr. Steven Rogers 11.2.1999.

[129] Email correspondence from Veronika Schwanz 4.2.1999.

When the project started it had a strong focus on research departments with classical station provenance trials and vigorous statistical analysis. Gradually, analysis of farming systems and the diverse nature of farming problems was given more attention. This led to the design of on-farm trials to evaluate potential solutions. Parallel to this, emphasis on conventional statistical analysis was reduced, as it often proved not possible or inappropriate in this context. New methodologies including PRA tools such as problem identification, causal analysis, prioritisation and ranking were introduced. This promoted farmers' participation encouraging them to test and evaluate possible solutions to their priority problems. Links with station research were maintained as necessary. Extension services were increasingly involved in the process and benefited from the PRA and on-farm technology testing. This inspired extension to use on-farm trials as a new method to promote what they considered as already proven technologies. The project also assisted extension in promoting on-farm demonstrations/field days and the preparation of extension materials. In Western Samoa the project started supporting and promoting farmer to farmer training and extension.

Farmer participation in the project increased over time considerably. Within the project mandate area[130] (e.g. agroforestry, soil fertility), farmers had possibilities to determine priorities, influence trial designs[131] and evaluate results. In this respect the project was among the first to promote a far reaching participation of farmers in the region.

The main project intervention was in the Waibau area, close to the capital Suva. The project used a set of criteria for the selection of farmers for co-operation. These were: semi-commercial farms, leaseholders, ALTA tenants that had soil fertility or perceived land sustainability problems. No studies were undertaken to estimate the number of farms with similar conditions on a national scale. Thus, remains unclear the number of farmers who could potentially benefit from the innovations developed.

Noteworthy is the technology development process. Trying to find solutions to farmers' problems, available international solutions, traditional knowledge and new ideas were tested. Among the innovations finally developed, farmers' traditional knowledge played a major role. One example (*Erythrina* trees) is a local legume tree that grows wild in Fiji and Samoa. In Tonga farmer yam production innovations were further developed.

Regarding actor configurations, the project assisted in building farmer, research and extension linkages. However, due to rather weak policy support within MAFF, these linkages were still largely limited to the staff directly involved in the project. A well visible institutionalisation and 'mainstreaming' of the methodologies developed has not yet been achieved. Outside the farmer, researcher and extension triangle, no other actors

[130] The typical dilemma of projects: Priorities are set on policy level before the project starts. Hardly any donors approve open pilot phases, where beneficiaries can express their priorities without major restrictions.

[131] Here the project faced another dilemma. As farmers have difficulties in expressing their understanding of matters, there was always a big risk that researchers or extensionists moved too fast and suggest 'their view' on designs, which were then adapted. This way researchers still dominated the process too much and farmers own ideas were not considered as much as might be desirable (email correspondence by Dr. Steven Rogers 11.2.1999).

were involved. In particular links to policy, market and private sector actors remained weak.

The main strengths of the project are the methodologies for participatory technology development and the identified innovations. The still rather limited field level impact of the project may be seen as a weakness. Only twenty farmers in Fiji have adopted innovations so far[132]. Another weakness, mainly of the MAFF system, is the lack of a monitoring system for adoption rates of farmers.

6.3.4 Pineapple export production

The project began in the late 1980s as a micro-project[133] funded by the Fiji Government and the EU. The development goal was to create income opportunities in remote rural areas of Vanua Levu[134]. A co-operative with smallholder farmers was created and a centre for collection, handling and marketing of pineapples was set up. Several start-up difficulties had to be overcome until the first exports were shipped in 1994. After this successful start was made and all capital works were completed, EU funding ran out in 1996.

The main project goal was to promote tropical fruit exports and start-up pineapple production and marketing. This should have been achieved through the following results:

- train 100 farmers in advanced pineapple production.
- ensure distribution of planting materials, inputs, fruit collection and extension.
- build-up fruit export handling facilities.
- organise tropical fruit export[135].

The project analysed current experiences of farmers in growing pineapples and promoting a package of innovative measures: closer spacing with higher planting densities, use of mill mud as organic fertiliser, fertilisation according to plant leaf diagnosis, year round production by steering plant flowering periods with plant hormones. This package enabled high yields even on poor soils. The fertilisation according to plant leaf diagnosis allowed excellent fruit quality with a perfect balance of sugars and acids[136].

The fruit packaging centre was built on the compound of the existing Seaqaqa research station. The small station also hosts extension staff, enabling good co-operation between research and extension. Research was involved in the project from the beginning. Its role was the testing and adoption of technology that was taken off the 'international shelf'. At

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[132] Estimate by Taito Nakalevu, the responsible project collaborator in Fiji (email correspondence of 3.6.1999).

[133] Micro-project is a special funding line of the EU. The main characteristics are limited funding volume, short period (2-3 years) and high own contributions by recipient country.

[134] The second largest island of the country.

[135] Interview with the project expert Mr. Van Santen 5.3.1993 (cf. VAN SANTEN 1994).

[136] Fruits sold on the local market soon built a very high reputation for the co-operative as the taste outstripped other local pineapples by far.

first there were tensions between the project expert who promoted the new cropping techniques, and researchers that did not consider them feasible. However, both on-station and on-farm tests soon demonstrated their advantages and feasibility. Research revised the old recommendations and developed fast multiplication techniques to produce planting materials on a large scale for farmers. A nursery was set-up specifically for this purpose. The existing local pineapple variety proved as very disease resistant and thus the crop did not require any pesticide applications.

Extension was organised as a classical T&V service. Extension staff were trained by the project. Extension officers then passed on their knowledge to selected farmers in various ways: formal training at the centre, extension leaflets, group discussions, on-station and on-farm demonstrations and farmer to farmer visits. Besides training, extension was responsible for input delivery and pick up of fruits. Thus, extension could provide ongoing advice to farmers according to the needs of the cropping calendar and the harvesting cycle. But training was not limited to agricultural production, it also included all issues of transport, processing and handling. In particular, the co-operative staff and manager had to be trained in management and marketing skills. This included practical trips to New Zealand to familiarise themselves with the views and requirements of importers and customers at supermarkets.

Overall, this was a very comprehensive approach with a combination of different training methods. This was certainly one reason for its good success. An important difference to the ordinary extension service was that the staff were really well trained in all issues relating to the commodity[137]. Extension workers benefited from having a message to offer and discuss[138]. Another crucial issue was that extension workers were to some extent accountable to farmers, as they had the chance to raise problems during the co-operative meetings that were also attended by MAFF representatives. To further strengthen this aspect, it was planned that MAFF extension staff should slowly phase out in the future (once production is reached and consolidated on full capacity). Then, the co-operative should devise and pay it's own extension service.

Farmers rarely participated at the technology development stage, but their influence as members of the co-operative was strong. Farmers could voice their interest during co-operative meetings, and thus influence decisions on extension activities, management and production issues, and also in the crucial area of price policy. In 1995 about 60 farmers participated actively in the project and the requests pending for membership exceeded the target of 100 farmers by far. This was due to the visibility of the success[139] of the innovation and also due to the good prices paid to farmers. However the growth speed of the project with about 20 farmers per year remained moderate, as the multiplication of

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[137] Interview with project expert Mr. Van Santen 23.3.1994.

[138] Other positive aspects were that staff could focus on one single commodity only, the ratio of extension officers to farmers (4 to 100) was very good and the project secured regular transport (cf. VAN SANTEN 1994, 8). Normal conditions in extension (in particular in remote locations like Vanua Levu) are usually much less favourable.

[139] Some of the farms were located close to the main highway, so that the fields were well visible. Many of the first farmers started building new houses soon after joining the project. This obvious indicator for success attracted many of their colleagues to apply for membership in the co-operative.

planting materials created the main bottleneck that determined the expansion of the project.

This example showed that economic incentives could have a significant impact on adoption rates[140]. Participation may be an important ingredient, too, but it is, as this case shows not necessarily the single most important factor.

The project maintained extensive relations with several actors. Government and donor were updated on project progress regularly which secured policy support and reduced funding delays. Besides good research and extension linkages, farmers' participation was insured through a strong influence in the co-operative. Very important were the links to marketing actors. The project created good links to all actors in the marketing chain (e.g. local market, carriers, importers in New Zealand). In this respect, the project certainly represented the largest configuration of actors involved in all four case studies examined.

The main strengths of the project were that it created considerable impact on farm level using a very comprehensive training approach covering field production to processing and marketing. The project used a good monitoring system to steer implementation. Furthermore, the functional multi-actor involvement was certainly an important key to the success of the project. At the end of the field research period in 1995, the pineapple project appeared to be a very promising case. Meanwhile, the project faces some marketing problems overseas[141].

The 'green revolution' type of high input technology may be seen as a weakness. This strategy comprehended more environmental risks. The marketing in this sector is riskier too, as the project competes with many conventional tropical fruit producers (e.g. big producers in Australia and Indonesia). Given the limited size of the overall intervention, an organic production strategy might be more sustainable in the long run.

6.3.5 Conclusions of these experiences

All four cases describe projects with considerable differences, not only in goals and approaches used, but also in terms of size, financial volume, staffing, and time frame of the interventions. Nevertheless, some general conclusions may be drawn from the examination of the case studies:

- All projects were donor funded as grants or loans with variable local contributions. Funding periods were generally too short to achieve a full consolidation and institutionalisation of measures.
- In all projects, experts played the main role in project management and training.
- The cases included projects with purely national (SVRDP, Pineapple) or regional (Agroforestry, Vegetable Seed) mandate. Due to the reduced physical presence of experts in regional projects, these generally had less impact in Fiji.

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[140] This is also an explanation why the proceeding example with agroforestry showed comparatively much less impact. Here, benefits are much less visible and economic returns turn up only in medium term.

[141] Communication with Mr. Bahn Singh, MAFF officer dated 10.3.2000.

- All three newer projects introduced participatory research and extension methodologies. These new ideas were gladly received by MAFF. However, the ability to use these new methodologies, remained largely limited to the staff directly trained in the projects.
- All projects were aimed at farmers as target groups. The degree of farmer participation was very different. On the one hand was the SVRDP with its top down approach and very poor farmers' participation. This certainly was one important aspect why the project failed. On the other hand the three other cases each had a different impact. In the vegetable seed project farmers' participation was also limited. To which extent farmers will benefit from new varieties through the private sector, remains to be seen. The last two cases showed that participation is an important factor for project success, but it is not the only one. The agroforestry project started at the roots with participatory technology development, but despite this good participation, adoption of the innovations by farmers was still modest. The pineapple project took existing technology from the shelf, and promoted it with participatory methods achieving harder impact quicker (largely due to economically attractive technology).
- This indicates that the success of an innovation does not necessarily depend on the fact that the innovation addresses a specific agricultural problem (e.g. agroforestry project: soil erosion, soil fertility). If the innovation solves a general farming problem (e.g. pineapple project: low income) it may work just as well. It is important that the solution works. Thus, it may be concluded that screening for problems and solutions on local, national or international level may be potentially equally rewarding. A model of such an approach was presented earlier in chapter 5.5.4.
- The less successful projects all had weak monitoring systems. In particular, indicators for project impact and adoption were missing. The more successful pineapple project used indicators to monitor quantitative and qualitative aspects of project progress. These indicators were linked to steer project activities. This is another important aspect explaining its success.
- The degree of institutionalisation of new methodologies promoted by the projects remained limited. Project experiences did not lead to new official guideline on methodologies.

For the further assessment of the case studies the hypotheses formulated at the beginning shall be recalled:

H 7 Good co-operation of several actors may be achieved by small networks or platforms. Such platforms will enhance system output in terms of useful innovations.

H 8 Platform creation is enhanced through donor assistance or existence of good export opportunities.

Viewing the projects as platforms, the first hypothesis H 7 could be confirmed. All projects co-operated with different actors and this certainly could be seen as effective networking. Thus the projects created an interest for the different actors to work together. All projects produced innovations which were more or less successful in the diffusion of these innovations. Therefore, it may be said that the projects also enhanced the output of the AKIS.

The second hypothesis H 8 could also be confirmed. In all cases, donor funds were the starting point for platform creation. Thus, donor funding can have a strong impact on the output of an AKIS. As no official statistics on the output in terms of innovations of the Fiji AKIS exist, it is difficult to estimate the contribution of projects. According to the researcher's experience and observations, donor contribution could be estimated in the range of 50 to 75 % of all innovations developed and diffused. This illustrates the strong dependancy of the AKIS on external technical assistance still.

The question to which extent the sustainability of platforms depends on donor funding cycles, could not be answered definetly. At the end of the research phase in 1998, several projects were still being funded and therefore it is still too early to give an answer to this question. Nevertheless, the case of the pineapple project (funding ended 1996) showed that platforms may be sustainable after donors withdraw funds. The cooperative continued functioning and the other actors also co-operated in this platform. The agroforestry platform should also be sustainable as the Ministry supports the concept with a specific unit in the extension division. In this respect the sustainability of platforms seems to depend on the question to which extent the participating actors can find alternative funding sources. If that is not the case, the further promotion of the respective innovations is endangered. For donors, the key question would be to determine the right point in time when to end funding. In this respect the case studies do not yet provide indications.

A closer look shall be given to platform leadership in the configuration of actors of the four case studies. Figure 25 is an attempt to display the influence of key actors graphically. The influence of each actor was ranked according to the perception of the researcher[142] on a scale of 1 = weak, 3 = average to 5 = strong. As the assessment is based on the perception of the researcher only, this constitutes a strong element of subjectivity[143].

The figure shows that all projects had established completely different configurations. In SVRDP farmers and research played a weak role while extension, policy and donor influence was strong. The vegetable seed project was divided in two groups with weak farmers, extension and policy actors on the one side and strong research and private sector on the other side. The agroforestry project had strong farmers, research and extension, while in the private sector, experts and policy actors were weaker. The pineapple project had overall a rather balanced profile. All actors ranged in between 3 and 4 as average to moderatly strong.

Considering the fact that the pineapple project was the overall most sucessful project, with a rather balanced influence of all actors, it could be concluded that this is a potential

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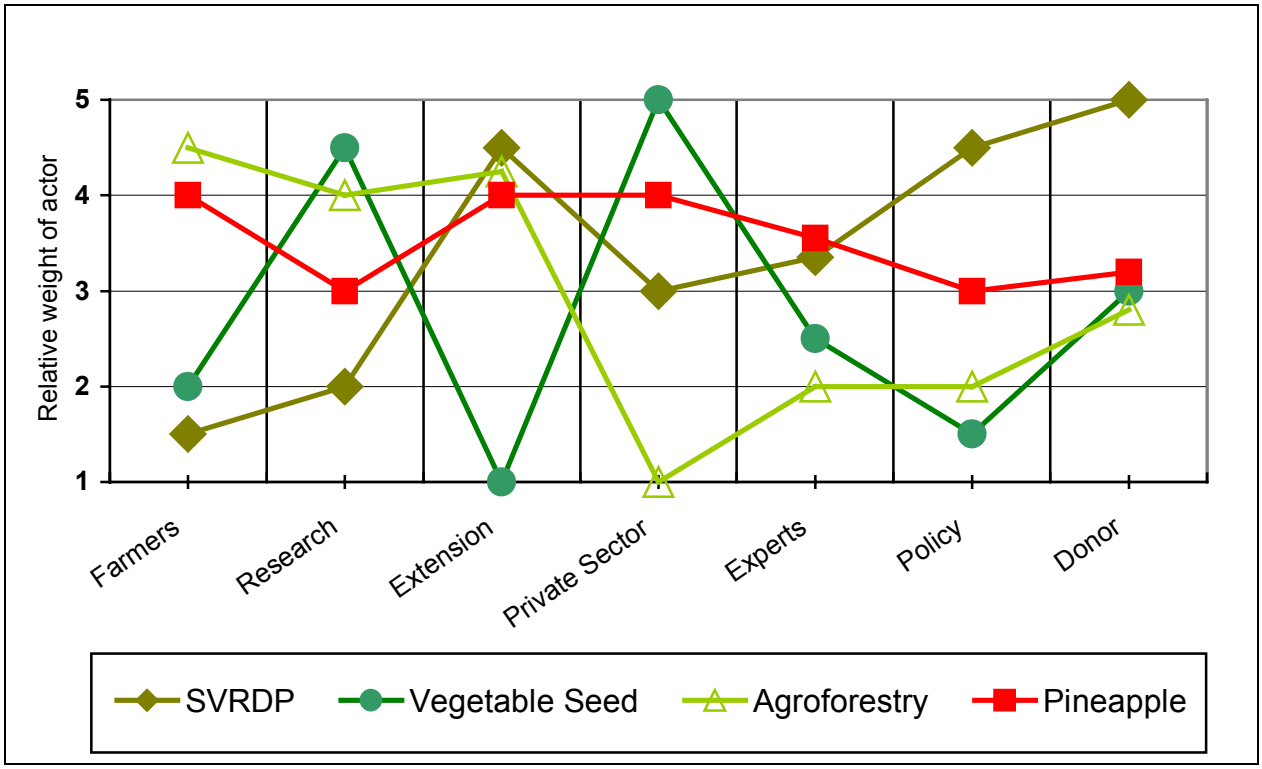
[142] The researcher was familiar with all projects (except SVRDP) through several field visits during implementation in the role of donor representative and later as program co-ordinator. As SVRDP was an older project, the assessment was based on discussions with former staff, visits to the project area, and available reports.

[143] It would have been interesting to compare the researchers view with the views of other actors involved. However, as the idea for this comparison emerged during the analysis phase of the study, it was too late to seek the view of other actors. Despite this limitation, the findings are presented here, because the findings and the tool may be an interesting starting point for future research.

lesson for future interventions: a balanced participation of actors in platforms ensures the best system performance.

In order to achieve such a 'balanced participation' good platform leadership is required. May be it is useful to distinguish between leadership and dominance in this context. Any set of actors working together will need some sort of leadership to achieve its goals.

Figure 25: Relative influence of selected actors in the case studies



Source: own data.

However, this leadership is only accepted by the other actors, as long as every actor in the configuration feels that his own interests are taken care of, and not dominated by other actors[144]. Perceived dominance could, consequently, be a reason for other actors to become more passive or even to withdraw from the configuration. This would then reduce the overall system output or performance. An important guideline for platform leadership could therefore be facilitation rather than strong leadership. Facilitation would further require that recognition be attributed to all platform members. It would also require taking over responsibility to ensure that all knowledge system functions are gone through by the platform.

Another aspect of 'balanced participation' would be the configuration as such. All relevant important actors should be represented. In other words, if important actors are

[144] In contemporary management literature, a large number of models to determine the best type of leadership exist. In recent years agreement has been growing towards the theory that the effects of the type of leadership depend on the requirements of the context conditions. "*The perception of one best type of leadership is replaced by a more relative : it all depends"* (STEINMANN, SCHREYÖGG 1993, 563). Among these context sensitive models in particular 'moderator models' gain importance (cf. STEINMANN, SCHREYÖGG 1993, 564).

missing, the platform is not 'properly configurated'. It could be seen as an important task of platform leadership to ensure that the platform is well configurated. This interpretation could also explain why some case studies were less successful. In the case of the SVRDP, farmers and researchers held too little influence, while policy and donors dominated. The vegetable seed project missed out extension while private sector issues dominated. The agroforestry project in the contrary, missed out the private sector.

Concluding, the graph could be used as a monitoring tool to analyse co-operation and leadership in platforms. Obviously, the number of case studies presented here is too small to fully validate the conclusions formulated. However, the findings may provide an interesting starting point for additional research.[145] The question of leadership in platforms will be investigated in more depth in chapter 6.4.2.

6.4 Outlook: platforms as means to promote innovations

The findings in this chapter are based on a separate section in the follow-up questionnaire that was distributed to research, extension and management staff at MAFF and the group of experts[146]. Prior to answering the questions, the respondents were asked to read a two-page outline of the platform model including graphical illustrations to familiarise themselves with the concept.

The findings in this chapter are, as the term 'outlook' in the heading already implies, an attempt to look into the future. Could platforms be a suitable means to improve the efficiency and performance of MAFF and the Fiji AKIS as a whole? It is important to note that this outlook or projection was based on what the respondents thought about the model, not on their practical experience working with the model. Nevertheless, some practical experiences were included, as several respondents have worked in projects that could, in retrospect, be perceived as such platforms. Such a retrospective assessment, which implies an 'unconscious' application of the model, is not the same as if a platform had been set up and managed with full intention. These limitations should be kept in mind during the assessment of these findings.

The presentation of the subject is segmented into six sections: platforms as a linkage mechanism, leadership and co-ordination in platforms, policy framework, driving forces for platforms, ways to introduce platforms and the overall suitability of the model for Fiji.

6.4.1 Platforms as linkage mechanism

'The platform model appears as a flexible solution that permits relevant people to work together, without the need for the creation of new formal units'. In the first question, the

[145] It could be interesting to analyse how different actors rate each others influence in such configurations. Monitoring of changes over time could further reveal to which extent the tool could be useful in identifying and solving problems of system inefficiencies.

[146] Management was also included as a separate group. However, as only one of the two management questionnaires returned contained answers on this subject, these responses were not included in the following analysis.

interviewees were asked to comment on this statement and express their opinion on the suitability of the model to solve the linkage problems within the Ministry.

The researchers all agreed on the suitability of the approach. Replies ranged from a simple[147] "*yes*" to "*strongly feel that the approach will solve linkage problems."* One researcher further specified "*as a participatory approach, the platform approach suits well to the RRA/PRA methodologies introduced earlier*."

ED staff confirmed the suitability as well. Fourteen staff members welcomed the approach with a simple "*yes.*" Others were more enthusiastic by saying: "*really suitable*" and "*better way*", "*saves time and money*". One comment stresses the dissatisfaction with the current Ministry set-up and welcomed the platform model "*...the platform approach is long overdue in our Ministry. It has been observed that most projects undertaken by the Ministry were undertaken without consultation and dialogue with the right personnel.*" Some concerns indicated further training would be required: "*a thorough understanding is needed.*"

The experts rated the approach more reservedly. Four experts confirmed the potentials, while two experts considered the approach as non feasible. The advantage of linkages was stressed strongly in two comments: "*this is exactly what is needed*", "*fully agree, informal linkages are the key, whereby those key players in an area need to form linkages.*" Others pointed to the fact that the idea is not at all new: "*platforms already exist in successful projects*", "*several projects ... have adopted this approach and provide platforms to different degrees*." A weakness that was raised was that linkage problems may be due to "*human nature*" and therefore not all problems could be solved by the approach. Another critical aspect was seen in the fact that the approach "*requires a champion - often a donor funded project to create the initiative, and facilitate the process.*" Fundamental scepticism was raised in one comment: "*although maybe a very good idea, it is not implementable in Fiji due to cultural and social background, and lack of continuity of policy.*"

These first comments showed that the model was acknowledged with interest and the majority of the interviewees rated the approach as useful for improving linkages.

In the second question, the groups were asked to comment on the following statement: 'An advantage of platforms is, that depending on the actual work activities (e.g. technology generation or dissemination) relevant actors can increase or decrease their input relevant to the work needed for the platform. Not all actors need to be fully engaged at all times, which saves time and resources.'

Again all researchers confirmed the statement as very relevant. Specific advantages were seen in "*complementary roles*" and "*absence of duplication*". "*Being informed about things"* was seen as another positive aspect of platforms. "*recognition*" was mentioned as an important steering instrument for platforms.

Extension staff equally strongly supported the statement which was best illustrated by some of the adjectives and words used: "*fine*", and "*excellent*". A few staff added some

[147] To preserve more of the richness of the views presented in the follow-up questionnaire, in a first step many of the comments were listed as quotes without immediate comment. Then an attempt was made to interpret the findings as a whole.

potential limitations of the approach: "*depends on the location*", "*consultation necessary*" and "*full participation required*."

The experts agreed to the increased flexibility in platforms and the potentially better resource use. But from experience, one expert raised the point that economies of time through platforms should not be overestimated: "*much effort is required to keep all parties up to date with current states of affairs."* Another problem associated with flexibility and voluntary access to platforms was raised as a question: *"how to ensure people interact in areas of need and not interest."*

The comments indicated that platforms can create additional flexibility, but as the last comment stressed, the limits to a free choice of platforms in small organisations like MAFF are likely to be rather narrow.

In the first linkage workshop, a considerable part of the existing linkage problems were attributed to the stiff hierarchical structure of the Ministry. For this reason the following statement was presented for comments: 'another advantage of platforms is that the approach can create necessary flexibility in stiff hierarchies. At the same time the advantages of hierarchies (direct responsibility, administrative convenience, routine procedures) can be maintained'.

Also in respect of this question, both researchers and extensionists strongly supported the statement. This was best illustrated in some comments: "*excellent*", "*breaks the barriers*", "*faster*", *easy for operation*", "*room for interaction*". Only a few reservations were articulated: "*some may use time to follow private purposes*", "*superiors should regularly try to adhere to it*" and "*the whole team (platform) should be made responsible for success or failure.*"

The experts agreed that more flexibility in the hierarchy was needed. One expert explained: "*rigid hierarchies often do not work efficiently because of weak links that cannot be bypassed. In a hierarchical system, informal networking becomes difficult, yet it is the key to progress. A classic example is that the private sector usually forms no part of the public sector hierarchy (by definition), yet as in the case of seeds, these people are crucial to the whole seed supply system.*" Too much flexibility was seen as an obvious danger: "*at the end of the day you still need good management and mechanism to plan, monitor and evaluate how resources are being allocated and used.*"

The comments showed that platforms were seen as a potentially appropriate means to complement the Ministry structure that was perceived more as a 'barrier' rather than an enabling structure. The main difficulty was seen in finding the right balance between increasing flexibility on the one hand and ensuring sound management of available resources on the other.

To assess the potential of platforms to create functional links to actors outside MAFF, the groups were asked to comment on the following statement: 'Platforms which aim at a particular commodity (e.g. ginger, fruits, coconuts, dairy) or more general aspects (e.g. farming systems, agroforestry) could bring together relevant staff from middle management, subject matter specialists, project experts, interested farmers and members of respective commodity boards or other market actors to achieve innovative progress'.

Both researchers and extenionists agreed with the statement. The parallel between platforms and commodity boards was acknowledged directly by one expert "*agreed, except a commodity board is probably already a platform. An effective commodity board certainly is!"* Commodity boards were seen as efficient structures, and the existence of commodity boards was rated as a good indicator for the chances to achieve innovative progress: *"where (platforms) do not exist, the likelihood of success is very low.*" Two existing commodity boards in Fiji were considered as a suitable example. The functioning of these boards, however, also caused some problems: "*the case in point there is now an industry group involved in ginger and another in taro but here appear to be inadequate resources from MAFF to address the major issues confronting these commodities.*"

The case showed that funding was considered as a crucial problem. This was also raised in another comment "*platforms need money to run. Who is going to pay for subsistence platforms?*" Another comment took a similar direction and stressed the need to provide incentives for farmers and the private sector to support their participation in platforms "*only very few are able to invest time and resources in such a network.*"

Summing up, it may be said that the potentials of platforms presented in the three statements were largely acknowledged in the different comments. Platforms were seen as a potential means to promote innovative progress. Funding and co-ordination of resources were seen as crucial point. The latter point will be examined further in the next section.

6.4.2 Leadership and co-ordination in platforms

Platforms need leadership to pursue their goal of developing a certain innovation. All groups were asked to rate the leadership potential of different actors in Fiji as low, medium or high. The rating results with comments are shown in Table 37.

All three groups had different views on the question, 'which actor might be most suitable for platform leadership'. Researchers saw the highest potential in the private sector (2.8), followed by top management (2.6) and themselves (2.5). Extension staff rated experts, top management and themselves all on the same level (2.6) as the actors with medium to high potential. The experts rated themselves as the only actor with high potential[148] (2.9) followed by the private sector with medium potential (2.3). The fact that all actors included themselves in the group of actors with higher potential, showed that all groups showed a good self-confidence.

Researchers gave their lowest rating (2.1) to experts, while extension attributed the same rating to farmers. The experts considered MAFF top management as the actor with the least potential (1.2). The following comments justified the ratings given. The RD and the ED ranked top management high as they have the "*authority*" and "*the final say*". Experts rated them low because they saw the "*risk of overload*" and the fact that management have "*other priorities*."

[148] Interesting leadership reflections were raised in this comment: " *I'm certain I could design some strong platforms with a large local component. I would almost invariably include a foreign element, not because it is foreign but because that is the source of specialist advice, which is often essential."*

Table 37: Potential of different actors for platform leadership

Actors	Potential for leadership				Comments by the three groups
	RD (n=8)	ED (n=21)	Experts (n=6)	Overall	
Experts	2.1	2.6	2.9	2.53	*"Good knowledge", "expertise, give direction", "can have leading function", "liaise, could facilitate –but outside", "broader perspective", "depends on individual", "not sustainable".*
Private sector	2.8	2.3	2.3	2.47	*"Can move anywhere, always in contact with farmers", "can be biased", "independent", "best in touch, yes –see sugar industry", "high potential –few time", "too little developed".*
Extension	2.3	2.6	2.1	2.33	*"Could co-ordinate and facilitate from their areas", "restricted by superiors", "together with privates", "pretty organised", "role could improve their status & motivation".*
Research	2.5	2.4	1.9	2.27	*"Could co-ordinate and facilitate from their areas", "poor resource personal", "restricted by superiors", "in co-operation with privates", "depends on individuals".*
MAFF top management	2.6	2.6	1.2	2.13	*"Depends on policy makers", "have the final say", "can have leading function", "far from reality", "authority", "horror", "risk of overload", "busy, other priorities".*
Farmers	2.4	2.1	1.7	2.07	*"Provide information", "should lead", "opinion leaders influential", "poor accessibility", "not empowered", "support needed", "small actor", "no associations", "lack of confidence", "industry farmers to lead".*
EP&S	2.3	2.3	1.3	1.97	*"Could co-ordinate and facilitate from their areas", "restricted by superiors", "technically unsound, too economical".*

Scale: 1=low; 2= medium; 3= high.

Farmers were seen as an actor that "*should lead*", but that are limited by "*poor accessibility*" and lack of "*empowerment*" that predetermines their role often as only to "*provide information.*" Both research and extension had some potential to "*co-ordinate and facilitate from their areas*", but they were "*restricted"* by the existing hierarchy and "*superiors*". In particular, for extension it was mentioned that the "*role could improve their status and motivation*." EP&S were rated to have some potential for leadership, but others considered them as "*too economical*" and "*technically unsound*." Experts reached the highest overall recognition due to their "*good knowledge*" and "*expertise*". Their main weakness was seen in the fact that they are "*outside*" MAFF and their contributions may "*not be sustainable*" due to their short term assignments and limited presence to guide a platform over a longer period of time. The private sector was equally recognised as an actor with high potential due to its "*independence*", "*good contacts to farmers*" and proven success for example in the sugar industry. However, the actor's weakness was stated as "*little time*" and at that time the linkage was viewed as "*under developed*."

The question of platform leadership was difficult to answer as the comments illustrated. Based on the fieldwork, the researcher largely agrees with the expert rating. Capacities at the RD and the ED are probably still too weak to take up a responsible platform

leadership. However, the potential is there, and the progresses made in the training course on participatory methods demonstrated that staff could improve considerably if exposed to the right challenges. Private sector actors already play an important role for established commodities such as ginger or taro. Private sector actors would have an interest to gain something out of the co-operation with the Ministry. At present, the Ministry with its slow bureaucratic structure certainly does not yet appear a very attractive partner. The existence of a platform structure with flexible funds might change this impression quickly. For these reasons, a start-up promotion of platforms is likely to require expert assistance. The question will be taken up again in the last sub-chapter.

Besides leadership co-ordination is required in platforms. That co-ordination was perceived as a difficult task, and can be seen in the following comment: "*a major problem with informal networking, is how to maintain co-ordination and avoid anarchy!*" Most of the other comments received equally pointed out the difficulties of achieving co-ordination. As reasons for co-ordination problems were mentioned: incompatibilities in goals between actors, a lack of a sense of joint ownership, little experience for co-ordination and conflict of ideas. However, others on the contrary, rated co-ordination as "*easy to follow*" and pointed to the fact that Fijian culture has a good tradition of achieving consensus. Again, others made recommendations such as "*positive thoughts and good co-operation need to prevail*" or "*control required to control uncooperative guys*". Others added that training for teamwork was required. Strong leadership was mentioned as an important factor to achieve co-ordination.

Besides co-ordination between individual actors of each platform, overall co-ordination is equally important. In a new question, the interviewees were asked if an overall AKIS co-ordination platform was necessary, and if the directors of the RD, ED, AH&P, EP&S plus project experts or other actors would be suitable to take over this role.

The majority of research staff (6/8) approved the above suggestion as a suitable option for an AKIS co-ordination platform. The remaining two officers preferred middle management staff or a board of private sector actors and farmers. Among extension staff, the majority (15/21) opted for the above proposal as well.

The experts discussed the topic very controversial. Comments supporting and rejecting it, were made[149]. A co-ordination platform was considered as "*somewhat artificial and not sustainable."* More pragmatic, the need for a co-ordination platform was seen to "*depend on how many competing platforms (projects!) were being facilitated simultaneously*."

If the Ministry started experimenting with only a few platforms, an additional co-ordination platform would certainly not be necessary. These few platforms could then be linked closely to the Ministry. One option would be to attach these platforms to the linkage unit that was proposed in chapter 6.1.2. This might facilitate the process of resource allocation. The suggestion will be further illustrated in the last sub-chapter.

[149] Rejections went so far as to question if the Ministry could at all play a constructive role: "*Ideally, one would close the Ministry and rely much more on commodity boards and other 'platforms'. Perhaps aid to the Ministries merely perpetuates an inefficient and unproductive system?"*

6.4.3 Policy framework for platforms

The Fijian Government introduced a new policy, the commodity development framework strategy (CDF) in 1997. This policy framework determined commodities for future programme activities. In this respect the question arose, to which extent these new guidelines would be compatible with the platform model.

Among the researchers, all agreed that platforms could be combined with a CDF strategy. Extension staff was more sceptical. Only about half of them (12/21) indicated that platforms would be compatible with the CDF strategy now favoured by MAFF. The major point of concern raised was: "*the CDF is a top down approach. The AKIS is a participatory approach. To combine both would be incompatible to promote sustainable development for the people at large. The CDF only takes care of small groups of commercial farmers*."

The experts were divided into groups that considered the new policies as a major obstacle to any kind of more participatory oriented methodologies and groups that did not expect major changes.

Considering the cases of platforms reviewed so far, these were either projects or commodity boards. Therefore, a policy focus on commodities is rather unlikely to affect the platform approach negatively. Nevertheless, it would be better if the commodities selected also corresponded to farmers' needs and potentials. A model of how farmers needs could be introduced into the AKIS was presented in chapter 5.5.4. Such a discussion process could ensure that both the views of farmers, Government and other key actors would be co-ordinated. Such a process would certainly ensure a higher motivation of all actors involved, and consequently also increase chances of success compared to a situation where decisions are imposed by the Fijian Government.

6.4.4 Driving force for platforms

A main assumption of the platform model is that the main driving force for different actors to work together in platforms is the formulation of a common goal and the joint understanding that this goal can only be achieved by close co-operation. The interviewees were invited to comment on this assumption and if necessary, to suggest additional incentives necessary to set-up and run platforms.

Among the researchers, three officers considered a joint goal as a sufficient driving force for platforms. Three other staff mentioned several incentives that were necessary to make platforms operational: autonomy, financial gain, recognition, satisfaction and other physical benefits. One officer suggested "*an institution building process similar to the approach of PRA/RRA training*". In the same direction another comment pointed to additional training requirements: "*the actors should have more qualifications*".

Among the extension staff, only six officers considered a joint goal as a sufficient driving force for platforms. Five were undecided while the remaining eleven staff mentioned a number of other incentives for platforms. Government support, quality reward system, resources and training were mentioned often. Other individual comments stated the

following incentives: *"flexible support service", "feedback and impartiality"* and *"daily practice"*.

The experts agreed that a joint goal on its own was not sufficient to set-up and maintain platforms. Similar to RD and ED staff, a number of different incentives were mentioned. Resources and funding continuity were seen as the crucial factor: "*would require a sustained support system (donor?) until positive results become apparent to those involved*." One expert stressed that besides external funding, MAFF should make better use of its own funds. As an example he mentioned the Ginger Council that was seeking outside assistance and funding for the research into pythiium rot: "...*CDF has a lot of money to address these issues but the funds are not allocated to the area with the greatest need.*" Other important aspects raised, focused on the question of status and recognition: "*job satisfaction, remuneration, medals. Being seen as a key player ... at least being able to say 'we did that'."*

These comments provided a strong indication that a joint goal by itself is not a sufficient incentive to keep platforms operational. A joint goal will help to provide direction and facilitate consensus, but it cannot stand-alone. Other minimum factors that must be ensured are funding and recognition of the various actors for their contributions.

6.4.5 Ways to start-up platforms

ENGEL and SALOMON (1997) developed a workshop approach designed to support the start-up of platforms. The approach is called rapid assessment of agricultural knowledge systems (RAAKS) and focuses on co-ordinating the potentials of different actors, analysing their goals and possibilities for co-operation, set platform goals, identify linkages, determine necessary information exchange, define working steps etc. The interviewees were asked to comment on the suitability of such a workshop promotion for platforms in Fiji.

Without exceptions, both researchers and extenionists welcomed such an approach to test the platform approach. This is best illustrated by some of the comments made: "*seems ideal*", "*yes, big potential*" , "*try every possible avenue"*, "*yes, do it don't talk.*"

The experts considered the approach as a good potential starting point to introduce the approach in Fiji: "*I would be interested to see the practical output from such a process. We should give it a go - all dependent on the quality of facilitation and the resources available.*" For an initial test of the approach it was suggested to apply the workshop to a narrower subject area rather than an entire department of agriculture.

This strong support for RAAKS showed a big interest in testing the platform model. An advantage of RAAKS would be that it could provide the necessary training that was raised by some interviewees, at the same time as setting up platforms. This is certainly one reason why this approach for the introduction of platforms was considered useful. Alternatively, the Ministry could experiment with platforms without external assistance, take up the concept in a running project or integrate it in the planning of a new

proposal[150]. The best experiences might be gained in a parallel set-up of platforms by the Ministry and promoted through donors via projects. A scientific follow-up of such a process could result in a more systematic analysis of future experiences. This would be an interesting field for future research that could further validate the insights gained with the present study.

6.4.6 Suitability of the platform model for Fiji

In the last point of the follow-up questionnaire, the interviewees were asked to specify strengths and weaknesses of the platform model and give an overall judgement of the suitability of the model for Fiji. Table 38 presents an extract of the main strengths and weaknesses mentioned.

Table 38: Strengths and weaknesses of the platform model

Strengths	Weaknesses
"helps achieve goals"	"time consuming, too many actors"
"brings the parties together"	"needs much facilitation also from top management"
"enhances team work"	"involves a weakening of hierarchical authority (this is a good thing in my view but will be resisted)"
"people learn where they stand"	"in some ways incompatible with current management systems: undermines the authority of the PS"
"improves linkages"	"egoism might be problematic"
"allows more flexible work practices"	"needs initiative, innovation, leadership and experienced-trained people. None of this is abundant."
"appears to reward competence and output, not length of service/seniority"	"flexibility creates a co-ordination problem that might be viewed as 'untidy' "
"could legitimise / regularise interactions with the private sector"	"it's difficult to see how it can usefully be formalised"
"it might improve status, morale and performance"	"less independence of actors"
"better pooling of resources"	"consensus difficult, needs good leadership"
"better work commitment, better co-ordination"	"as a generalised, conceptual structure it has limited appeal"
"reduces duplication"	
"works if there is a strong economical interest and an already expanding market"	

The comments compiled in the table speak for themselves. Better co-ordination, improved linkages, better interplay of actors, means to reach goals, reduced duplication and better use of resources were identified as strengths of the platform model. Furthermore, it was assumed that platforms might have a positive influence on status, morale and performance by rewarding competence and output rather than length of service. Some of the strengths were also seen as potential weaknesses. Co-ordination and reaching of consensus might

[150] The proposal for a follow-up project for PRAP P3 in the seed sector integrated the platform concept. (Email correspondence with Dr. Stephen Preston 6.2.1999).

be difficult to achieve or time consuming. Too much flexibility was seen as a danger for co-ordination. A risk was seen in the fact that platforms might weaken the hierarchical authority and therefore might be resisted. Other weaknesses were seen in the need for strong leadership and experienced-trained staff that are not available in abundance.

The overall judgement of the researchers expressed a strong support for the concept and considered it as suitable (7/8) for Fiji. Only one research officer was less certain and stated prudently "*seems efficient*."

Extension staff showed an almost equally high support. Sixteen staff rated the approach as good or very good. Only 2 officers were "*not sure*" or "*reserved*". Four staff made no comments.

The support for the model was also shared by the experts. Various weak points or reservations were stressed, but overall, 4 experts favoured the model, one remained undecided while one firmly rejected the model. Two quotations may best illustrate this support with proviso: "*It's an approach I would support, indeed we have adopted elements of this with a degree of success. As stated several networks already exist using a variety of participatory approaches - one should build on these and enhance positive experiences*", *"to be cynical, Fiji has many of the elements of the classical framework for failure. Yet compared to many PICs*[151]*, Fiji has many if not all the ingredients for success, and should perform better. Therefore, playing with the institutional arrangement may be the key.*"

Overall, the comments of the interviewed researchers, extensionists and experts supported the platform model as a potential means to address current inefficiencies at the Ministry and make the development process of agricultural innovations more effective. The support and the reservations raised, indicated that the model has a good potential to prove valid in practice. The three case studies of newer projects presented in chapter 6.3 equally pointed in the same direction.

However, the empirical base is still too small to allow for a definite judgement of the model. Using the terminology of the participatory action research applied in this study, a new learning cycle would be necessary to test the platform model in practise. The experiences gained so far and the potential strengths and weaknesses identified could be used to formulate new working hypotheses to further guide the process of introducing platforms to the Fiji AKIS. A scenario for such an introduction process of platforms will be outlined in the following paragraphs.

In order to allow good judgement of the approach, the model should be tested in a number of case studies. Two to four case studies should be sufficient for this purpose. Such a number of case studies would permit comparison of different start-up settings and actor configurations. It would appear useful to compare a start-up with the help of workshops (e.g. RAAKS) and external assistance with a start-up without specific assistance. The latter case could include projects that are already implemented under full responsibility of the Ministry. This would provide insights into the suitability and necessity of start-up facilitation, and indicate how much training for platforms would be necessary.

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[151] Pacific Island Countries.

The case studies could also provide further insights into the question of platform leadership. In this respect, the performance of different actors in leading roles could be compared. Based on the present research findings it would be interesting to compare the three actors that were attributed with the highest leadership potential: experts, private sector and MAFF staff. The concern of limited platform sustainability with experts as platform leaders could be further investigated by continued observation of the case studies presented in this study. Meanwhile, in all three cases, technical assistance ended[152]. How far this termination of donor support effected the sustainability of platforms, changes in actor configuration occurred and how the diffusion of the respective innovations was affected, could be studied.

The new case studies could further provide insights to which extent platforms could increase flexibility and improve co-ordination between actors. Regarding the question of overall platform co-ordination and the type of linkage between platforms and the Ministry, it appears suitable to attach these platforms to the linkage unit (that would also need to be created). This revised platform model is depicted in Figure 26.

This set-up would create a formal link between the platforms and the Ministry. Platforms would no longer be 'floating' completely outside MAFF. This might reduce reservations and potential resistance against the model. At the same time, this should facilitate the process of resource allocation to platforms and reduce the risk of co-ordination problems.

Compared to the first platform model presented in chapter 2.2.4, the co-ordination platform is replaced by the linkage unit in the new model. To indicate the connection of the unit with the Ministry, a double line is drawn to the policy framework of the model. Platforms could then be perceived as satellites of the Ministry. Besides promoting internal linkages these satellite platforms could improve contact and co-operation with all outside actors.

Overall platform co-ordination would thus become the task of middle management staff in the linkage unit. The advantage of this set-up would be that decisions would be closer to the executive staff of the Ministry. This might reduce some of the information flow problems, with information flows becoming shorter. More decision power would be delegated to middle management, while top management would be released from an excess workload. Only major[153] decisions would have to be taken by top management. This might have positive effects on the efficiency of the hierarchical structure of the Ministry.

As the follow-up questionnaire findings indicated, a joint goal is unlikely to be a strong enough incentive to run platforms. Therefore, in parallel to the above organisational modifications, the Ministry could start to develop a new reward system to promote and recognise the initiatives taken in platforms. Using the soft systems perspective, all actors would need to develop a more sympathetic understanding for each other. This would mean that actors could learn to actively take up and learn from other actors' point of view. In other words each actor should learn to look at matters from different perspectives (e.g.

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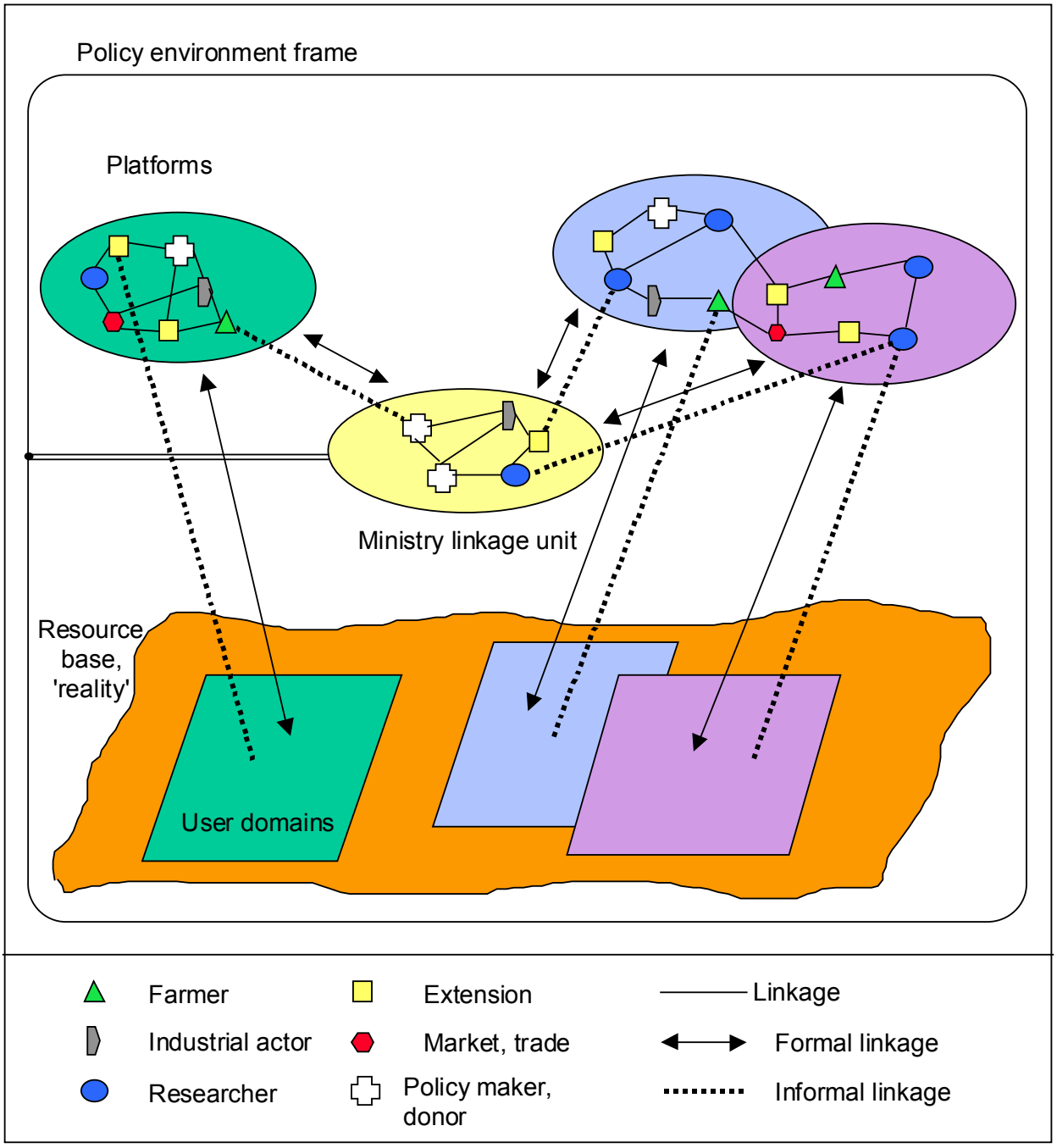
[152] The last PRAP project ended late in 1999.

[153] Division of labour and tasks would require a comprehensive review to be negotiated in the process of organisational reform.

farmer, extension, research, economist, sociologist, politician), to obtain the best possible understanding and consequently provide the best chances for platform success.

Figure 26: New platform model



Source: own design with ideas from ENGEL (1995, 203), ROUX (1995, 19), RÖLING (1995, 12).

A scientific follow-up of this scenario could assist a more systematic analysis of the progress of implementation. It could provide interesting opportunities for further education for participating MAFF staff. Assistance by external researchers would certainly also be beneficial. After an implementation period of three to four years, the experiences should be evaluated. The evaluation should then enable a sound judgement as to, if and how the platform model should be introduced on a wider scale at MAFF.

7 Discussion of results and recommendations

The research findings and recommendations are structured according to the main lines of inquiry. First, the main findings for each line of enquiry are summarised. Then, necessary conclusions are derived and a set of recommendations is discussed.

7.1 Integrating farmers' problems into the AKIS

The initial expectation that in a small island country like Fiji, the range of farmers' problems might be rather limited and thus easier to assess and structure, proved a wrong assumption. Due to the mountainous topography, the country is divided in a range of agro-ecological zones. The multi-ethnic composition of the population leads to an additional differentiation of socio-economic factors that further increases the diversity of farming systems.

To structure farming problems, a draft farm classification system that distinguishes two agro-ecological zones (upland and lowland) and two types of progressiveness of farmers (average and advanced), was elaborated. These criteria could provide a starting frame for a farm classification system. The draft set of criteria may not yet cover the existing diversity of farms sufficiently well, but further criteria may be added to the system, as more information becomes available. However, the limited size of the countries research and extension system calls for a simple, rather than a very complex and detailed solution. Further research will be necessary to validate the choice of criteria.

The analysis of actual farmers' problems revealed that unlike many other developing countries, Fijian farmers do not have major problems to sustain their livelihood. In this respect, farmers do not face a need for urgent change. Problems raised were very diverse, sometimes interrelated. Comparing problems with solutions showed that at times, a number of different options for addressing problems were possible. The comparison of different projects revealed that farmers are particularly interested in solutions that also result in economic advantages. Concluding, an intervention strategy can not be as simple as: here is the problem and there is the solution. Problems and solutions need to be viewed together.

A discussion and ranking process of problems and solutions is thus necessary at a farm level, and in addition, on a national level to determine extension and research priorities.

A model of such a structured problem and solution identification process was presented in chapter 5.5.4. Therefore, it shall not be repeated here again. The focus of the following section will be on a series of aspects that may be of importance for the introduction of the model in practice.

Institutional set-up

A multi-divisional task force could be responsible for the implementation the model at MAFF. This group could comprise of the RD, ED and EP&S[154]. To reduce additional

[154] In the medium term, it should also be considered to merge crop and livestock divisions. Then AH&P should also be part of this group.

workload, staff that already had similar tasks in the past should be seconded for this purpose. Within EP&S the new working group that co-ordinates the CDF might be the best choice.

To gain experiences, it seems rational to begin on a smaller scale. The fieldwork could be started in one division, and if completed successfully, the work should be expanded to the other divisions of the country. For the initial start, the farming systems criteria identified above should be used. To limit the scope in the beginning, it might be useful to examine only cropping problems and if the approach worked out well, livestock problems could be dealt with in a second round.

Training and backup support

It would need to be clarified if additional training for participating staff is necessary. Given that several training courses on participatory methods were conducted, this might not be necessary. The fieldwork would provide the opportunity to further practice participatory methods. To facilitate the process, external technical assistance might be helpful. This could provide a better supervision of the process. This could also enable a better scientific follow-up of the process and could provide an opportunity for MAFF staff to engage in further education.

The analysis of the field results would be another responsibility of the task force. In this respect, it might be necessary that the group seek assistance from the Ministry's statistical section or other qualified sources (e.g. USP, experts).

Increasing the 'borrowing capacity' of the AKIS

For the compilation of solutions, the existing recommendations produced by research should be screened in detail. In addition a detailed world literature review would be necessary. This task could be shared among researchers and subject matter specialists. This regular up dating with developments outside Fiji should become a routine that is carried out in at least yearly or two yearly intervals. It is an important aspect to raise the 'borrowing capacity' of the AKIS. The results of the compilation process of problems and potential solutions should be documented in a draft report.

National Council for research and extension priorities

The task force would then have to organise a national Council to determine the new research and extension priorities. It would be important that staff of all management levels participate in the meeting. This should ensure that competence from a grass roots level to a policy level is represented. The priority areas of problems might also give an indication in which areas co-operation with the private sector (e.g. exporters, processing industries) might be interesting. These private sector actors could then be invited to the Council meeting. The Council would then discuss the draft report presented by the task force. To achieve a good discussion process, external moderation of the process would be useful.

The new priorities should be integrated gradually into the system. A radical break with ongoing activities should be avoided. Old priorities should be phased out over a reasonable transition period.

This model could lead to a systematic integration of farmers' problems into the AKIS, and would enable the participation of all major actors in the process of determining priorities. Considering that the existing policy driven system, with limited transparency and focusing on transfer of technology, has not achieved any major success in the diversification of agricultural production in Fiji. A reorientation of the AKIS towards farmers' problems and meaningful solutions appears as urgently required.

7.2 Making better use of participatory methods

Participatory methods as tools to bridge the interface between farmers and researchers and extensionists, proved very useful. The methods permitted the addressing of information deficiency problems quickly, and further provided good learning opportunities for all parties involved.

The process of introducing participatory methods in the Ministry showed a number of important points that may be recalled:

For staff that begin learning participatory methods, sufficient time and practice were required before participatory methods were fully mastered. The training course on participatory methods revealed a number of strengths and weaknesses of the trainees. The following aspects were learned easily and could be rated as strengths: organising a survey, field use of tools, practical implementation, presentation and visualisation of findings.

Conceptual thinking, analytical skills, interpretation and report writing skills were identified as weaknesses that limited the overall training success. Participatory methods require a rather high level of these more general abilities. The main reason can be seen in the fact that participatory methods focus on problem solving, which requires the ability of adopting tools and consequently limits the scope for standardising procedures. The Ministry hierarchy, with the strong bias for standardising and regulating procedures, represented rather unfavourable conditions for learning participatory methods. Used to rules and regulations, staff had considerable initial difficulties to deal with complex problems that require creative and unconventional approaches to solving matters.

The better overall abilities are, the faster participatory methods will be understood and mastered. Repeated practice with the tools also leads to better learning success. Thus, creating practice opportunities, is an important factor in consolidating training efforts. It should be noted, however, that repeated training could not compensate a low level of general abilities. In terms of basic qualifications it would be ideal, if all MAFF staff had a Bachelor or Masters qualification[155]. These qualifications ensure a better training in self determined work and encourage problem-solving capacities. Thus, in the short term, the focus should lie on increasing practice, in the medium to long term on raising the general qualification levels of staff. This could be achieved, for example, by reviewing the curricula at FCA and USP and including participatory methods as own new subjects. In

[155] Thompson (1994, 57) points in the same direction and postulates that PRA training should be part of a wider human resources development programme.

addition curricula could be revised in order to increase their relevance for training problem solving capacities and reduce the amount of factual knowledge taught[156].

Another important aspect of the training programme was the provision of backup training support after the initial training. This service was provided through the PRAP P11. This support helped staff to solve problems that were encountered while making the first steps in trying out participatory methods at work[157].

Further promotion of participatory methods

Participatory methods should be applied on a wider scale in the Ministry. For this purpose more opportunities for applying participatory methods could be created. Introducing the model for farmer problem assessment, discussed above, could be one of those opportunities. But the methods could also be used very well in the context of technology generation and technology consolidation, for extension as well as for monitoring or evaluation[158] purposes.

Given the fact that the process of institutionalising participatory methods in MAFF has only reached limited levels so far, it will be necessary to allocate official attention to this important issue. More top management support will be necessary to achieve a sound institutionalisation within the Ministry.

Institutional set-up

To strengthen this process, the set-up of a new unit for participatory methods would be the right measure. The functions of such a unit were already highlighted in chapter 6.1.2. Such a unit could also facilitate the function (or equally resume the role) of the multi-divisional task force suggested in the last section to set up the national farmer problem assessment. In this respect, synergy effects could be used. The unit could also provide the necessary back up training support for participatory methods. To fulfil all these tasks it may be necessary that the Ministry seek external support from experts. Existing staff at the Ministry are probably still too weak to resume these important tasks independently[159].

Since the original start of the training measures in 1994 six years have passed. Considering that the degree of institutionalisation of participatory methods is still only

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[156] An example of curricula orientation towards new learning and problem solving capabilities is the University of Western Sydney - Faculty of Agriculture and Rural Development in Hawkesbury, Australia (c.f. BAWDEN and MACADAM 1991, 368).

[157] SCHÖNHUTH and KIEVELITZ (1994, 31) made similar observations. They report that PRA workshops have a great impression on workshop participants, but that did not change much in projects or programmes. Therefore, they call for post training action plans to ensure that staff have backup support after the first training workshops are completed (SCHÖNHUTH and KIEVELITZ, 1994, 34).

[158] For participatory monitoring and impact assessment, IIED recently allocated a full journal of the PLA notes for this topic (IIED, 1998). They also published a new resource book on this topic (c.f. GUIJT, 1998).

[159] Also PREUSS (1994, 227) highlights the problem that local staff of developing countries with the abilities to use participatory methods are not available in sufficient numbers. Besides education strategies that will lead to improvements in the medium term, he points out the need for donors to finance more experts to fill the gap until the local capacities are developed adequately.

limited, a reasonable assumption would be to allow at least another equally long period to ensure a sound institutionalisation within the Ministry.

7.3 Ways to improve the organisation and performance of the Ministry

The two workshops on linkages and information flow in the Ministry showed that a number of problems existed in this area. Co-ordination problems between all divisions of MAFF relating to all functions of a knowledge system in the development and diffusion of innovations were identified. The Ministry hierarchy was seen as an impediment to the direct information exchange between divisions. The strategy of promoting participatory methods and encouraging informal linkages between staff of all divisions to solve these problems, achieved only limited progress.

The main overall problem that hampered the performance of the Ministry was identified in the low level of formal staff qualifications. In all divisions, in particular extension, the majority of staff, including senior positions, only held the technical diploma of FCA. Thus, their staff are largely under-qualified for the tasks they have to perform.

The financial situation of the Ministry was relatively stable. The research division managed to expand its budget, while the extension division was exposed to strong fluctuations in its budget. Assisted through project funding, the facilities and equipment of the Ministry were sufficient and in good condition. Altogether finances, facilities and equipment could not be rated as major limiting factors for the output of the Ministry.

The research division's mission statement and its priorities were largely influenced by periodic ISNAR reviews. Extension lacked a clear mission and goals, and their priorities were perceived as determined through Government policies. Actual farmers' problems only played a minor role in the priority setting for both divisions. At the beginning of the research phase, methodologies used at research consisted mainly of traditional on-station research. Donor intervention led to the introduction of more on-farm research and participatory field tools. In the same period, working approaches at extension developed from a strict transfer of technology thinking similar to the T&V system to a somewhat more farmer oriented approach. However, at the end of the research phase these new methods were only partly institutionalised within both divisions.

The analysis of information usage showed that researchers make too little use of available international literature. Extension staff largely relies on experience only, as little relevant information is published locally. They equally search too little for relevant new information. As practically all staff come from FCA, they have a very similar knowledge base and could be rated as generalists. Even between divisions, staff do not have well specialised own knowledge profiles (e.g. plant breeder, entomologist, crop specialist). As the differences in knowledge between staff are limited, less knowledge can be shared in working activities. This also reduces the potential output of interdisciplinary working teams.

These findings lead to a number of recommendations to improve the above situation:

Organisational reorganisation

As the strategy to improve linkages by promoting participatory methods and informal linkages between staff showed no satisfactory improvement, a strong linkage unit appears necessary. The main functions of such a unit were already discussed in chapter 6.1.2. Some additional aspects shall be discussed here. To enable good co-ordination and a better information flow, it would be best to attach the unit to middle management level. The unit would link the various divisions (RD, ED, EP&S, TC&S) on this level. Staff could be seconded from each division and the position of the head of division could rotate between the divisions. This should ensure better co-ordination between all divisions rather than creating a new completely independent section or attaching it to only one of the main divisions. The exact role and decision power of the unit would need to be negotiated in detail between the various divisions.

To fulfil its function as a new information hub for all innovations and diffusion relevant information, it would be useful if the unit could assist in the documentation of appropriate information. The training course in participatory methods showed that staff at extension and research had considerable difficulties in report writing. A service to assist in the documentation of findings could thus contribute significantly in increasing the output of relevant information. For this purpose, the Ministry could recruit a number of journalists. With the help of professional journalists, the area of documentation relevant information could become much more effective[160].

Strategies for further education

Addressing the problem of the low level of staff qualifications in the Ministry will require a comprehensive strategy. In the short run, no major improvements appear realistic. In service training could be an instrument to improve matters. However, this area would also require external assistance. During a transition period, the Ministry would require additional external support to be able to offer up to date training programs. When focusing on training measures, emphasis on 'learning how to learn', should be placed. Staff need to learn how to access new information and develop routines for keeping it up to date. Job promotion procedures in the Ministry should include the candidate's track record in further education as important criteria.

In addition, staff should be given every opportunity to participate in further high school education programs, either locally or overseas. In the medium term, staff recruitment strategies may help to raise qualifications. As mentioned earlier in respect of participatory methods, the curricula of FCA and USP could be reviewed to ensure that the needs of the Ministry would be better met.

Competence build-up

Practice and training should ensure that the level of competence reached in using participatory research and extension methods, would be consolidated. In addition to a good methodological toolbox, staff require a sharper knowledge profile. Specialisation of

[160] In the short term, this could probably increase the output of information much faster than waiting for the build up of report writing skills in the divisions. In the medium to long term, journalists could also assist in training writing skills.

staff in specific areas should be encouraged. This should broaden the knowledge base in the divisions, and enlarge the pool of potential solutions to farmers' problems.

Further education and recruitment strategies should also attempt to widen the overall competence of the Ministry. Succeeding in the global market will require more economic competence, both in terms of farm economics as well as in business and political economy to be better prepared to promote agricultural trade. Thus, recruitment strategies should consider more students from the field of social sciences to enhance the competence of the Ministry in this field.

7.4 The potential role of platforms in the AKIS

The analysis of the Fiji AKIS showed that a number of small structures or networks existed, that could be perceived as platforms. Common elements of these platforms were joint goals and funding sources. The majority of platforms were donor-funded projects. Goals for these platforms were determined between donors and the Ministry[161]. Other existing platforms were commodity boards. These cases indicated that the concept of platforms was not completely new to Fiji. Experiences with 'networking' exist, which could be used for a further expansion of the approach.

The case studies investigated showed that the newer projects using participatory methods were successful in developing innovations, and as yet, also partly successful in the diffusion of these innovations. In this respect, these donor funded platforms assisted to increase the overall output of the Fiji AKIS in terms of useful innovations.

An important component for platform success was identified in a sound monitoring system. The most successful case study had a good monitoring system, while all other cases had shortcomings in this area. This finding supports the model of knowledge system functions that highlights the central role of monitoring, storage and retrieval of relevant information for innovation development and diffusion.

To which extent platforms can be sustainable after donor funding is terminated, remained an open question. Commodity boards were cases that managed to build up self funding sources through the export trade. Similar, in the case of the 'pineapple platform', a co-operative was set up that could generate sufficient self funding. However, in particular for less commercial innovations, platform funding is likely to require Government or donor funds exclusively.

Platform leadership and co-ordination could be identified as another important factor for platform success. The most successful platform was characterised by balanced contribution and participation of all actors. Including all relevant actors in the platform, also proved important . The question which actors qualified best for actor leadership was difficult to answer. In all case studies, experts played the leading role. Capacities of research and extension staff are probably still too weak, although these expressed self-confidence to resume full responsible platform leadership. Certainly, some potential

[161] Feasibility studies and logical framework workshops played an important role in the planning stage of projects, as more participatory means to determine goals and funding of projects.

among individuals is there, and the progress made during the training course on participatory methods, demonstrated to MAFF that staff could improve considerably if exposed to the right challenges. Private sector actors already play an important leadership role in commodity boards for ginger and taro. However, to further promote platforms, expert assistance will still be required for some time.

Responses to the follow-up questionnaire identified better co-ordination, improved linkages, better interplay of actors, better means to reach goals, reduced duplication and better use of resources, as the strengths of the platform model. Furthermore, it was supposed that platforms might have a positive influence on status, morale and performance by rewarding competence and output rather than length of service. Some of the strengths were also seen as potential weaknesses. Co-ordination and reaching of consensus was rated as potentially difficult to achieve or time consuming. Too much flexibility was seen as a danger to co-ordination. The fact that platforms might weaken the hierarchical authority and therefore might be resisted within the Ministry was seen as a risk. Another important weaknesses was seen in the need for strong leadership, and the fact that experienced and trained staff are not available in abundance in the Ministry.

Platforms as driving forces for innovations

The analysis of case studies and the follow-up questionnaire findings, indicated that platforms have the potential to provide a good organisational frame to promote innovations. In chapter 6.4.6, a model was developed to show how platforms could be linked to the Ministry, and how these could be further tested and introduced into the Ministry. These recommendations could be implemented and do not require further comments. Instead, focus will be on the requirements of MAFF's management.

Management implications

During the linkage and information flow workshops, and again at the end of the research phase in the follow-up questionnaire, the MAFF structure and hierarchy was seen as a major hindrance in effective organisational output. To solve complex problems and steer innovation and diffusion processes, such a structure is not appropriate. Modern organisational management theories[162] developed in industrial countries, suggest 'organic structures' to enable innovative problem solving work. The ideal features of such an organisation are characterised by the following:

- Instead of a stiff hierarchy with strong formalisation of behaviour and a distribution of competencies according to formal qualification of staff, a structure with little formalisation of behaviour is required. Co-ordination is achieved through joint harmonising and not by standardisation of procedures. Therefore, in all functional units, 'managers' are required to ensure moderation, maintenance of human relations, and to lead necessary negotiations with other groups inside or outside the organisation.

[162] In this context, MINTZBERG (1992) is an important representative. He calls the configuration that will be described further down as 'ad-hocraty', as it is able to bring together experts from different disciplines in ad-hoc projects (MINTZBERG 1992, 336). Such functional working groups are also suggested by various authors in the context of agricultural innovation development (cf. LÜHE 1996, 242; PREUSS 1994, 224). Such functional working groups are similar to the concept of platforms. The advantage of platforms is that they explicitly point to the possibilities of including actors from outside their own organisation as well.

Executives in the classical sense of organisational theory are no longer required (cf. LÜHE 1996, 242).

- Procedures for planning, implementation and controlling are adapted in a continuous process to the requirements of the organisation and the environment. Due to the dynamic environment, conflicting goals and priorities inside the organisation, the organisation is subjected to a process of continuous adaptation. In organisations that develop innovations, organisational charts are often outdated, as soon as they are printed (MINTZBERG 1992, 338).
- Strategy development does not occur at one single time or at pre-determined times at the top of the organisation. Strategy development is a continuous process, iterative, encompassing all levels of the organisation. The reason may be understood easily: if it is the central task of the organisation to develop innovations, the results of such developments can never be determined in advance. Therefore, the organisation can not develop a strategy, a consistent pattern for decisions, before the organisation actually takes these decisions. At best, such patterns will be available as a result of these specific decisions (MINTZBERG 1992, 348).
- Knowledge and qualification of staff are only the basis for a search for innovations that must be done in collaboration with farmers to identify solutions to existing problems. The assumption of classical organisational theories, that the knowledge and skills of staff represent per se the solution to problems as soon as they are applied, is not valid in this context. Research and extension organisations' findings have to be adapted case by case, depending on the specific needs of the situation (LÜHE 1996, 242).

These ideal features could provide a guiding direction for the necessary reorientation of management at the Ministry. Platforms could be the right means to start experiments with such new management concepts. Without abandoning the existing structure, platforms could enable learning processes, and provide the opportunity for a gradual reorientation of the whole organisation towards the above ideal.

Private sector co-operation

Platforms could also be the right means to build up links with the private sector. At present, the Ministry with its slow bureaucratic structure, does not yet appear as a very attractive partner. The existence of a platform structure with flexible funds could change this impression. In addition, if the Ministry engages in the suggested qualification programme of its staff it should become a more competent actor, and joint ventures with the private sector are likely to become more frequent. In this context, a wider understanding of innovation is important for the Ministry. At present, the research and extension divisions in particular are too limited in the rather classical agricultural domains of crop and livestock production. The socio economic areas (e.g. marketing innovations, new types of co-operation, processing of foodstuffs and other agricultural resources) are by far underdeveloped. In these areas in particular, innovations may be developed and promoted in much shorter time than in the traditional agricultural domains. To improve the output of innovations, a shift in this direction is required. To achieve this, MAFF should try to attract foreign investments for Fiji's agriculture. This could include a policy of active advertisements in the surrounding large economies (e.g. Australia, New Zealand, Japan, US, Canada) to attract potential investors. In times of stagnating donor support, good links to private investors gain in importance.

Regional networking

Networking in platforms should not be seen limited to available national actors. What was said earlier under the topic, 'increasing the borrowing capacity' of the AKIS, could in fact, be networking activities. Closer co-operation with the small island countries in the region (regional platforms) could help in exchanging ideas, and also reduce costs, for example, of joint research efforts. But besides the Pacific, networking with other island countries with similar conditions (Caribbean) could also be rewarding. Of particular interest should be increased networking with Mauritius. This island country was also very dependent on sugar exports, but managed to diversify its agricultural sector significantly. With the rapid expansion of the Internet, local, regional and international networking has been facilitated tremendously. Providing good Internet access for staff should thus be an important goal for the Ministry.

Implications for donors

The results of examining donor assistance in Fiji agriculture, have been mixed. The progress made towards institutionalising participatory methods, and the case studies described in this study illustrated this case. The rather limited overall success to date, may be felt as discouragement for donors. In this respect, more patience is required. Progress in the right direction was made, and sufficient time should be given for things to develop.

The overall trend, in particular of German technical co-operation to reduce the number of experts in projects, is certainly, in Fiji's case, the wrong policy. The weak local capacities will, on the contrary, require sound human resource development that needs more, rather than less personal assistance. Another general trend in donor funding is the focus on the state of infrastructure and the supply of equipment. The study showed that this was no major constraint at MAFF. Promoting participatory methodologies will, however, require an increase in operational funds to enable more mobility in fieldwork and better co-operation with target groups. Fiji faces an arduous phase of structural adjustment and diversification in the agricultural sector. The country will require further assistance along this difficult path.

7.5 Fields for further research

The outcomes of participatory action research could be called 'intermediate' results. The term intermediate is used as the results could be used to provide the basis for further improvement in new research cycles. This is equally true of this study. At several points already, recommendations for further research were given.

This refers to the question of appropriate farm classification criteria for Fiji. The further process of introducing platforms, with the questions of platform leadership and platform sustainability, could be accompanied by a scientific follow-up.

To convince stakeholders in Governments and development organisations, and also researchers and extensionists about the advantages of participatory methods and new management concepts, more empirical research will be necessary to prove the superiority of the approaches (e.g. field successes, cost effectiveness). In this respect an important field for future research is the question, how the results of participatory technology

development that were developed with a rather small group of farmers, can be scaled-up and passed on to a larger group of farmers.

Current findings with participatory methods indicate that the solutions developed are rather small-scale and localised. But that may be one immanent principle of sustainable development, the search for many small local successes, rather than the one big overall push.

8 Summaries

8.1 English summary

Problem

The agricultural sector in Fiji is heavily focused on sugar cane production which constitutes more than 90 % of its agricultural exports. The effects of globalisation are forcing the country to restructure sugar production and diversify agricultural production. Past attempts to diversify agricultural production have not been very successful. A major reason is the very limited output of feasible innovations by the Ministry of Agriculture. Limited adaptation of innovations to the agro- ecological and socio economic conditions of farmers, their specific needs and problems are major reasons for the past failures of diffusion.

Research objective

The objective of this study was to identify the main constraints of the Ministry of Agriculture for the limited output of innovations and the failure to diffuse innovations to farmers successfully. The research was split into four main lines of inquiry: 1. identification of ways to make farming problems the subject of agricultural innovation development, 2. identification of constraints for an efficient service of agricultural research and extension to farmers, 3. analysis of the potential role for participatory methods in such a system for innovation development, diffusion and adoption, and 4. assessment of how the major actors involved in innovation, diffusion and adoption may be best integrated in a system to improve performance.

Theoretical framework and methodology

Considering the complexity of the research objectives, a flexible and explorative research approach was necessary. Therefore, a participatory action research (PAR) methodology was applied. The cyclical progress of PAR, with the steps of planning, implementation, monitoring and evaluation, allowed a step-by-step learning and reflection process. The research process started with a workshop to analyse the problems and linkages between all major actors in the innovation development and diffusion process. The workshop revealed a lack of co-operation and participatory field methodologies. To address this problem the researcher conducted a training course in participatory methods for Ministry staff of all relevant divisions. The fieldwork of the training included three RRA/PRA surveys to investigate farmers' problems and categorise existing farming systems. In total, 148 male and female farmers as individuals or in groups were consulted in the process. Participatory observation during the work with the different divisions, personal interviews and the study of internal documents, reports and publications, provided the basis for the in depth analysis of the core actors research and extension. This was complemented by the findings of a formal questionnaire distributed two years later to 35 Ministry staff and a panel of six experts working in donor funded projects. Four project case studies were used to explore the process of innovation development and diffusion, and derive conclusions on the best organisational configurations to enable efficient co-operation. The questionnaire findings were further used to assess the impact and degree of institutionalisation of participatory methodologies within the Ministry, and to assess the potential that platforms could play in co-ordinating the process of innovation development and diffusion.

Results and conclusions

Despite the small size of the country, the mountainous topography creates a wide range of agro-ecological zones. Together with the multi-ethnic composition of the population, this leads to a strong diversity of farming systems. To structure farming problems, a draft farm classification system that distinguishes two agro-ecological zones (upland and lowland), and two types of progressiveness of farmers (average and advanced) was elaborated. The analysis of actual farmers' problems revealed that unlike many other developing countries, Fijian farmers do not have major problems sustaining their livelihood. Problems raised were of very diverse nature and difficult to structure. Participatory tools proved very suitable in assessing farmers' problems. The findings were used to elaborate a model for a systematic problem and solution identification process. The information collected at a farmers' level is compiled on a national level, and in this process, compared with international available solutions. A national Council including all relevant actors is suggested to determine tentative extension and research priorities that are then once more discussed with farmers to determine concrete action.

Participatory methods as tools to bridge the interface between farmers, researchers and extensionists, proved very useful. The methods permitted to address information deficiency problems quickly, further provided good learning opportunities for all parties involved. Sufficient time and practice were required before participatory methods were fully mastered. The training course revealed the following strengths of the trainees: organising surveys, field use of tools, presentation and visualisation of findings. Conceptual thinking, analytical skills, interpretation and report writing skills were identified as weaknesses. Using participatory methods required a high level of these more conceptual abilities. The main reason being that participatory methods focus on problem solving, which requires the ability to adopt and modify tools. Consequently, this limits the scope for standardising procedures.

Repeated practice using the tools also leads to better learning success. Thus, creating practice opportunities, is an important factor in consolidating training efforts.

Examining linkages and information flow in the Ministry revealed co-ordination problems between all divisions of MAFF relating to all functions of a knowledge system. The Ministry hierarchy was seen as an impediment to the direct information exchange between divisions. The strategy to promote participatory methods and encourage informal linkages between staff of all divisions to overcome these problems, achieved only limited progress. The main overall problem that hampered the performance of the Ministry was identified in the low level of formal staff qualifications. In all divisions, in particular extension, the majority of staff, including those in senior positions, held only a simple technical diploma. The Ministry should attempt to provide better opportunities for on-the-job training and incentives to participate in formal further education programmes to raise qualification levels. In the short to medium term external expert assistance will be necessary to further promote the build-up of competence.

The financial situation of the Ministry was rather stable. Finances, facilities and equipment could not be rated as major limiting factors for the output of the Ministry. The research division's mission statement and its priorities were largely influenced by international assistance provided by periodic ISNAR reviews. The extension division lacked a clear mission and set of goals. Farmers' problems only played a minor role in the priority

setting for both divisions. At the beginning of the research phase, methodologies used at the research division consisted mainly of traditional on-station research, and the extension division used an approach similar to the T&V system. Donor intervention led to the introduction of more on-farm research and participatory field tools, and a more farmer-orientated approach of extension. However, at the end of the research phase these new methods were only partly institutionalised within both divisions. Therefore, the creation of a linkage unit to assist information exchange and co-ordination, and consolidate the introduction of participatory methods in the Ministry, is recommended.

The analysis of the Fiji AKIS showed that a number of small structures or networks existed that could be perceived as platforms. The majority of platforms were donor-funded projects or commodity boards. These experiences with 'networking' should be further consolidated. The case studies investigated, showed that the newer projects using participatory methods were successful in developing innovations, and as yet, also partly successful in the extension of these innovations. In this respect these donor funded platforms assisted to increase the overall output of the Fiji AKIS in terms of useful innovations. An important component for platform success was identified in a sound monitoring system. To which extent platforms could be sustainable after donor funding is terminated, remained an open question. Commodity boards were cases that managed to build up self funding sources through the export trade. However, in particular for less commercial innovations, platform funding requires Government or donor support. Platform leadership and co-ordination could be identified as important factors for platform success. The most successful platform was characterised by a balanced contribution and participation of all actors involved. The question, 'which actors qualified best for actor leadership', remained open. In all case studies experts played a leading role. Capacities of research and extension staff to take over this role were still weak. Strengths of the platform model were identified as such: better co-ordination, improved linkages, better interplay of actors, better means to reach goals, reduced duplication of efforts, and better use of resources. Weaknesses were seen in the need to achieve consensus and co-ordination, the weakening of hierarchical authority due to increased flexibility, and the fact that experienced-trained staff were not available in abundance in the Ministry.

The findings underlined that platforms could be suitable means to improve the process of innovation development and diffusion. The Ministry should support the creation of platforms that could be linked to the Ministry via a linkage unit enabling at the same time better co-ordination of overall resources. To promote platforms in the medium to long term, further donor and expert assistance will be required.

8.2 Deutsche Zusammenfassung

Problemstellung

Die Landwirtschaft in Fidschi ist sehr einseitig auf die Erzeugung von Zuckerrohr ausgerichtet. Der Zuckersektor erwirtschaftet 90% der landwirtschaftlichen Exporterlöse. Die zunehmende Globalisierung zwingt das Land, den Zuckersektor neu zu strukturieren und die landwirtschaftliche Produktion zu diversifizieren. Die bisherigen Anstrengungen zur Diversifizierung der Landwirtschaft waren wenig erfolgreich. Ein wesentlicher Grund dafür liegt in dem sehr geringen Angebot an praxistauglichen landwirtschaftlichen Inno-

vationen. Die Innovationen schlugen hauptsächlich deswegen fehl, weil sie nur mangelhaft an die örtlichen agrarökologischen sowie sozioökonomischen Rahmenbedingungen angepasst waren und die Probleme und Potentiale der Bauern nur unzureichend berücksichtigten.

Zielsetzung

Ziel der Studie war es zu untersuchen, welche Faktoren von Seiten des Landwirtschaftsministeriums die Entwicklung von Innovationen und deren Verbreitung zu den Bauern, begrenzen. Dabei gliederte sich die Forschungsarbeit in vier wesentliche Themenbereiche: 1. Entwicklung eines Ansatzes, der die Probleme der landwirtschaftlichen Betriebe zum Gegenstand der landwirtschaftlichen Innovationsentwicklung macht; 2. Analyse der wesentlichen Hemmnisse für eine effiziente Dienstleistung der Forschungs- und Beratungsdienste für die landwirtschaftlichen Betriebe, 3. Analyse, welche Rolle partizipative Methoden in dem System von Innovationsentwicklung, Verbreitung und Neuerungsübernahme spielen können; und 4. Untersuchung, wie die Hauptakteure in diesem Umfeld besser kooperieren können, um die Effizienz des Gesamtsystems zu erhöhen.

Methoden

Angesichts der Komplexität der Forschungsziele war ein flexibler und explorativer Forschungsansatz notwendig. Aus diesem Grund wurde ein partizipativer Aktionsforschungsansatz gewählt. Die zyklische Vorgehensweise der partizipativen Aktionsforschung mit den Schritten Planung, Durchführung, Reflexion und Evaluierung ermöglichte einen schrittweisen Lern- und Verbesserungsprozess. Zu Beginn der Forschungen wurden die Probleme der verschiedenen beteiligten Akteure und ihre Form der Zusammenarbeit mittels eines Workshops analysiert. Es zeigten sich Defizite in der Zusammenarbeit der Akteure und der Anwendung partizipativer Feldmethoden. Als Konsequenz wurde ein Weiterbildungskurs in partizipativen Methoden für Mitarbeiter des Landwirtschaftsministeriums durchgeführt. Als praktische Übungen beinhaltete der Kurs drei Felderhebungen mit partizipativen Methoden (RRA, PRA), die gleichzeitig der Analyse und dem Verständnis der Probleme der Bauern dienten. Während der Erhebungen wurde mit insgesamt 148 Bäuerinnen und Bauern, zum Teil in Einzelinterviews und/oder in Gruppenübungen, zusammengearbeitet.

Teilnehmende Beobachtung während der Arbeit mit den verschiedenen Abteilungen im Landwirtschaftsministerium, persönliche Gespräche sowie das Studium interner Dokumente, des Berichtswesen sowie von Evaluierungsberichten und Veröffentlichungen bildeten die Grundlage der Analyse der Hauptakteure Forschung und Beratung. Ergänzend wurden 2 Jahre später insgesamt 35 Mitarbeiter des Landwirtschaftsministeriums sowie 6 in landwirtschaftlichen Projekten arbeitende externe Experten mit Hilfe eines standardisierten Fragebogens befragt. Neben der Analyse der Arbeitsmethodik der verschiedenen Akteure diente der Fragebogen vor allem einer Bewertung des Erfolgs der Trainingsmaßnahmen in partizipativen Methoden und der Frage, in welchem Maße diese innerhalb des Ministeriums institutionalisiert wurden. Darüber hinaus wurde der Prozess der Innovationsentwicklung und Neuerungsübernahme anhand von 4 Entwicklungsprojekten als Fallbeispiele untersucht.

Ergebnisse und Schlussfolgerungen

Obwohl Fidschi geographisch sehr klein ist, besteht das Land vor allem wegen seiner bergreichen Topographie aus einer Vielzahl von agrarökologischen Zonen. Zusammen mit der multi-ethnischen Bevölkerung (u.a. Ureinwohner, Inder, Chinesen, Europäer) führt dies zu unterschiedlichsten landwirtschaftlichen Betriebsformen. Um die Probleme der Bauern zu strukturieren, wurde eine vorläufige Betriebsklassifikation erarbeitet. Diese unterscheidet zwei Anbauregionen (Hoch- u. Tiefland) sowie zwei Arten der Betriebsführung (durchschnittlich und fortgeschritten). Die Auswertung der bäuerlichen Probleme zeigte, dass auf Fidschi, im Gegensatz zu vielen anderen Entwicklungsländern, die Bauern keine größeren Schwierigkeiten haben, ihren Lebensunterhalt zu bestreiten. Mit Hilfe der Ergebnisse konnte ein Modell zur systematischen Identifikation von Problemen und möglichen Lösungen erarbeitet werden. Die mittels partizipativer Methoden auf bäuerlicher Ebene gesammelten Informationen werden auf nationaler Ebene zusammengefasst und anschließend mit international zugänglichen Lösungen verglichen. Ein nationales Gremium, welches sich aus allen wichtigen Akteuren zusammensetzt, hat dann die Aufgabe, Vorschläge zu Beratungs- und Forschungsprioritäten zu erarbeiten. Diese werden in einem weiteren Schritt erneut mit den Bauern diskutiert, um abschließend konkrete Prioritäten festzulegen.

Partizipative Methoden erwiesen sich als sehr hilfreich, um die Kommunikation zwischen Forschern, Bauern und Beratern zu verbessern. Die Methoden erlaubten es, Informationsprobleme und Lücken schnell aufzuzeigen, und boten ferner gute Lernmöglichkeiten für alle Beteiligten. Genügend Zeit und Übungen waren notwendige Voraussetzungen, damit partizipative Methoden von lokalen Mitarbeitern des Landwirtschaftsministeriums richtig beherrscht wurden. Der Trainingskurs zeigte folgende Stärken der lokalen Mitarbeiter auf: Organisieren von Untersuchungen, Anwendung partizipativer Methoden im Feld, praktische Implementierung, Visualisierung und Präsentation von Untersuchungsergebnissen. Schwachpunkte wurden hingegen in folgenden Bereichen festgestellt: konzeptionelles Denken, Interpretation und Auswertung der Daten sowie der schriftlichen Abfassung von Ergebnissen. Die Anwendung von partizipativen Methoden verlangt aber ein hohes Maß gerade an diesen konzeptionellen Fähigkeiten. Partizipative Methoden verlieren erheblich an Problemlösungspotential, wenn sie nur standardisiert eingesetzt werden. Um partizipative Methoden deshalb optimal nutzen zu können, müssen die Methoden nicht nur angewandt, sondern auch angepasst und verändert werden können. Das wiederholte Üben der Methoden führte bei den Kursteilnehmern zu einer ständigen Verbesserung des Lernerfolgs. Daher wird die weitere Förderung des praktischen Einsatzes partizipativer Methoden im Arbeitsalltag des Ministeriums ein wichtiger Faktor zur Vertiefung und Festigung der Schulungsmaßnahmen sein.

Untersuchungen der Verbindungen und Schnittstellen sowie des Informationsflusses im Ministerium zeigten Koordinierungsprobleme zwischen allen Abteilungen des Ministeriums. Probleme traten in Bezug auf alle Funktionen, die zur Entwicklung und Verbreitung von Innovationen notwendig sind, auf. Die bestehende Hierarchie des Ministeriums erwies sich als hemmend für den direkten Informationsaustausch zwischen den Abteilungen. Die Erwartung, dass partizipative Methoden die informellen Kontakte zwischen den Abteilungen und somit den Informationsfluss im Ministerium verbessern könnten, hat sich nur teilweise als richtig erwiesen. Als eine Hauptursache für die geringe Leistungsfähigkeit des Ministeriums konnte der niedrige Ausbildungsstand der

Mitarbeiter identifiziert werden. In allen Abteilungen, insbesondere in der landwirtschaftlichen Beratung, besaß die Mehrzahl der Mitarbeiter, gehobene Positionen inbegriffen, nur einfache technische Diplome (unterhalb des deutschen Fachhochschulabschlusses). Das Ministerium sollte zukünftig versuchen, bessere Möglichkeiten für arbeitsbegleitende Weiterbildungsmaßnahmen zu schaffen. Darüber hinaus sollte die Weiterqualifikation der Mitarbeiter und der Erwerb von Hochschulabschlüssen über Stipendien gefördert werden. Kurz- und mittelfristig werden ausländische Experten zur Weiterbildung und zur Kompetenzsteigerung der Mitarbeiter des Ministeriums dringend notwendig sein.

Die finanzielle Situation des Ministeriums erwies sich als stabil. Das Budget und das technische Ausstattungsniveau der Behörde stellten keine wesentlichen Engpässe dar. Lediglich die Beratungsabteilung litt unter starken Budgetschwankungen.

Die Aufgabenstellung der Forschungsabteilung und ihre Themenschwerpunkte waren maßgeblich von internationalen ISNAR-Studien beeinflusst. Die Beratungsabteilung verfügte über keine klaren Aufgabenstellungen und Zielsetzungen. Die Probleme der Bauern spielten nur eine geringe Rolle auf der Prioritätenliste beider Abteilungen. Zu Beginn der Untersuchungen arbeitete die Forschungsabteilung fast ausschließlich auf Forschungsstationen. Die Beratung war stark an dem T&V System ausgerichtet. Die Projekte verschiedener Geldgeberorganisationen führten zur Förderung partizipativer Forschungs- und Beratungsmethoden. Am Ende der Forschungsphase waren diese neuen Methoden jedoch nur teilweise in beiden Abteilungen institutionell verankert. Aus diesem Grund wird die Bildung einer Stelle, die die Verbindung insbesondere zwischen Forschung und Beratung und die weitere Verbreitung partizipativen Methoden fördern soll, empfohlen.

Die Analyse des landwirtschaftlichen Wissenssystems in Fidschi zeigte eine Reihe von bereits existierenden Netzwerken oder ähnlichen Strukturen, die als Plattform im Sinne des Plattformmodells angesehen werden konnten. Die Mehrzahl dieser ‚Plattformen' waren Projekte der Entwicklungszusammenarbeit oder Handelsgenossenschaften zur Vermarktung von Exportkulturen. Die Erfahrungen mit diesen Plattformen sollten weiter gefördert werden. Die untersuchten Fallbeispiele zeigten, dass diejenigen Projekte, welche partizipative Methoden anwandten, sehr erfolgreich in der Entwicklung von Innovationen waren. Bei der Verbreitung der Innovationen waren die Erfolge der Projekte jedoch unterschiedlicher. Insgesamt haben die geförderten Projekte oder Plattformen dazu beigetragen, die Effizienz des landwirtschaftlichen Wissenssystems in Fidschi, gemessen an der Verfügbarkeit angepasster Innovationen, zu erhöhen. Als ein wichtiger Faktor für den Erfolg der Plattformen konnte die Nutzung von Monitoring Systemen festgestellt werden. Handelsgenossenschaften als Plattformen konnten durch Exportgeschäfte ihre Eigenfinanzierung sichern. Für weniger kommerzielle Innovationen zum Beispiel für Subsistenzkulturen benötigen Plattformen aber die Unterstützung der Regierung oder andere Geldgeber. Gezielte Führung und Koordination von Plattformen konnten als wichtige Faktoren für deren Erfolg identifiziert werden. Von den vier untersuchten Fallbeispielen zeichnete sich die erfolgreichste Plattform durch eine ausgewogene Beteiligung aller Akteure aus. Die Frage, welche Akteure am besten für die Führung und Koordination von Plattformen geeignet wären, konnte nicht eindeutig geklärt werden. In allen Fallbeispielen spielten Experten eine führende Rolle. Die Kompetenz der Mitarbeiter der Forschungs- und Beratungsabteilungen, diese Aufgabe zu erfüllen, erschien als zu gering. Abschließend konnten folgende Punkte als Stärken des

Plattformmodells festgehalten werden: bessere Koordination, verbesserte Verbindungen und Schnittstellen, bessere Zusammenarbeit aller Akteure, bessere Aussichten gesetzte Ziele zu erreichen, Vermeidung von Doppelforschung und eine effiziente Ausnutzung der vorhandenen Ressourcen. Schwächen oder mögliche Schwierigkeiten für die Umsetzung des Modells wurden in folgenden Punkten gesehen: Probleme bei der Konsenserzielung, die Schwächung der bestehenden hierarchischen Strukturen durch die gesteigerte Flexibilität und die Tatsache, dass gut ausgebildete Fachkräfte dem Ministerium nicht im benötigten Maße zur Verfügung stehen.

Die Ergebnisse zeigen, dass Plattformen zu einer Verbesserung von Innovationsentwicklung und -verbreitung beitragen können. Das Ministerium sollte die Bildung von Plattformen fördern. Dabei könnte die Verbindungsstelle zwischen Forschungs- und Beratungsabteilung eine Schlüsselstellung als Koordinationsplattform übernehmen. Dies würde auch eine bessere Verteilung aller Ressourcen sicherstellen. Um Plattformen mittel- u. langfristig im Ministerium zu fördern, werden weiterhin Projektmittel und entsandte Fachkräfte notwendig sein.

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10 Annex

Annex 1: Daily labour activity profile for farmers in an upland settlement

Activity	Group	Mon.	Tue.	Wed.	Thur.	Fri.	Sat.	Sun.	Av. per day	Total per week	Total per year
Farming	Average 1	0	7	7	7	7	2	0	4.3	30	1500
	Average 2	6	6	6	6	6	2	0	4.6	32	1600
	Advanced	6	6	6	6	6	1	1	4.6	32	1600
	Women	2	4	5	5	3	3	0	3.1	22	1100
Household	Average 1	1	1	1	1	1	1	1	1.0	7	350
	Average 2	1	1	1	1	1	3	3	1.6	11	550
	Advanced	2	2	2	2	2	1	0	1.6	11	550
	Women	2	4	5	5	4	4	4	4.0	28	1400
Meals	Average 1	3	3	3	3	3	3	3	3.0	21	1050
	Average 2	3	3	3	3	3	3	4	3.1	22	1100
	Advanced	2	2	2	2	2	2	3	2.1	15	750
	Women	3	2	2	2	2	2	4	2.4	17	850
Relaxing	Average 1	3	2	2	2	2	2	7	2.9	20	1000
	Average 2	2	2	2	2	2	2	6	2.6	18	900
	Advanced	2	2	2	2	2	2	6	2.6	18	900
	Women	2	1	2	1	3	1	4	2.0	14	700
Marketing	Average 1	0	0	1	0	1	0	1	0.4	3	150
	Average 2	0	0	0	0	0	0	0	0.0	0	0
	Advanced	0	0	0	0	0	0	0	0.0	0	0
	Women	1	1	1	1	2	0	0	0.9	6	300
Shopping	Average 1	0	0	0	0	0	5	0	0.7	5	250
	Average 2	0	0	0	0	0	2	0	0.3	2	100
	Advanced	0	0	0	0	0	4	0	0.6	4	200
	Women	1	4	0	1	1	5	0	1.7	12	600
Religious	Average 1	1	1	1	1	1	1	3	1.3	9	450
	Average 2	1	1	1	1	1	1	3	1.3	9	450
	Advanced	0	0	0	0	0	0	5	0.7	5	250
	Women	1	1	1	1	1	1	3	1.3	9	450
Communal	Average 1	9	0	0	0	0	0	0	1.3	9	450
	Average 2	1	1	1	1	1	0	0	0.7	5	250
	Advanced	3	3	3	3	3	0	0	2.1	15	750
	Women	1	0	0	0	1	1	0	0.4	3	150
Education	Average 1	0	0	1	0	0	1	2	0.6	4	200
	Average 2	1	1	1	1	1	0	0	0.7	5	250
	Advanced	0	0	0	0	0	0	0	0.0	0	0
	Women	1	1	1	1	1	0	1	0.9	6	300
Sleeping	Average 1	7	9	7	9	8	6	7	7.6	53	2650
	Average 2	6	6	6	6	6	6	8	6.3	44	2200
	Advanced	8	8	8	9	8	8	9	8.3	58	2900
	Women	8	6	6	6	5	5	8	6.3	44	2200
Wild food	Average 1	0	0	0	0	0	2	0	0.3	2	100
	Average 2	3	3	3	3	3	3	5	3.3	23	1150
	Advanced	1	1	1	1	1	6	0	1.6	11	550
	Women	2	0	1	1	1	2	0	1.0	7	350

Annex 2: Development of production for major crop enterprises

Year		1976	1978	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1998
Sugar cane	ha	47 000	54 519	62 284	65 639	65 888	69 178	59 171	68 575	70 506	70 066	66 493	63 864	70 496	70 000	72 000	72 000	74 000	74 000	
	1000 t	2211	2849	4058	3360	3931	4074	2202	4289	3042	4109	2960	3185	4099	4016	3380	3533	3704	4064	
	t / ha	47.0	52.3	65.2	51.2	59.7	58.9	37.2	62.5	43.1	58.6	44.5	49.9	58.1	57.4	46.9	49.1	50.1	54.9	
Coconut[1]	ha	65 400	65 289	65 233	65 178	65 123	65 067	65 012	64 957	64 901	64 846	64 791	64 736	64 681	64 626	64 571	64 516	64 461	64 450	
	1000 t	26.69	26.31	21.82	22.84	20.56	22.13	23.59	24.66	21.23	22.02	13.09	10.73	13.36	19.00	15.19	16.04	10.23	8.40	16.52
	t / ha	0.41	0.40	0.33	0.35	0.32	0.34	0.36	0.38	0.33	0.34	0.20	0.17	0.21	0.29	0.24	0.25	0.16	0.13	
Rice	ha	9 011	8 824	9 371	9 008	8 185	9 554	8 924	10 442	11 653	11 416	12 227	13 401	13 147	12 112	12 337	10 441	9 459	7 865	2 892
	1000 t	20.26	16.10	18.71	17.84	16.97	20.30	16.16	22.24	27.57	24.21	23.48	32.15	31.82	26.47	29.03	22.47	22.28	18.02	5.19
	t / ha	2.2	1.8	2.0	2.0	2.1	2.1	1.8	2.1	2.4	2.1	1.9	2.4	2.4	2.2	2.4	2.2	2.4	2.3	1.8
Mature	ha	41			49	61	106	107	94	95	116	121	93	92	89	97	89	40	29	132
Ginger	1000 t	1.09			2.46	3.07	5.31	5.35	4.71	4.75	5.80	6.08	4.67	4.60	4.45	4.85	4.45	2.02	1.46	2.17
	t / ha	26.6			50.2	50.3	50.1	50.0	50.1	50.0	50.0	50.2	50.2	50.0	50.0	50.0	50.0	50.5	50.3	16.4
Immature	ha				17	27	29	44	29	38	40	41	51	49	79	104	59	30	49	84.4
Ginger	1000 t				0.20	0.23	0.41	0.71	0.61	0.41	0.92	0.84	0.76	0.83	2.39	2.55	1.22	0.85	1.00	1.33
	t / ha				11.8	8.6	14.1	16.2	21.1	10.8	22.9	20.4	15.0	17.0	30.2	24.5	20.7	28.3	20.4	15.8
Cocoa	ha				294	346	380	756	764								614	1 720	2 868	562
	1000 t				0.14	0.19	0.13	0.24	0.25	0.22	0.24	0.47	0.24	0.38	0.41	0.36	0.33	0.12	0.16	0.145
	t / ha				0.47	0.53	0.34	0.31	0.32								0.53	0.09	0.06	0.26
Maize	ha		630						820						925	413	446	566	597	714
	1000 t		5.1	6.7	8.1				1.9						2.0	0.50	0.96	0.52	1.53	1.30
	t / ha		8.1						2.3						2.1	1.2	2.2	0.9	2.6	1.8
Taro	ha		2 875						1 500				922	1 040	4 589	1 810	1 855	1 899	2 924	6 800
	1000 t		26.4						15				8.8	7.8	8.8		5.9	5.3	8.8	25.6
	t / ha		9.2						10.0				9.5	7.5	1.9		3.2	2.8	3.0	3.8
Cassava	ha		6 934						4 100				1 901	1 842	4 332	6220	1 588	2 876	4 245	2 250
	1000 t		159.4						49.2				19.96	16.18	23.53		8.06	8.94	15.76	29.2
	t / ha		23.0						12.0				10.5	8.8	5.4		5.1	3.1	3.7	13.0

Source: MPI 1985; MPI 1990b, MAFF 1995; MAFF 1999, NAGATALEVU M., FIELD S. and FOARETE 1994, 76.; FAO 2000, [1] ha data 1978-1993 own estimates.

Annex 3: General staff abilities rated by different groups

Abilities	PRA team (n=4)	Experts (n=5)	Management (n=2)
Speed of learning	4.1	4.6	3.1
Self-confidence	3.8	4.5	4.4
Ability to draw conclusions	2.9	3.8	4.4
Problem solving capabilities	2.9	3.6	3.8
Ability to work independently	3.4	3.5	4.4
Mathematical abilities, dealing with figures	3.8	3.4	3.1
Report writing skills	2.9	2.4	3.8
Overall average	3.4	3.7	3.9

Scale: 1= poor, 2= acceptable,3= satisfactory, 4 =good, 5= excellent.

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1987	**Diplomarbeit**: Aspekte bei der Integration von Ackerbau und Viehhaltung in der Trockensavanne Malis.
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BERUFSERFAHRUNG:

12/91 – 10/92 BRD Deutsche Welthungerhilfe	**Projektbearbeiter der Welthungerhilfe** für Projekte in Mali, Burkina Faso und Senegal. Arbeitsschwerpunkte: Ressourcenschutz, Landwirtschaft, Frauenförderung, Armutsbekämpfung und ländliche Entwicklung. Kleinprojekte mit Selbsthilfe-Gruppen, Kreditgenossenschaften, Frauengruppen und anderen lokalen Trägern.
11/92 – 10/94 Europäische Kommission	**Beigeordneter Sachverständiger in der EU Delegation** für den Süd-Pazifik. Prüfung und fachliche Betreuung aller Projekte im Bereich Land- und Forstwirtschaft, Fischerei und Ressourcenschutz mit einem Volumen von 20 Millionen Euro. Koordination von Projekten: Anbausysteme, Süßkartoffel- und Kokusnußzüchtung, Gemüsesaatgutversorgung, Biologische Schädlingskontrolle, Landwirtschaftliche Informationssysteme, Biometrie, Agrarforschung- und Beratung. Hauptaufgabengebiete: Fachliches Backstopping, Finanzabwicklung, Arbeitsprogramme, Gutachterauswahl und Sektorstudien. Leitung von Workshops und Tagungen, Regierungsberatung, Mitarbeit bei den Verhandlungen zu den Lomé IV Folgeprogrammen.
11/94 – 4/95 Fidschi	**Koordinator der EU** für das Pacific Regional Agricultural Programme (PRAP). Hauptaufgaben: Auswahl und Anstellung von Experten, Erstellung von Arbeitsprogrammen, Verhandlungen mit verschiedenen Projektträgern und Zwischenevaluierung.
5/95 – 12/95 Fidschi	**Feldphase für die Dissertation**. Durchführung eines Ausbildungsprogramms für lokale Mitarbeiter des Landwirtschaftsministeriums in partizipativen Methoden (RRA, PRA). Analyse des Informationsflußes und Organisationsanalyse des Landwirtschaftsministeriums.
seit 1/96 BRD Humboldt-Universität, Berlin	**Freier Mitarbeiter** am Fachgebiet Landwirtschaftliche Beratung und Kommunikationslehre der Humboldt-Universität. Erstellung einer Dissertation mit dem Thema „Review of the Agricultural Knowledge System in Fiji. Opportunities and Limitations of Participatory Methods and Platforms to promote Innovation Development. Literaturstudium, Datenanalyse und Nacherhebungen in Fidschi.
Freiberufliche Gutachtertätigkeit	**Moderation** von Seminaren zur landwirtschaftlichen Beratung an der Justus-Liebig-Universität in Gießen. Kurs zur Organisationsanalyse mit SWOT am Seminar für Ländliche Entwicklung (SLE) in Berlin. **Kurzzeitgutachten** zu Projektplanung und Monitoring für Projekte der Entwicklungszusammenarbeit in verschiedenen Ländern Afrikas und Asiens.

SELBSTÄNDIGKEITSERKLÄRUNG:

Hiermit erkläre ich, dass ich die vorliegende Dissertation selbstständig angefertigt habe und dabei nur die angegebenen Quellen als Hilfsmittel benutzt und wörtliche oder inhaltlich übernommene Stellen als solche gekennzeichnet habe.

Grüningen, Oktober 2000

Lorenz Bachmann