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PACIOLI 2

Accounting and managing innovation

Workshop report

February 1996

Agricultural Economics Research Institute (LEI-DLO)

ABSTRACT

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The PACIOLI project is a concerted action for the EC consisting of four workshops; the first workshop farm accounting and information management was held in March 1995, the second workshop accounting and managing innovation was held in September 1995. The objective of PACIOLI is to explore the needs for and feasibility of projects on the innovation in farm accounting and its consequences for data gathering with Farm Accountancy Data Networks (FADN).

The second step on the way to innovation of gathering data with a FADN, includes analysis of the various national FADNs and the stakeholders in their specific environment. In this way the platform that will prepare the necessary and feasible proposals for innovating FADNs has gained more insight and is getting prepared for actual innovation.

Innovation/Farm Accountancy Data Networks/Information management/Information modelling/Stakeholder analysis

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CONTENTS

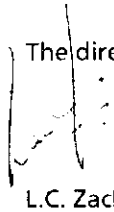
PREFACE

The changing conditions in agriculture during the last years have brought fundamental changes in agricultural decision making on farm level but certainly also in agricultural policy making. Since decision making processes determine the information requirements, it is clear that the activities that supply the necessary information should be adapted to a new situation too.

LEI-DLO as an institute that tries to fulfill the information needs of (Dutch) agricultural policy makers, is also confronted with this changing environment. During the last five years serious changes in types of data that are gathered and in the data gathering process have taken place. In this respect we are very pleased to be able to discuss with our colleagues throughout the EU, our process of change, the things we are concerned about and the ideas for future directions in the further development of our farm accountancy data network.

We hope that by sharing ideas and extensive collaboration the FADNs will be able to generate the information that is required by our clients; in the near future as well as in the long run. We are very much aware that this ambition will confront us with the need for major changes in our activities. We hope that the PACIOLI project will help us and our FADN colleagues to make a major step in the good direction.

The director,



The Hague, February 1996

L.C. Zachariasse

SUMMARY

The PACIOLI project is a concerted action for the EC consisting of four workshops; the first workshop on farm accounting and information management was held in March 1995. The second workshop on accounting and managing innovation is held September 1995. The objective of PACIOLI is to explore the needs for and feasibility of projects on the innovation in farm accounting and its consequences for the data-gathering with Farm Accountancy Data Networks (FADN).

In the first workshop the objectives of the project were discussed and it was concluded that the main objectives for innovation in the FADNs are improvement of the quality of FADN data, the use of data and the cost effectiveness of FADNs. A mature level of strategic information management is a prerequisite for more flexible FADNs that supply high-quality data in a cost-effective way.

In the second workshop the national FADNs were the main subject. According to the principles of Strategic Information Management (SIM) and Information Modelling (IM), each country gave a global description of its FADN. Both the organization around the FADN and within the FADN are described. Around the FADN, the management and funding structure of the organization of the FADN is described, as well as the stakeholders: everyone who deals with the FADN in one way or another. The section on accounting at farm level gives an impression of the technological and fiscal environment of the FADN. Within the FADN, a process model is given and the latest innovations which have taken place are mentioned.

The FADN stakeholders are very important for the PACIOLI project. As the objective is to innovate the FADN, we have to know to whom we should listen and pick up ideas for change. Especially the relation between the FADN and the policy makers is discussed extensively. Their need for up-to-date data was expressed, because policy making is 'future making'. At the same time researchers ask for data similarity between the countries in the RICA data set.

On the way to innovation, the gathering of data on issues like environment and forestry is discussed. The conservation of the environment and forestry management are examples of these topics. In the software field the use of data with 'client' software (a client-server approach using an interface based on Windows) was presented by Italy.

The participants that were present at this second PACIOLI workshop agreed that the next step in the process is to make lists of potential innovations and to arrange these topics according importance and preference. To contact and maybe involve the most important stakeholders is another task. During PACIOLI 3 the topics will be described and the need for change will be pointed out. The effect of the changes on the information model will be discussed and

a stakeholder analysis will make clear how to deal with the most important stakeholders. This should result in a list of subjects which can be worked out to make actual project proposales. By preparing innovations in this structured and 'stakeholder-oriented' way, the chances on succes of our efforts will improve.

Last but not least this second workshop made the enthusiastic network of accounting experts, information scientists and FADN experts of 7 EU countries even more enthusiastic. Experts from Belgium and Germany had already joined this group. For the remaining two workshops the other EU member states are still invited, in order to get a broad platform for ideas about innovation of FADNs.

HOW TO READ THIS BOOK

This book is the result of the second PACIOLI workshop. The workshop was organised around three days of presenting papers, discussing them and discuss related subjects. This book follows the order of the performances in the workshop.

The national FADNs were the main subject in the second PACIOLI workshop. The global descriptions written by the countries discuss the national FADNs around four themes: Farm Accounting, description FADN, FADN stakeholders and innovation. These global descriptions are presented in chapter 2 to 9.

The second PACIOLI workshop was organized around the same four themes. Chapter 10 and 11 contain papers presented on the first theme: Farm Accounting. The first working group session, the discussion on Farm Accounting, is presented after chapter 11.

Chapter 12 to 14 contain papers presented on the second theme: description FADN. The discussion on (the process-model of) the FADNs was held in working group session 2. The results of this discussion are added to the global description of each country.

Chapter 15 to 19 contain papers presented on the third theme: FADN stakeholders. Working group session three and four, presented after chapter 19, contains the discusion on FADN stakeholders.

Chapter 20 to 22 contain papers on the fourth theme: innovation. After chapter 22 working group session 5 is presented which contains the discussion on what will come up in the third PACIOLI workshop and how we are going to prepare that workshop.

The workshop was closed by making some concluding remarks, which are presented here in the epilogue.

1. INTRODUCTION PACIOLI 2

George Beers

1.1 The PACIOLI project

This paper gives an introduction and some backgrounds of the second workshop in the PACIOLI project. PACIOLI is a concerted action for the EC in collaboration with the RICA/FADN unit. The objective of the concerted action is to explore the needs for and feasibility of projects on the innovation in farm accounting and its consequences for data-gathering on a European level through Farm Accountancy Data Network (FADN). This may also be considered as a first step in disseminating Dutch experiences with the information modelling approach in agriculture. The long term objective of PACIOLI is to come to an infrastructure for innovation of FADNs. More specific, the concerted action is a step in preparation and development of projects in which information models will be developed that support the development of information systems to improve and extend the RICA/FADN network with various types of data in order to support EC-policy making and evaluation.

1.2 Workplan

The concerted action is organized around four workshops:

Workshop 1 (March 95). 'Introduction and Information Analysis'
In the first workshop the concerted action has been introduced and the objectives have been discussed. The need for strategic information management in Agriculture has been identified and some experiences with this in various memberstates were presented. A special focus was on the Dutch experiences with the Information Modelling Program.

Workshop 2 (September 95). 'Accounting and managing innovation'
The challenge of the second workshop is to obtain a global overview of the FADN related information systems as they already exist in the various member states. This concerns information systems, manual as well as computerized, on the primary level (e.g. farms, their suppliers) as well as the level of the national FADN's and all information systems involved in them. Besides this other sources of information that might be relevant (e.g. chambers of commerce, labour offices) will be inventoried.
In order to prepare for projects in which actually information models will be developed, it is necessary to think about the organisational aspects. Different factors that influence the organisation and implementation of accounting in the member states, will be discussed. In these discussions the focus will be on innovation in accounting and the FADN as a source

of information for various purposes. To support these discussions for each country the broad variety of organisations that are involved in agricultural data-processing, will be described globally. Besides the information technical aspects, the focus will be on the institutional structures of the FADNs and their implications for innovation processes.

Workshop 3 (March 96). 'Need for change'

The third workshop can be considered as a brainstorming to bring up ideas for innovation of the FADNs. Special attention will be given to the policy making processes since policy can be considered to be the primary users (and financiers) of information obtained by FADNs. Attention will be given to the information requirements related to policy making processes and the way these information requirements are influencing the FADNs. Representatives of the users of FADN will be participating in this workshop, explicitly to give directions for innovation of FADNs on national and EU level. The consequences of the suggestions from policy makers will be discussed as a first assessment.

Workshop 4 (September 96). 'Suggestions for continuation'

In the last PACIOLI workshop ideas from the previous workshop will be worked out to proposals for follow-up. The discussion will be on priorities of topics and identification of projects. Using the material brought up in the other three PACIOLI workshops innovation projects will developed for the FADNs, including the information models to be used, organizations to be involved and the main threads and benefits of the proposals.

1.3 Conclusions of the first workshop Ameland '95

In the first workshop it was concluded that the main objectives for innovation in the FADNs are improvement of FADN data, the use of data and the cost effectiveness of FADNs. A mature level of strategic information management is a prerequisite for more flexible FADNs that will be able to supply data with high quality in a cost effective way.

Within the group that was present in Ameland there was on remarkable consensus about 'the need for action'. For all participants it was beyond any doubt that new development of FADNs is necessary to survive. It was clearly stated that improvement of FADNs will not be enough, we should strive for INNOVATION of FADN. Suggestions were generated that should help to make some steps in the direction of this innovation process.

In further development of FADN it is stressed that more attention for the users of the FADN data is an absolute prerequisite. Another aspect in the thinking about innovating FADNs and farm accounting is to take explicitly into consideration the developments and trend in the information and communication technology (ICT). In this respect one can think of e.g. the farmer as a supplier of data. It is also important not to forget to involve the financiers of FADN in the further development of plans for innovation of FADNs. To combine the

various aspects there is a clear need for a structured approach like the information modelling approach.

In the PACIOLI context strategic information management is aimed at effective and efficient gathering and distribution of information. The Information Modelling (IM) approach and the Dutch experiences with IM have been introduced. Information models are essential tools in information management activities. Some experiences with the information modelling approach and their applicability for the FADN domain have been discussed. In development of information models for the farm accounting and the FADN domain, some problems have to be overcome. The big diversity in farm systems throughout the European Union, the high costs of development and maintenance of the models and resistance against harmonisation and uniformity are the main problems to overcome.

It was agreed that the next step in the process is to make descriptions of the various national FADNs by making global process models. In the second workshop the models of different countries will be compared and the differences and similarities will be explored. This should result in a clear picture of the FADN domain which will be used as an input for discussion in the third and fourth workshop about what should be changed.

1.4 Reflection paper

The papers presented and the results of the various working group sessions during the workshop are published in an extensive workshop report 1) and a management summary. In addition to the workshop report a synthesis of the papers, discussions during the workshop and aftwards and a good doses of reflection, the workshop also resulted in a so-called reflection paper. This reflection paper 2), that contains an analysis of the RICA 'Farm Return' sheet, provides suggestions for decision making on the further development of the European FADN and is submitted to the management committee of the RICA.

The reflection paper of the second workshop will be about innovation and integration in the various levels of accountancy (farm, national FADN, EU FADN). The papers, discussions and working group sessions in the second workshop have to provide the material for reflection on these issues.

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1) Beers, G. et al. (ed.), PACIOLI 1 Farm accountancy data networks and information analysis; workshop report, LEI-DLO Mededeling 532, The Hague, 1995.

2) Poppe, K.J. and G. Beers, PACIOLI 1 On data management in farm accountancy data networks; reflection paper, LEI-DLO Mededeling 533, The Hague, 1995.

1.5 Issues of the second workshop

The objective of the second workshop is to get an insight in the FADNs. How are the various FADN's organised, what are the processes required to gather the data, how do the data sources look like and what are the developments in them. In making plans for innovation it is important to get some 'grip' on innovation processes. How did some recent innovations in the FADNs take place, what are the important actors (initiators, facilitators), how was the 'resistance' organized. In short: How was the innovation organized. In the traject to innovation analysis is required of stakeholder in FADNs and analysis of the trends in data-flows on the farm and within the accountancy.

In order to get some answers on these (and some related) questions, the workshop will be organized in five blocks with presentation, discussion and working group sessions:

block I: Introduction national FADNs

Global descriptions of the FADNs, including process model and stakeholders diagrams will be compared and discussed.

block II: Farm accounting

Recent developments in farm accounting will be presented and discussed.

block III: Recent developments in FADNs

Some recent developments in FADNs will be presented and discussed

block IV: FADN stakeholders

The relation between various stakeholders in the FADNs will be discussed. Special attention will be on the relation between the FADN and agricultural policy makers as important users of FADN data.

block V: FADN innovation

Some experiences with and vision on innovation processes in the FADN environment will be presented and discussed.

The workshop ends with a step up to the third workshop. In the third workshop ideas for innovation will generated and discussed. Participants are asked to give suggestions on how to prepare on this third workshop; special attention will be on the question of how to communicate with the various stakeholders on the way innovation of FADNs.

2. PROCESS-MODEL AND STAKEHOLDER-ANALYSIS RICA

Krijn J. Poppe

2.1 Introduction

This short note describes the EU's FADN / RICA to facilitate discussions in the PACIOLI workshop. Most participants will have at least some idea of the organisation of the RICA, as it is provided by the European Commission in its 'FADN an A to Z of methodology' (CEC, 1989) and in the paper by Nigel Robson (1995) to this workshop. This note thus focuses on the process-model and the stakeholders diagram, as these models are also provided by other participating countries.

A draft of the process-model and the stakeholders diagram were originally made by the author of this note, based on his long term experience in cooperating with the RICA-team. The draft was discussed extensively for about 2 hours with the RICA-team in Brussels in a meeting in July 1995. This has lead to some changes in the process-model and several important additions in the stakeholder analysis.

2.2 Process-model

The process-model (figure 2.1) contains 9 important functions:

- strategic planning
- data management
- operational management
- receiving data
- weighting data
- distribute data
- making analysis
- making forecasts (RICA forecasting system)

Strategic planning is not a very structured process, and the initiative is not always with the RICA-team. Parts of it (EU enlargement, policy developments) have to do with the interaction with EU-policy. This could result in proposals to change the data collection. Data management consists of activities that guard the methodology of RICA, including the gathering of some external data like exchange rates. The real data handling is carried out in the functions 'receiving data' and 'weighting data'. Data management is more focused on the management of data-definitions.

Operational management includes the 'team-work' of the RICA unit A/3. Typical activities for the Commission have to do with the organisation of RICA-

meetings and with keeping in touch with the member states. The function of the management of the information system is straight forward. It should be noted that some of these activities (especially maintenance on software) is sourced out to specialised companies.

The activity of 'receiving data' includes the maintenance of the control-software. This is a bit arbitrary, as it could also be seen as an activity that belongs to the management of the information system. It has been put here as it calls for a lot of specialist know how, and it is improved continuously in close connection with solving the detected errors. The same arguments apply to the place of the process 'distribution of control software'. This could also be seen as a part of the 'management of member states' or as a part of a (not identified) function 'distribute data and software'. Taking into account the way the work is organized at this moment, the process-model is a good description.

The function 'weighting data' includes the collection of data on the observation field. One could argue that there is some overlap between 'comment selection plan/report' and 'control representativity'. However, at the moment comments are not made frequently and are often restricted to a small discussion in the RICA-committee. Quite apart representativity is checked in the unit with an eye to a specific analysis made.

The function 'distribute data' is clear: it includes the 'publishing' of electronic tapes to member states and (from time to time) a statistical publication. The support of external users includes the creation of (special) tables on their request.

The function of 'Making analysis' includes several activities that have to do with the key production activity of the unit: to perform analysis for the DG VI hierarchy. Although there is probably no clear intake-procedure for new requests, a separate process has been modelled: in connection with the operational process 'weekly workplanning' the head of the unit is involved in the decision to carry out an analysis or not. 'publishing' and 'after sales service' should be taken with a grain of salt: most of the analysis are not formally published, even not after some time. At best they will be presented as an RI/CC document to the RICA-committee. After sales service is used as a descriptor for activities as the presentation of the paper to policy departments and answering their additional questions.

The process 'subcontract a study' has been placed in this function because some studies are carried out by contractors. It should be noted however that contractors have also been or are involved in studies on methodology (e.g. weighting, data quality) and on new data requirements (e.g. a consultant on non-farm income). An alternative model would be to include a decision on subcontracting in several processes (receive requests, weekly planning) and to have a process 'contract and monitor subcontractors' under operational management.

The function 'making analysis' includes so called scenario-simulations. In practice a lot of the activities for these studies are equivalent to those of 'normal' studies. The main difference is that in scenario-simulations additional assumption are made on future circumstances (e.g. higher yields, lower prices) and on farmer behaviour (e.g. lower prices will lead to a reduction of inputs).

A special type of analysis are the income forecasts for the current year by the Rica Forecasting System. This has been modelled in a special function.

2.3 Stakeholders diagram

About 15 (groups of) organisations have an interest in the RICA-unit, according to the stakeholders analysis presented in figure 2.2. Nine of them are part of the European Institutions, ranging from departments in DG VI to other European Institutions like the Court of Auditors or the European Parliament. Within DG VI there is a large range of stakeholders, ranging from the legal service and the translation service up to the policy units and the top of DG VI.

Outside the European institutes, another 6 types of stakeholders have been identified. Some of them are users (COPA, scientific world, private companies), others are (also) of political importance (ministries of agriculture in member states, COPA).

In some member states the RICA data are gathered and delivered to Brussels by the national Ministry of Agriculture. In other countries this job has been handed over to research institutes or universities. In both cases it makes sense to identify the national data collectors (including private accounting companies that work for ministries or national research institutes) apart from the ministries of agriculture. Probably these two types of organisations are motivated by other aspects (political vs. expert and monetary interests) and this will influence their behaviour, especially towards innovation.

About 50% of the stakeholders are (also) users of RICA-data. This includes organisations as national agricultural ministries and even the legal service that uses data in procedures like the SLOM-case.

2.4 Innovation

The process-model and stakeholders diagram describe the current situation. They can be helpful in looking to the future. The stakeholders diagram can be used to understand innovation. The two biggest cases pursued in recent years are the issue of non-farm income and the CAP ('Mac Sharry') Reform.

The modification of the RICA-Farm Return to incorporate data on the CAP Reform payments was mainly driven by the unit's wish to cater for questions of stakeholders like DG VI and European institutions. National data collectors were not unfavourable towards this innovation as they had to account for the payments anyway and because they faced the same situation at home. There was no strong opposition, other than practical problems and discussion among experts on the best way of implementing this change.

The issue of non-farm income had probably weaker supporters within the DG VI hierarchy, as this involved rather new clients like the units running the structure / rural development policy in stead of the units involved in market policies. Main reason why this innovation did not succeed however was the attitude of the national data collection institutes. Some of them do not gather

this data and do not face an immediate problem if they leave the situation unchanged. In addition some countries see major problems, due to non-response, when they start collecting this data. The proposals were not able to tackle this feeling. In the end this resulted in a clear 'non' from one of the major member states and from COPA with a corresponding and effective lobby to make the collection of these data not obligatory.

It goes beyond the scope of this paper to discuss the topic if the current process-model and stake-holders diagram would be the ideal situation for the next years. Looking to the shortage of personal in the unit, the new possibilities of electronic data transfer, and new policy themes (rural development, environment, Eastern Europe) entering the stage, it would be an interesting exercise:

* to see which processes are key-processes that must be carried out by the unit A/3 itself, and which ones could be carried out on a joint-actvitity basis with RICA-experts in the member states
* to map new stakeholders that might become important in the next years (e.g. other policy units, other data suppliers).

2.5 Process-model RICA: remarks by Finland and audience

Remarkable elements

* Strategic planning (take effort to know what is happening in the future).
* Making analysis and forecasts.

Chances and threats for future developments

What is RICA doing now (to much busy with collection of data!) and what is RICA supposed to do (more using the data!)?

* Ability to reflect the changing needs (farm return, non-farm income).
* Time lag in presenting data.
* Utilization of results.

RICA is very detailed, but also very rigid: it takes two years to implement something like farm return.

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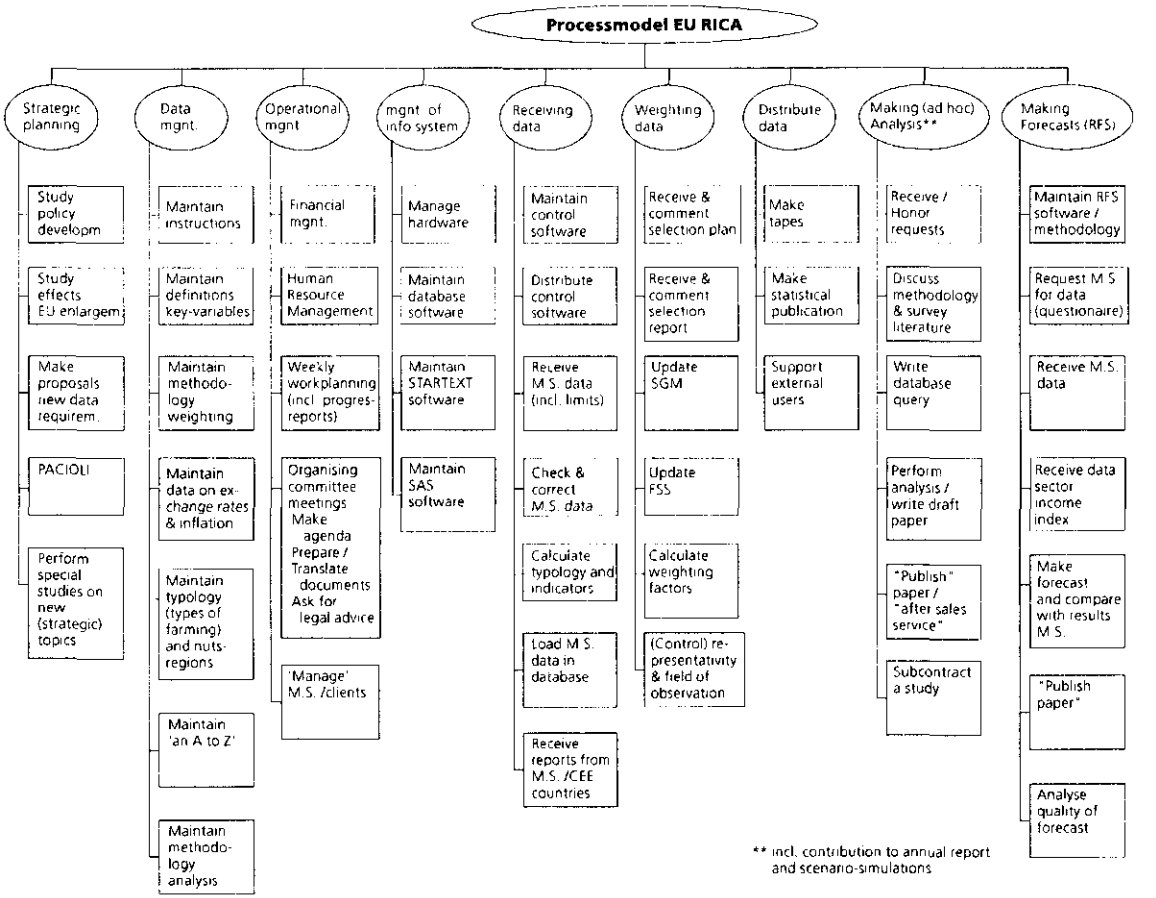
Processmodel EU RICA
Strategic planning
Study policy developm
Study effects EU enlargem
Make proposals new data requirem.
PACIOLI
Perform special studies on new (strategic) topics
Data mgnt.
Maintain instructions
Maintain definitions key-variables
Maintain methodo-logy weighting
Maintain data on ex-change rates & inflation
Maintain typology (types of farming) and nuts-regions
Maintain 'an A to Z'
Maintain methodo-logy analysis
Operational mgnt
Financial mgnt.
Human Resource Management
Weekly workplanning (incl. progres-reports)
Organising committee meetings
Make agenda
Prepare / Translate documents
Ask for legal advice
'Manage' M.S. /clients
mgnt of info system
Manage hardware
Maintain database software
Maintain STARTEXT software
Maintain SAS software
Receiving data
Maintain control software
Distribute control software
Receive M.S. data (incl. limits)
Check & correct M.S. data
Calculate typology and indicators
Load M.S. data in database
Receive reports from M.S. /CEE countries
Weighting data
Receive & comment selection plan
Receive & comment selection report
Update SGM
Update FSS
Calculate weighting factors
(Control) re-presentativity & field of observation
Distribute data
Make tapes
Make statistical publication
Support external users
Making (ad hoc) Analysis**
Receive / Honor requests
Discuss methodology & survey literature
Write database query
Perform analysis / write draft paper
"Publish" paper / "after sales service"
Subcontract a study
Making Forecasts (RFS)
Maintain RFS software / methodology
Request M.S. for data (questionaire)
Receive M.S. data
Receive data sector income index
Make forecast and compare with results M.S.
"Publish paper"
Analyse quality of forecast
** incl. contribution to annual report and scenario-simulations

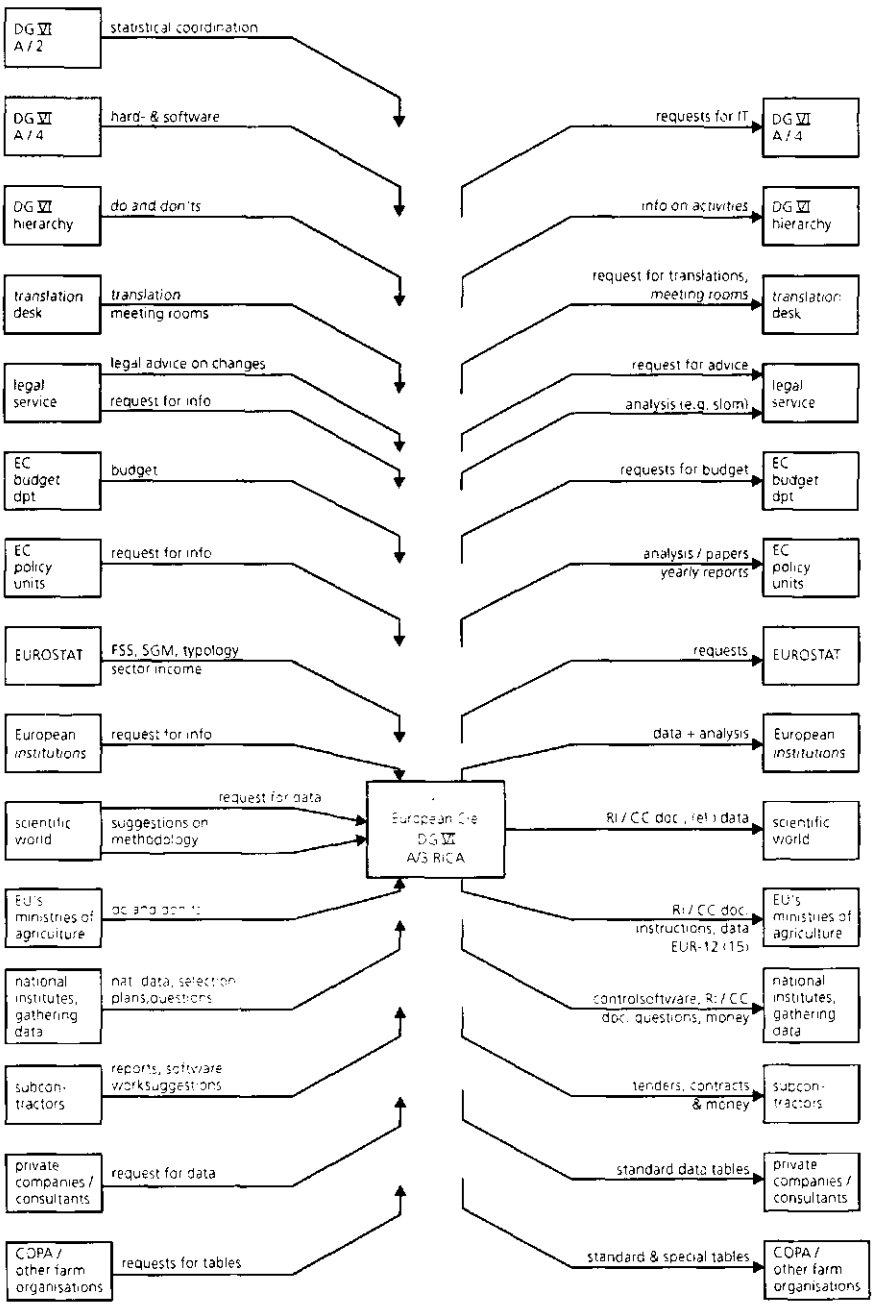

Figure Stakeholders diagram EU/RICA

3. DESCRIPTION OF THE FADN IN FINLAND

Simo Tiainen 1)

3.1 Introduction

Farm Accountancy Data Network is called in Finland the official profitability study of agriculture. The activity was founded in 1912 by the agricultural advising organizations. On 1915-1962 the work was carried out by the National Board of Agriculture. After that the task have belonged to Agricultural Economic Research Institute (the finnish acronym MTTL).

MTTL is a research institute specialized in agricultural economic research. The institute operates under the Ministry of Agriculture and Forestry. It was founded in 1952. The total number of staff is about 40, of which about half are researchers. The farm accountancy data network is nowadays one of the four main fields of research in the institute. The organization of the Finnish FADN is presented in figure 3.1.

The FADN tasks in Finland is totally financed by the state. MTTL receives yearly finances from state budget to carry out the work. In the institute there are at the moment 11 persons working with the subject. The regional work in Finnish FADN is done by 20 Rural Advisory Centers. In the regional level the total work done for FADN is about 15 full-man- year but the number of persons working with the subject are about double. MTTL makes every year a contract between the head organization of Advisory Centers (The Association of Rural Advisory Centers). This is the contract of the work done for FADN in the regional offices and the payment for that work. In the past few years the number of bookkeeping farms in Finland has been around 1,100.

Table 3.1 Some facts about the resources in Finnish farm accountancy network

Size of the sample in 1994	1,072
Total staff working with the network (full-man-years)	26
Yearly budget of the network	4,5 mil FIM / 0,8 mil. ECU
Average yearly costs/holding	4,200 FIM / 760 ECU

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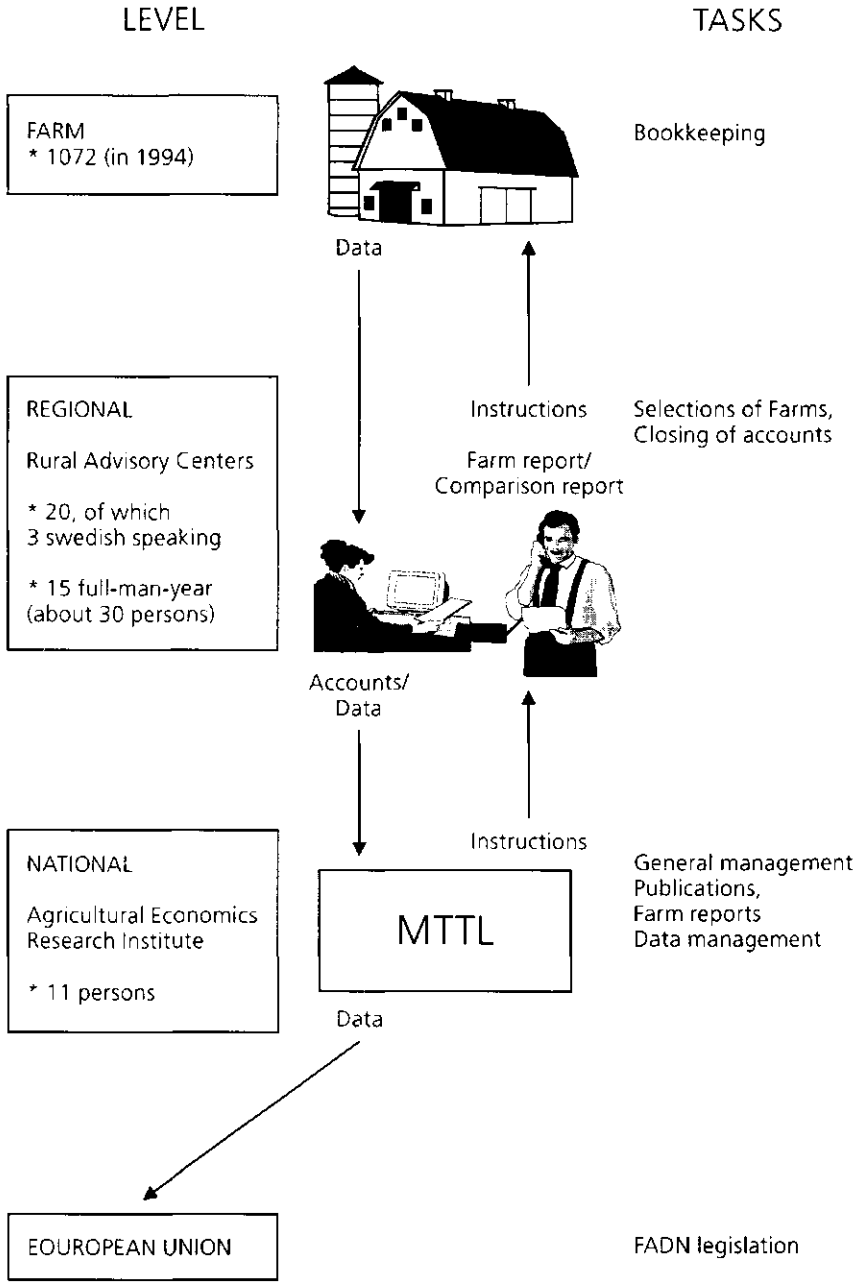


Figure 3.1 The FADN organization in Finland

The regional bodies, Rural Advisory Centers make all the connections with farmers. They select and canvass the participating farms. They give to the farmers the accounting books and the instructions for filling these. At the end of the accounting year they collect the books from the farms and feed the data into computers. Some of this recording work is also done in MTTL. The Centers transfer the data to MTTL on diskettes by ordinary mail. Every year MTTL organize a training meeting to the staff working with FADN in regional bodies.

The MTTL compile annually statistics on the data from the bookkeeping farms. The average results for different regions, farm size classes and production lines are calculated. The breakdown for size classes have been based on arable land area and the production lines have been determined on the basis of the gross return. The classification system based on standard gross margins have not been applied until now. The most central economic indicators calculated for agriculture are farm family income, taxable net return and profitability coefficient. Besides agriculture the Finnish bookkeeping network is monitoring the forestry activities, subsidiary earnings and private household of the participating farms.

In due to joining to the EU in 1995 Finland has to adapt the national farm accountancy data network to the FADN carried out by Commission and regulated by the Community legislation. For this reason there are quite a many changes needed to be done in the Finnish current system. The biggest change is perhaps a new way of classifying the holdings and picking the sample. In Finnish system the bookkeeping farms have actually not been a sample. They have just been farms willing to keep detailed accounts. However, they have represented quite well commercial farms in the most important production lines. The classification to different production lines have been done afterwards according to the gross return from agriculture. The weighting of the results have been based on hectares. So, the yearly results of agriculture in each size class are calculated per hectare of arable land, not per holding. The work of adapting the Community typology and preparing the first FADN selection plan is going on in Finland.

3.2 Accounting at farm level

Agricultural accounting in Finland has mainly been determined by the needs of taxation. In 1968 a reform of agricultural taxation took place. Before the reform the taxation was based on the arable land area and after that the base for taxation have been the tax bookkeeping on the farms. Farmers are responsible for keeping books of the receipts and expenditure of agriculture. The records of receipts and expenditure items must be based on documents, unless they are self-evident or minor amounts. Tax bookkeeping in Finland mainly concerns cash receipts and expenditure, i.e. stock property, livestock, and their value changes, among other things are excluded. Also human labor is not recorded. The complexity of tax accounting in Finland can be described to be quite low. However for most of the farmers it forms the only base of monitoring the economic result of the enterprise. According to gallup study in

last year 72% of Finnish farmers are doing the agricultural tax bookkeeping themselves while 20% let the accounting office to do it.

The official profitability study of agriculture (FADN) in Finland has for decades provided an important information system serving for many stakeholders but also farmers themselves. In the farm level the information needed is recorded mostly manually in books prepared for this purpose. These includes the list of property, a cash book and a book of working hours. Also some other data, i.e. use of arable land, yields, unpaid transactions are recorded. Some of the farmers are also using computers for recording the information. The obvious lack in Finnish current system is that there are no special software available for farmers to record the data already in the farm. The farmers participating to the network receive annually quite detailed results of their farms and also the average results for comparing.

In Finland there are about 17,500 on-farm PC's of which 56% are used in bookkeeping. There are several agrarian bookkeeping software available (about 11,000 sold programs) on the market. The Association of Rural Advisory Centers has the most biggest market share in farm accounting software. They also offer some EDI services for farmers. About 6,500 farms have the communication from their computers to a bank and are using the computer for paying the bills and getting the bank statements.

Annually about 30,000 farms in Finland in different production lines are taking part of the production recording system. The system is also maintained by the Rural Advising organization. For example about 60% of the dairy farms are covered by the milk recording system. Milk recording includes planning of the production, analyzing of the production results and analyzing of the economic results. The target of the work is a more profitable production.

Table 3.2 Some facts about accounting at farm level in Finland

	unit	FIN
Number of farms	#	120
Farms with on-farm PC	#	17,500
Farms with bookkeeping: total	#	all
Farms with bookkeeping: on own PC	#	10,000
Fiscal bookkeeping obliged by law	yes/no	yes
Complexity of fiscal regulation	high/low	low
Complexity of ownership situation	high/low	low
Specialized agrarian bookkeeping software available on the market	yes/no	yes
Farms with production record system	#	30,000
Comparison of results between farms common	yes/no	no
Specialized agrarian accounting offices	#	several dozens
Average 'out of pocket' accounting costs per farm with bookkeeping	FIM	1,000 -1,500 FIM
Specialized agricultural banks	#	1
Market share specialized banks in the agricultural sector	%	70
EDI services available	yes/no	yes

3.3 Process model

This is probably the first time when a process model of Finnish FADN is presented in this form. The exercise is not easy but there are no doubt that specially in this situation it is very useful.

There are many changes to be done to the Finnish current system. Adapting the FADN legislation affects some direct changes to the network but probably the bigger need for change is coming from changes in agricultural policy and hole agricultural environment in Finland.

When preparing a Finnish FADN procesmodel and having the Dutch model as an example it can be noticed that almost the same processes exists (or should exist in the future) but for most of them not much attention have been paid. Specially the management processes in Finnish FADN have been the items where not much interest have been paid. Also the applications are the area where not much work have been done. The procesmodel is presented in figure 3.2.

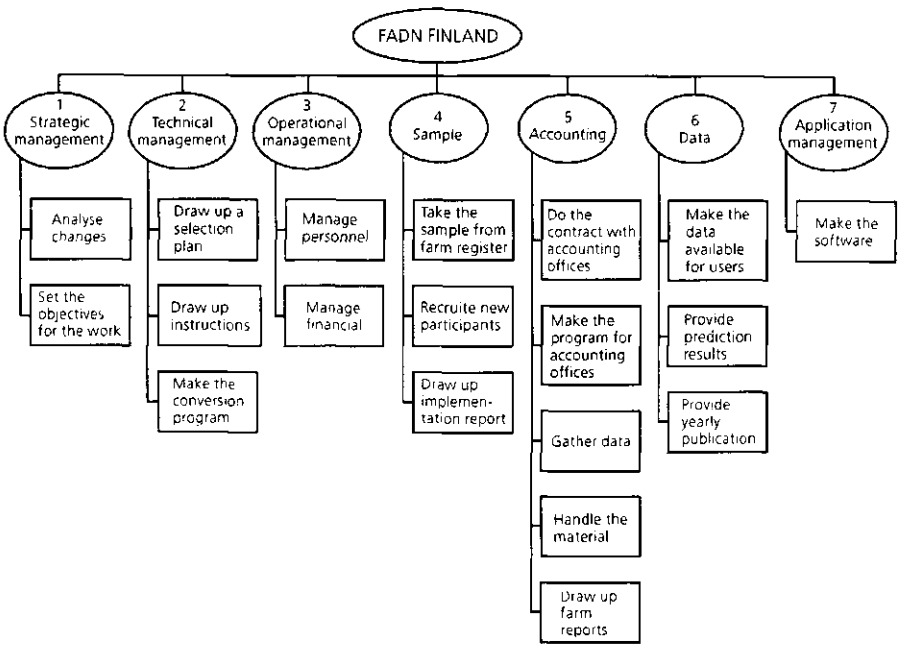


Figure 3.2 The procesmodel of the FADN in Finland

3.4 Stakeholders

The main stakeholders in the Finnish FADN are presented in figure 3.3. This stakeholder analysis describes more the situation how the things will be in the near future rather than they have been in the past. The farm register

and most of the agricultural statistics in Finland are maintained by the separate agency operating under the ministry of agricultural and forestry, The Information Centre of Ministry of Agricultural and Forestry. The Statistical Office has a role as a general coordinator in statistical work including agricultural statistics. A new stakeholder in Finland is the National FADN Committee (based on Community legislation). This committee have just been set up in Finland. The committee is perhaps not a separate stakeholder. It is a group of persons representing the most important stakeholders. But the idea with the committee is that it will provide a good forum for the most important national stakeholders to give ideas and opinions for developing the system.

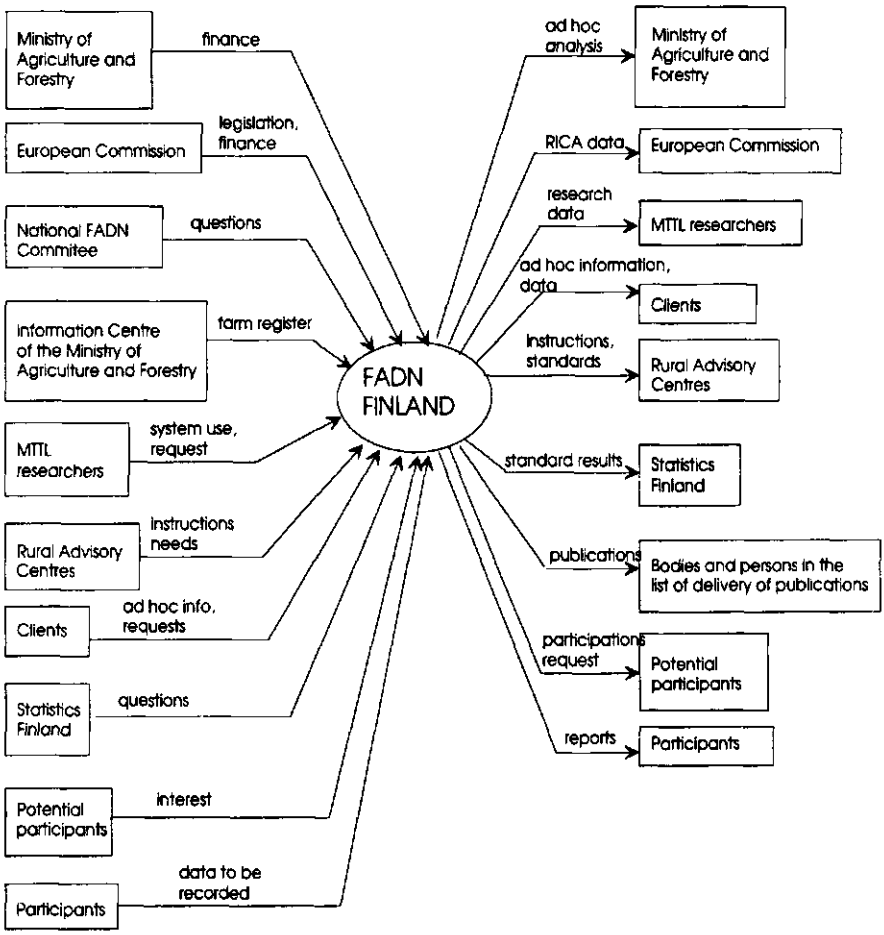


Figure 3.3 The stakeholders of the FADN in Finland

3.5 Innovations

The most important innovations taking place in Finnish FADN in the last 5 years are the following;

1) EDP system based on PC's in 1990

Description: Making the software for PC's available for accounting offices to do the closing of accounts
Driving force: Internal (making the system more efficient and getting more qualified data)
Put on brakes: Nobody (Lack of resources)

2) Conversion between the accounting software and FADN data

Description: Getting part of the data from needed in FADN directly from special agrarian accounting software
Driving force: Internal (to avoid double accounting)
Put on brakes: Too many different software on the market (plenty of updating needed every year)

3) Accounting of organic farms

Description: Getting the results from organic cultivated farms
Driving force: Data necessary both for researchers and policy makers
Put on brakes: Potential participating farms

3.6 Process-model Finland: remarks by Spain and audience

Changes

* Driven by changes general environment.
* Price driven income support ➞ direct income support.

Main change areas

* Representativeness:
  new way of picking a sample (representativity)
  presently: - selected by rural advisory centres
  - on a voluntary basis
  change the size stratification system (surface arable land, standard gross margins)
* Institutional arrangement
  national RICA committee

* Technical (changes going on!)
  introduction of control programmes
  conversion programs (to translate from national level to RICA)

Threats

* COSTS (biggest threat)
* Keeping / enlarging sample size (secondary)

4. GLOBAL DESCRIPTION FRENCH FADN

France

4.1 Introduction

The French RICA is managed by a branch of the ministry of agriculture: the 'S.C.E.E.S.' (Service Central des Enquêtes et Etudes Statistiques: 'Central Service of Statistical Surveys and Studies'). The S.C.E.E.S. is a statistical office (700 employees) which doesn't only work on RICA: it has 8 full-time employees working on the RICA in Paris and 20 local employees working full- or part-time on RICA in the S.R.S.A. (Service Régional de Statistiques Agricoles: 'National Service of Agricultural Statistics'). It also has 157 sub-contractors to collect data.

The S.C.E.E.S. works independently from the well-known statistical office: INSEE.

The beginning of French RICA is dated from 1965. The first database was built in 1968 in Aix en Provence.

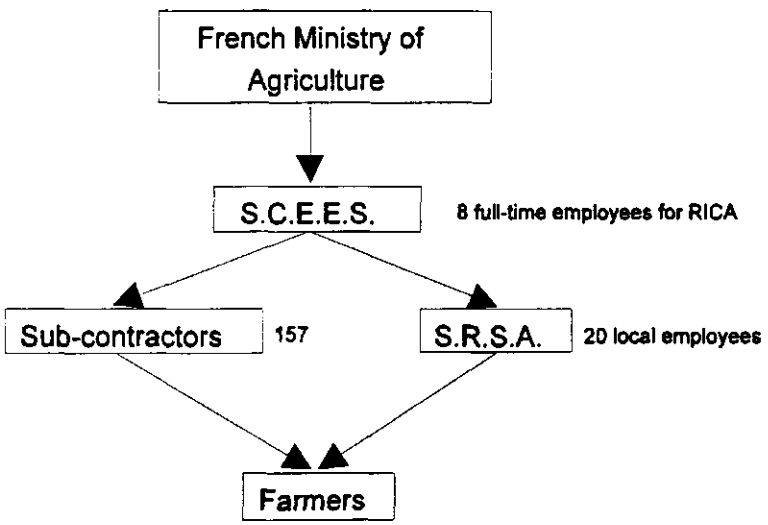


Figure 4.1

Now, the French sample of the RICA is above 7,600: it represents 460,000 farms (in France there are approximately 800,000 farms) and the representativity of French production is above 90%. There are 3 sub-samples in the French RICA.

The cost of the collect is 24 million, financed for 20% by European Community (120 ECU per farm return) and French Ministry of Agriculture. Otherwise, the global cost rises to 30 million.

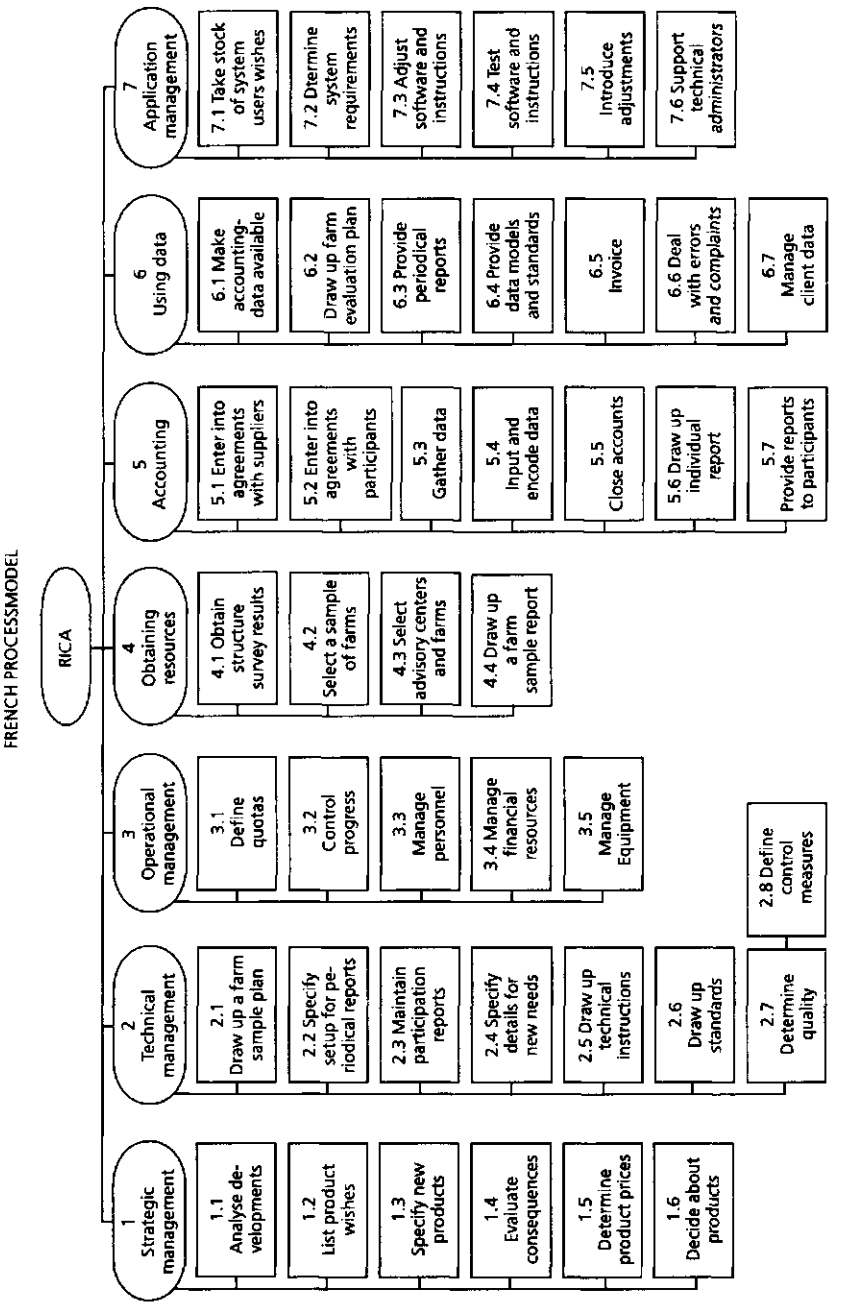
4.2 Accounting at farm level

In France, almost all farms use the accounting system for external reasons: taxation, as well as financial and legal imperatives. Also many farms are now equipped with a computerizing accounting system, no centralized data network exists. What exists is a software and services market in management which leads to competition and not cooperation. There is a great deal of heterogeneity of information recorded since each network has its own definition of terms. There is no link between RICA and the management network. The Advisory Centers do not use RICA's information. This leads one to consider the problem of price as well as information accessibility.

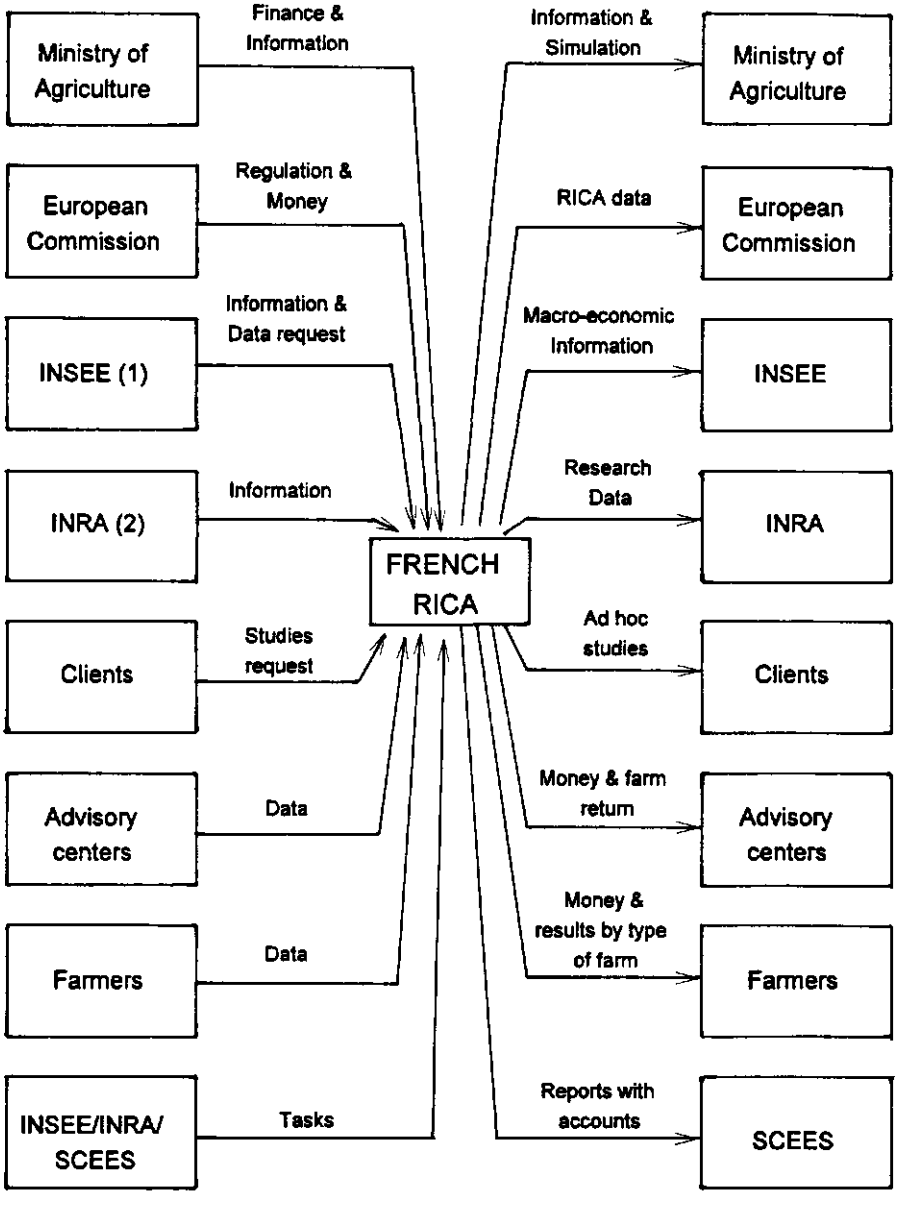
Table 4.1

	Unit	FR
Number of farms in country (x 1,000)	#	800
Farms with on-farm PC	#	50,000
Farms with bookkeeping: total	#	600,000
Farms with bookkeeping: on own PC	#	30,000
Fiscal bookkeeping obliged by law?	yes/no	yes
Complexity of fiscal regulations	high/low	high
Complexity of ownership situations	high/low	low
Specialized agrarian bookkeeping software	yes/no	yes
available on the market?	#	>10
Farms with production record system	#	?
Comparisons of results between farms common?	yes	no
(# farms involved)	#	no
Specialized agrarian accounting offices	#	200
Average 'out of pocket' accounting cost per	$	10-15,000
farm with bookkeeping		FF
Specialized agricultural banks	#	1 to 2
Market share specialized banks in the	%	90
agricultural sector		
EDI service available?	yes/no	yes

4.3 Processmodel



4.4 Stakeholder analysis of the FADN



(1) INSEE: Name of the National Statistical Office
(2) INRA: Name of the National Institute of Agricultural Research

4.5 Process-model France: remarks by Sweden and audience

Remarkable elements

* Pragmatic system (stable, but not flexible)
* Not a random system (they have to fill up the sample)
  There are many sub-contractors in the system!

Changes and threats for future developments

* Representativity (seen as an statistician)
* Validity (seen as an economist)

5. GLOBAL DESCRIPTION DUTCH FADN

Krijn Poppe

5.1 Introduction

The Dutch national FADN is embedded in the DLO Agricultural Economics Research Institute (LEI-DLO). LEI-DLO has 280 employees of whom a hundred work at the FADN. The FADN was started in 1942 and is within LEI-DLO devided between four departments, as shown in figure 5.1.

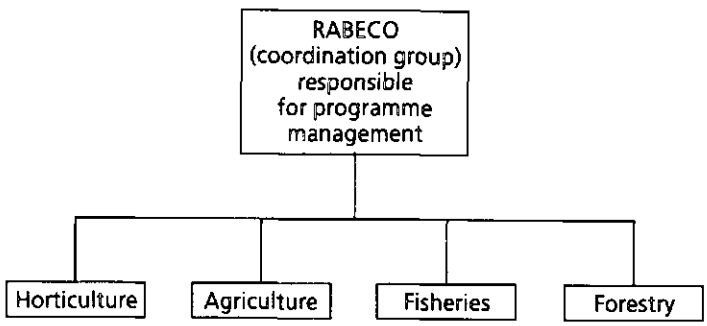


Figure 5.1 Organogram Dutch FADN

LEI-DLO as a part of DLO (Agricultural Research Department) is an independent research institute which receives finances from the Ministry of Agriculture to carry out the FADN task. Personell of LEI-DLO have the status of a civil servant. Collection of the data is carried out by LEI-DLO presonell in sixteen regional offices. Compared to other countries more data is gathered on non-farm income, gross margins, volumes and environmental issues.

5.2 Accounting at farm level

The Netherlands has about 120,000 farms (source: Farm Structure Survey), of which 90,000 belong to the observation field of the FADN. Farms are often very specialized and face (since the beginning of this century) an obligation to keep books for tax purposes. The tax accounts and the (quite difficult) tax report are in nearly all cases made by a professional accountant. Many farms are partnerships, e.g. between father and son or man and wife. On average the farmer pays nearly *f* 5,000.- guilder for (tax-) accounting and advice. The main accounting offices were founded as a cooperative or as an activity of the farmer's organisations. At the moment those offices (about 15) have a market

share of more than 50%. Although PC's and management systems are often used by Dutch farmers, accounting is not one of the activities performed on these PC's. A seperate paper for this workshop (Poppe, 1993) tries to explain this rather typical situation.

	unit	NL
Number of farms in country (*1,000)	#	120
Farms with on-farm PC	#	40,000 ?
Farms with bookkeeping: total	#	120,000
Farms with bookkeeping: on own PC	#	< 5,000
Fiscal bookkeeping obliged by law?	yes / no	yes
Complexity of fiscal regulations	high/low	high
Complexity of ownership situations	high/low	high
Specialized agrarian bookkeeping software available on the market?	yes / no #	yes 3
Farms with production record system	#	40,000?
Comparison of results between farms common? (# farms involved)	yes / no #	yes
Specialized agrarian accounting offices	#	25
Average 'out of pocket' accounting cost per farm with bookkeeping	$	Dfl 4,600
Specialized agricultural banks	#	1
Market share specialized banks in the agricultural sector	%	90
EDI services available?	yes / no	yes

Figure 5.2 Facts about farm accounting

5.3 Process model

The process model of the Dutch FADN has been discussed in a paper by Verwaart and Spiering (1995) for the first Pacioli workshop. It should be stressed that this process model still describes a desired and not the actual situation. In the actual situation 'strategic management' has a very low profile and 'technical management' is scattered over the different departments, resulting in a lack of harmonisation between data sources.

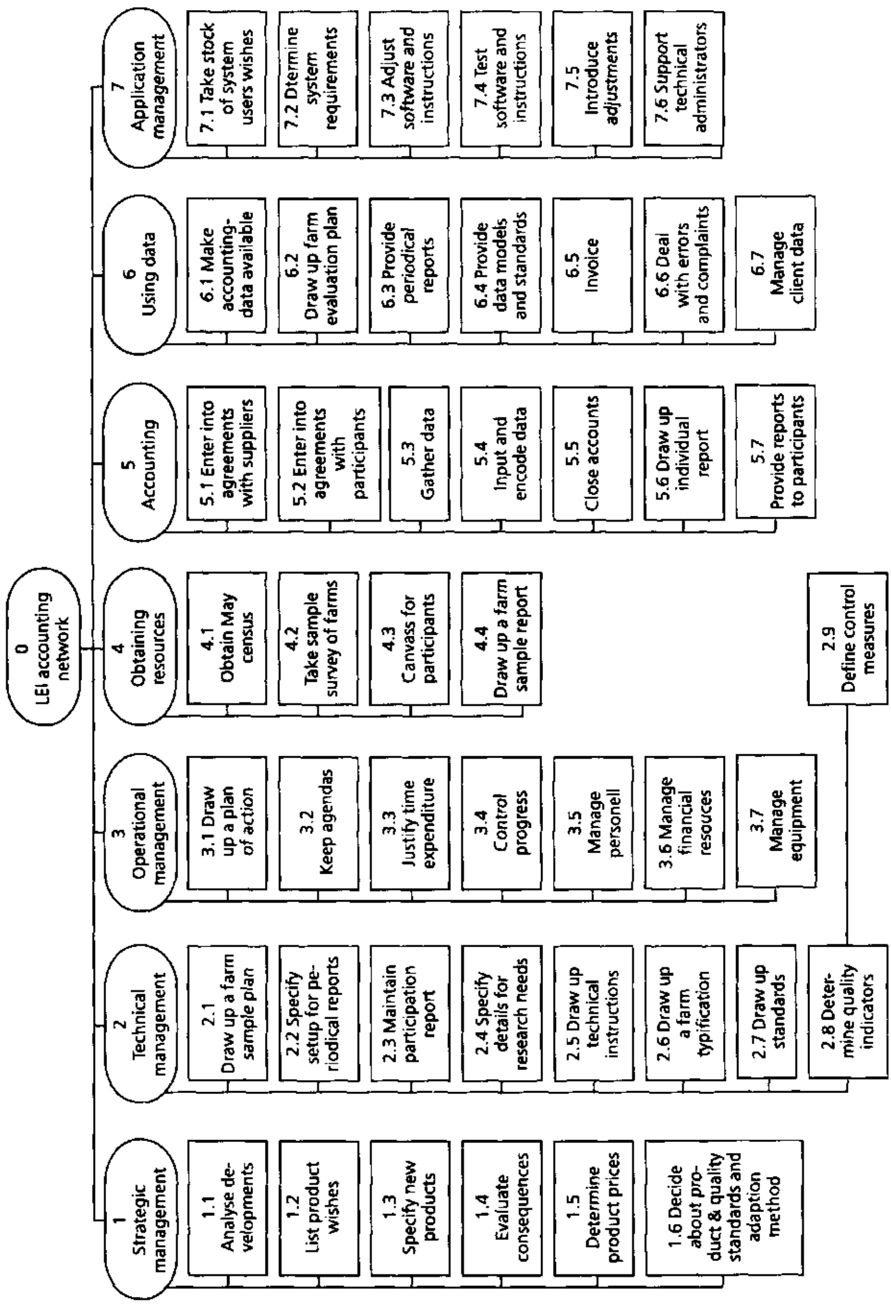


Figure 5.3 Process model, The Netherlands

5.4 Stakeholder analysis of the FADN

The stakeholders analysis shows 11 stakeholders. Finance is coming from the Ministry of Agriculture, subsidizers (including the EU) and (research-)clients. Data is coming from the Central Statistical Office (CBS) in the form of the anual census (FSS), the farmers and assignees: banks and other data sources that have been authorized by the farmer to provide data on his farm to the LEI-DLO.

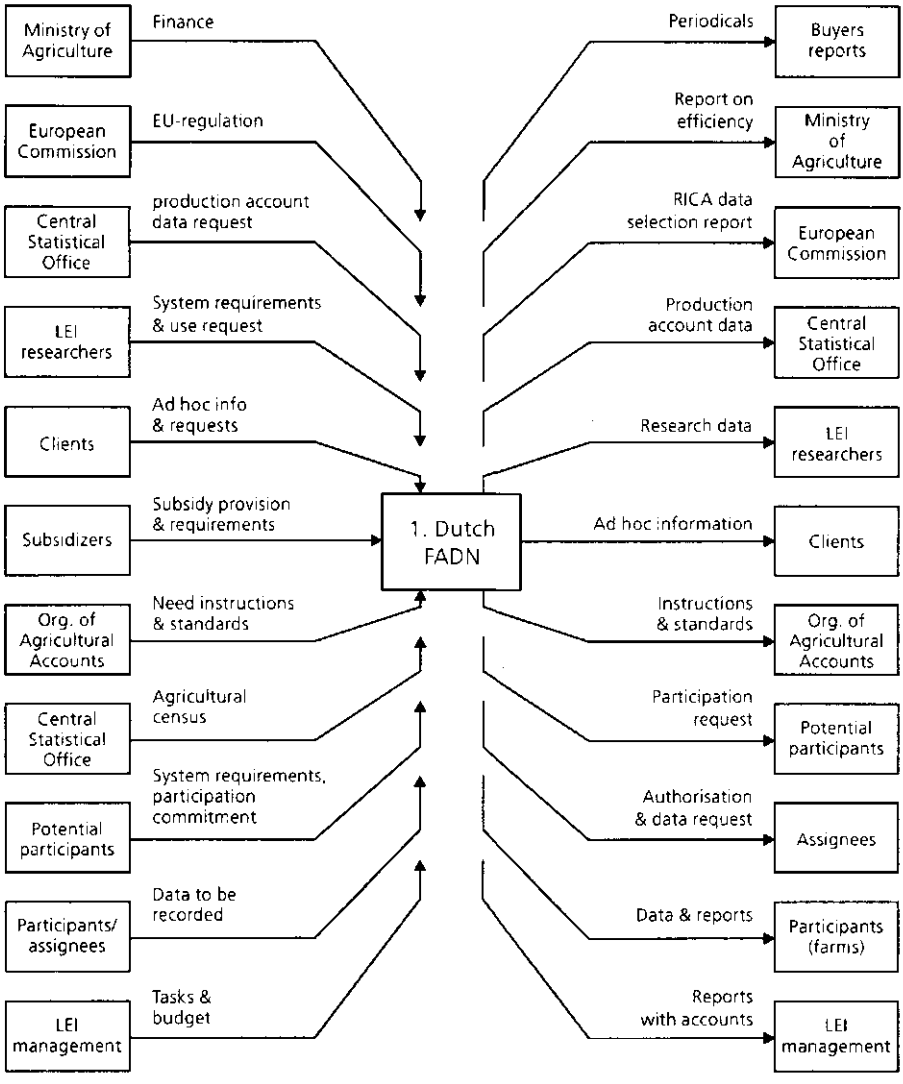


Figure 5.4 Stakeholder analysis, The Netherlands

Most important user-categories are RICA, LEI-researchers and clients. Of course farmers are also users of results (on their own and on comparable farmers) and our accounting staff in the region tends to see them as their main client. From the management point of view however, this feed back is not a purpose but a mean.

5.5 Innovation

The major innovations that have taken place in the Netherlands are:

1) accounting of the mineral balance
2) EDI of bank payments, data
3) accounting of pesticides
4) harmonisation of agriculture and horticulture
5) accounting Mac Sharry information
6) using the network for questionaires

ad 1) description: gathering data on inputs and outputs of minerals (N, P, K)
driving force: environmental data neccesary for researchers and policy makers
put on brakes: - internal (bookkeepers)
- potential participating farmers

ad 2) description: automatic transfer of bank data
driving force: - internal (efficiency)
- potential participating farmers (are less troubled)
put on brakes: nobody

ad 3) description: gathering of data on pesticides
driving force: Ministry of Agriculture
put on brakes: nobody

ad 4) description: harmonisation of of farm selection and accountancy methods between two departments within LEI-DLO
driving force: external users and researchers
put on brakes: internal accountancy departments

ad 5) description: gathering data on Mac Sharry payments
driving force: European Commission (RICA)
put on brakes: nobody

ad 6) description: using the very good contacts with the farmers (and their trust) to ask for additional information in questionaires
driving force: researchers, LEI-DLO management
put on brakes: nobody

5.6 Process-model the Netherlands: remarks by the United Kingdom and audience

Remarkable elements

* Single national institution (c.f. UK).
* Incorporation of data on fisheries, forestry, recreation & nature within 'FADN type' system.
* Volume and breadth of data: non-farm income, physical inputs, mineral balances, pesticides, energy (glasshouse).
* Compliance role in energy reduction programme.
* Development of 'new' products.
* Responsible for publishing national data; deciding on medium and disaggregation (flexibility).
* Electronic data inputs (auctions, banks etc.).
* Responsible for quality control on own work.

Chances and threats for future developments

Threats
* Funding constraints / cuts.
* Representativeness threatened by farmer having own data: not participating.
* Competition from other sources of data.

Opportunities
* Increase flexibility via information systems (speed, accuracy, cost reduction, increased response rate (less onerous on farmer).
* Growing market for data - commercial and government organisations c.g. oil companies - total consumption of their sales by region.

6a. THE MAIN CHARACTERISTICS AND PROJECTS OF THE SPANISH FADN

Carlos San Juan

The present paper describes the general characteristics of the Farm Accountancy Data Network (FADN) in Spain, together with some projects underway.

Farm participation in the FADN Programme is totally voluntary, receiving an annual amount for their cooperation which is presently set at 16,500 ptas.

Each farm is registered at a certain Accounting Office: the number of cooperating farms for the year 1991 reached 10,500.

a) The Accounting Offices

Each year and through the relevant Public Offer, the General Technical Secretary of the Ministry of Agriculture contracts the services of entities (external consultants) which act as a technical 'bridge' between the cooperating farms and the Cooperating Commission.

The Accounting Offices have the following main tasks:

- Collecting the information supplied by the farms;
- Applying this information using the accounting programme and by sending the processed information to the Cooperating Commission;
- Bringing in new farms.

The number of Accounting Offices which were working in 1991 reaches 34, with an average of 300 farms registered at each one.

The Accounting Offices are remunerated proportionally to the number of farms they manage, at 20,000 ptas. per farm.

b) The Cooperating Commission

This is set up by the General Technical Secretary of the Ministry of Agriculture, although the technical and administrative functions are carried out, as pointed out above, by the Microeconomic Analysis Services of the General Deputy Management for Sectoral Statistic and Analysis.

The said Services have the following main tasks:

- The setting up and execution of the whole FADN methodology;
- The receipt, control and sifting of information received by the Accounting Offices;
- Inspection visits to the farms and Accounting Offices;
- The treatment of the information to be sent to the Commission;
- The implementation of information which is already consolidated in the FADN data base;

- The production, analysis and publication of the accounting results;
- The calculation and establishment of Standard Gross Margins (SNM) which are sent to the National and Community statistical organs;
- All the administrative procedures the previous works entail (Preparation and appointment of Public Offers, processing of payments to the Accounting Offices and Exploitations, etc.)

In order to carry out the above functions the Services have the following human resources available:

- 6 technical people;
- 1 administrative person;
- 2 assistants

as well as the part-time cooperation of two computer experts from the General Deputy Software Direction of the Ministry of Agriculture.

The software system itself is based on a fourth generation language which has access to an SQL data base, implemented in a minicomputer under UNIX.

The services of the main computer in the Ministry of Agriculture are also used.

The FADN farm file It is characterized by being totally compatible with the community file, which constitutes a large group, and from which it differs in two main aspects:

- It supplies more detailed information, particularly regarding harvest products.
- It includes a balance structure which allows an easy verification of its coherence and a better exploitation of results.

6.1 The software programmes

The total number of programmes which make up the FADN software system is very high, but they are all based on 4 main programmes:

6.2 Typology programme

FADN uses the community typology programme to classify its farms. This means that it is compatible with the RICA results, from a typological point of view.

6.3 Control programmes

The verification of the Spanish file is carried out by the RICA Control Programme, together with a complementary programme which allows one to verify the information in the Spanish file which does not appear in the community file.

6.4 Programme for changes in format

Using the files FADN carries out an aggregate of the fields and recodifies the products, giving rise to RICA files.

6.5 Programme for FADN results

This generates the standard Spanish results, based on the farm files.

6.6 Accounting programme (IDUS)

Contrary to the previous programmes, which run in large systems, this programme is implemented by microcomputers; the programme is fully operative and is the only legal requirement for all the Accounting Offices since 1990.

Using the inventories and daily codified reports it elaborates the accounting and generates the abstract FADN file, together with additional different information.

The main advantages derived from the use of the programme are:

- A drastic decrease in the staff work which allows the Accounting Office to dedicate more time to field work, which entails greater quality and greater availability of data.
- It standardizes the processes by eliminating uncertainties and mistakes in interpretation by the accounting offices.
- It greatly eases the verification processes of information by eliminating arithmetical errors.

6.7 The exploitation of FADN information

Once all the information for each accounting exercise is consolidated, this is incorporated to the SQL data bases as structure tables which are identical to the similar ones in the farm file. It is then ready for any kind of computerized application, either by means of programmes or interactive consultation.

The standard exploitation for the FADN file allows the annual publication of Business Methodology and Results. This gathers a series of technical and economic indicators for the whole of Spain and for each one of the 17 RICA areas (which correspond to the 17 'Comunidades Aut≤nomas' in Spain), for each group of farms belonging to a certain OTE and CDE.

The indicators are grouped in five sections which reveal the productive structure of the farms and the economic and financial results obtained in the accounting exercise in question, as follows:

a) The section labelled 'Structure' includes 26 indicators relating to the productive structure of the average farm, of the group in question. The composition of the work factor used is set up, measured in U.T.A. (Annual

Work Units) and using the ground or Useful Farming Surface in Has. of S.A.U., as well as the composition of the Total Cattle in Cattle Units.

The Use of the Ground is carried out in 16 indicators which reflect the farm's surface distribution amongst the main types of harvests and pasture.

b) The second section of results labelled 'Gross Production' examines the value of the total gross production (made up of 34 indicators) in the different vegetable and animal exploitations. It includes a rubric reflecting the Variation in the Cattle Inventory for the exercise, which is an integrating part of the different gross animal productions.

Likewise it includes two indicators relating to the value of Self-consumption and Self-employment for the exploitation.

c) The third section of results describes the 'costs' in 24 indicators which refer to the use of production means in the production process: specific costs of harvests and cattle, and non-specific costs. Redemptions and Salaries, and Rents and Interests paid, are also included in this section.

d) In the following section Subsidies and Taxes are quantified by means of seven indicators, as well as the indicators of profitability: Final Agrarian Production, Gross Added Value, Net Added Value and its coefficient referred to the Annual Unit of Work and Business Availability.

e) The last section labelled 'capitals' encompasses a total of 17 indicators which reflect the capital structure for the average farm, which describes the composition of the farm's productive capital - in fixed capital and variable capitals - as well as the farm's financial capacity. Lastly, in this fifth section of results the Investments and Subsidies linked to the said capital acquisitions are analyzed.

The structure of the tables follows an arrangement by files reflecting the abovementioned indexes, and by columns reflecting the values related to the various types of dimension, with the last column collecting the waged average of all the classes.

6.8 Projects underway

As well as the establishment of a new Selection Plan which entails the aggregate of OTES and UDE mentioned previously, the RECAN Services have other projects underway described as follows:

a) Control Programme at the base
It is run by microcomputers and it allows the total verification of the FADN file by the Accounting Offices before it is sent to the Cooperating Commission. It is in an advanced stage of execution and will be operative in the next accounting exercise of 1992.

b) Accounting Programmes for management

The idea of creating a polyvalent programme for analytical accounting which is compatible with RICA and is implemented in microcomputers seems attractive at first sight, but it is carried out with difficulty in practice: suffice it to say that the IDUS programme, much less ambitious than the one proposed, runs along 30,000 code lines and has taken up 18 months of analysis, programming and adjustment.

The experience acquired through IDUS has suggested that the FADN Services choose as a solution the carrying out of a series of specific programmes for the main productive orientations, which will eventually replace IDUS in its field of application as they are adjusted.

The first of these management accounting programmes applicable to dairy farms is already at an analytical stage.

This will eventually be used by the Accounting Offices starting in 1993.

6b. REGIONAL DIFFERENCES/SIMILARITIES IN THE SPANISH FADN (RECAN): GLOBAL DESCRIPTION BASQUE FADN (RICAV)

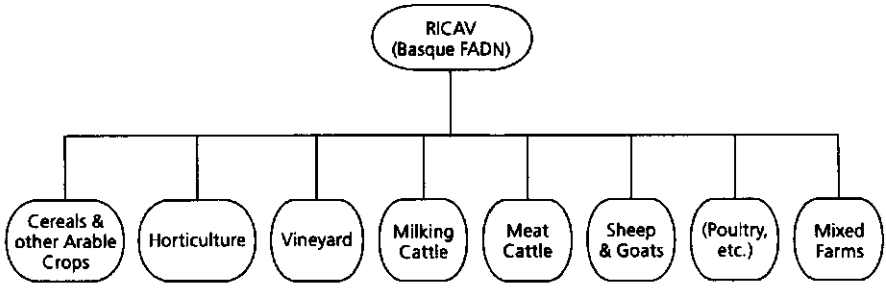
Prof. Inmaculada Astorquiza 1)

6.1 Introduction

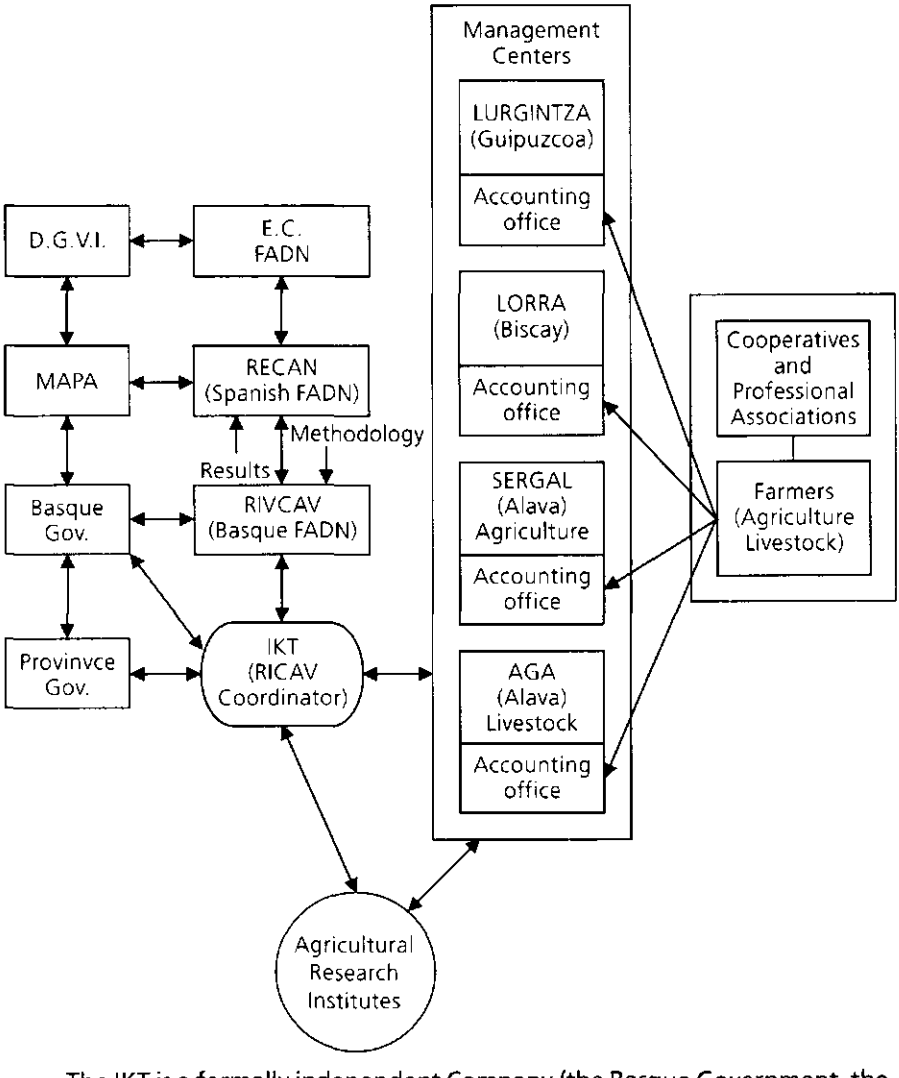
The Basque FADN (RICAV) is embedded in the Basque Country Management Centers (LURGINTZA in Guipuzcoa, LORRA in Biscay and AGA-SERGAL in Alava). These Management Centers have more than 100 employees, thirty of whom work at the RICAV. The Management Centers and the RICAV are internally organized by sectors (type of farming).

The RICAV (Basque FADN) was started in 1985 when the Basque Government and the Spanish Ministry of Agriculture, Fishery and Food (MAPA) signed a 'Protocol of Reciprocal Action'. Formerly, the Basque Country took part in the RECAN (Spanish FADN) in the same way as other Spanish Regions did and, in the majority, still do.

Since 1985 the RICAV works in a fairly autonomous fashion, that is the Accounting Offices, that belong to the Management Centers, select a sample among associated farms who express their willingness to participate in the RICAV-RECAN. Afterwards they gather the data and process it, following the methodology fixed by the Spanish National FADN Bureau with regard to definition of variables, accounting and valuation criteria, etc.



1) Departamento de Economia Aplicada I, Universidad del Pais Vasco, (Spain).



The IKT is a formally independent Company (the Basque Government, the three Provincial Governments and the Management Centers share its capital: 45%, 15%, 15%, 15% and 10% respectively). This Company is in charge of the software development for the Management Centers, RICAV included, and coordinates every process in the information system. It participates in the homogeneity of methodologies as well as in the coherence analysis of generated information in each point of the system. Besides, it is closely related with the Statistical Service of the Department of Agriculture of the Basque Government.

The Management Centers offer a lot of services, not only to individual farmers but also to Professional Associations and Cooperatives, so accounting

is just one of the services they offer to their associates and RICAV is a secondary product and a way individual farmers have to get cheaper management services.

The Basque Management Centers were created in the beginning of the seventies in Guipuzcoa, afterwards they spread to the other 2 provinces (Biscay and Alava). They carry out several activities such as the direction, coordination, administration, data processing and technical advising of the associations as well as the following services to individual farmers:

1) Technical and Economic Management
   - Accounting management by activities
   - Livestock feeding management
   - Plant production management (seeding, fertilizing, treatments, etc.)
   - 'Intensive Vigilance Unit'service for farms with special financial problems
2) Accounting
3) Veterinary Services (Sanitation, reproduction, production...)
4) Agronomic Services (Sanitation, cultivation processing, production...)
5) Legal and Fiscal Advice
6) Investment Projects
7) Coordination of the Substitution Service
8) Technical, Economic and Social Training

The experts from the Management Centers are in close contact with the Agricultural Research Institutes and the IKT, because these provide not only services to them but also transfer technology and all of them work together in some studies and analyses.

6.2 Accounting at farm level in the Basque Country

1) Number of farms (1989 Census) 43.193
   - Number of farms with at least 1 Annual Work Unit 10.851
   - Number of farms whose head is older than 60 ..... 16.991
2) Number of farms with on-farm PC ..... at least 40 (Known)
   - Number of farms with production record systems .. much more (?) (milking computers, etc.)
3) Number of farms with bookkeeping: total 3.000
   - Number of farms controlled through Technical + Economic Management (associated to the Management Centers) 1.200
4) Number of farms with bookkeeping: on own PC .. at least 40 (Known)
5) Is fiscal bookkeeping obliged by law? ..... No, except in Alava
6) Complexity of fiscal regulations ..... There are 3 types of fiscal regulations
7) Complexity of ownership situations ..... Quite variable (from simple to high)
8) Specialized agrarian bookkeeping software available on the market? ..... Yes, at least 3

(But most farmers use general accounting software)

9) Number of farms with production record systems (Milking systems + Books) ..... 5.000 (?)

10) Is comparison of results between farms common? ..... No
- It is common only among farms associated to the Management Centers 1.200

11) Specialized agrarian accounting offices (Management Centers/RICAV) 4

12) Average 'out of pocket'accounting cost per farm with bookkeeping ..... 50.000 pts/year
- *Average 'out of pocket' technical + economic* management cost per farm ..... 150.000 pts/year

13) Specialized agricultural banks (in theory) 2
- In practice most commercial banks have a special agricultural section 100%

14) Market share specialized banks in the agricultural sector 100%

15) EDI services available? ..... No

*) Additional explanations:

(2) Farmers with on-farm PC's are very professional and the farm is of medium to high size (by Basque standards). They value highly their autonomy in processing the data .Generally they use different types of software applications: accounting, feed and production control, etc. Most of them send processed information to the Management Center in order to get information about rankings, average productions, etc.

(6) Fiscal Regulations (Income, VAT)

- Income:
  - i) By Modules [Acreage (ha.), Livestock (heads)]. *Afterwards add the* Net Yields of each activity] → Biscay and Guipuzcoa → Low Complexity.
  - ii) By Coefficients [Income Book, Costs Book (No water, electricity or telephone costs), Investment Book (No amortizations/depreciations)]. Afterwards: Income - Cots - % Coeff.(compensate the amortization/depreciation and overhead costs not included) → Net Yield → Alava → Higher complexity
  - iii) By Direct Valuation [Books + Accounting] → Usually Cooperatives, SAT, Non family farms (receipts: + 50 million pts.; employees: + than 12) → The highest complexity.
- VAT (Value Added Tax):
  - a) Special VAT System for farmers. They charge a 4% VAT to their sales in order to compensate the VAT they pay in the purchase of variable inputs, equipment, etc.
  - b) General VAT System. Farmers who adopt this general system are obliged to keep books and accounting. They must use the Direct Estimation System to declare their incomes. Family farms with high investment rates can be occasionally interested in this type of system.

6.3 Procesmodel

The process model of the Management Services is more complex since they offer more products than accounting.

*) Technical and economic management

It is one of the products offered by the Management Centers. The associated farmers are obliged to gather technical and economic data which are given to the specialists. The gathered data is quite detailed and links physical and economic variables.

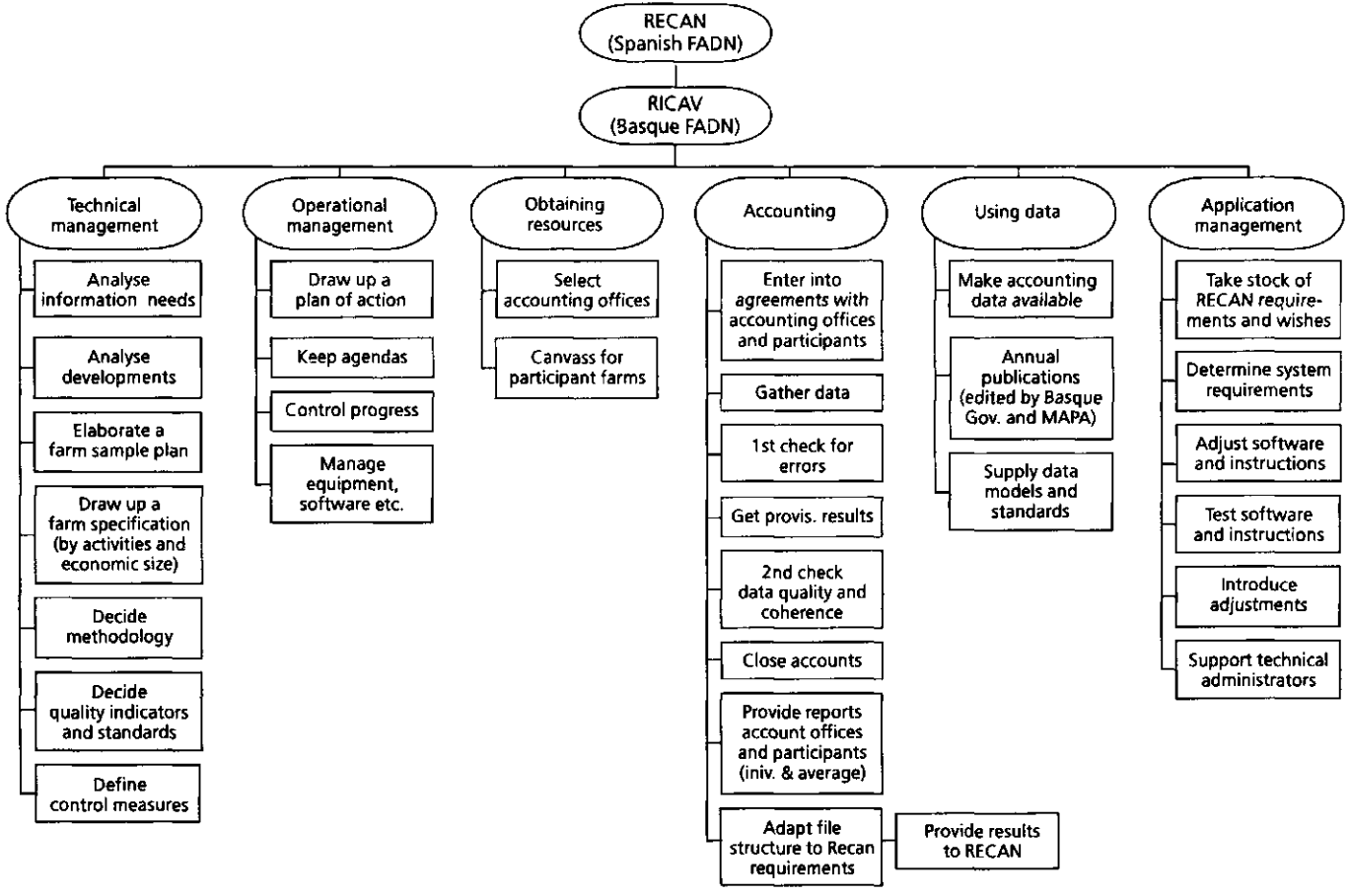
The input data is processed in the computer to obtain management results (technical and technical-economic indices) for each farm, as well as group averages and rankings. Some of these results are reported monthly and others yearly to farmers.

When the specialists visit the farm, besides management advice, they analyse livestock feed as well as crop operations. They answer the farmer's questions and provide information about fiscal regulations, grant and subsidy plans, etc.

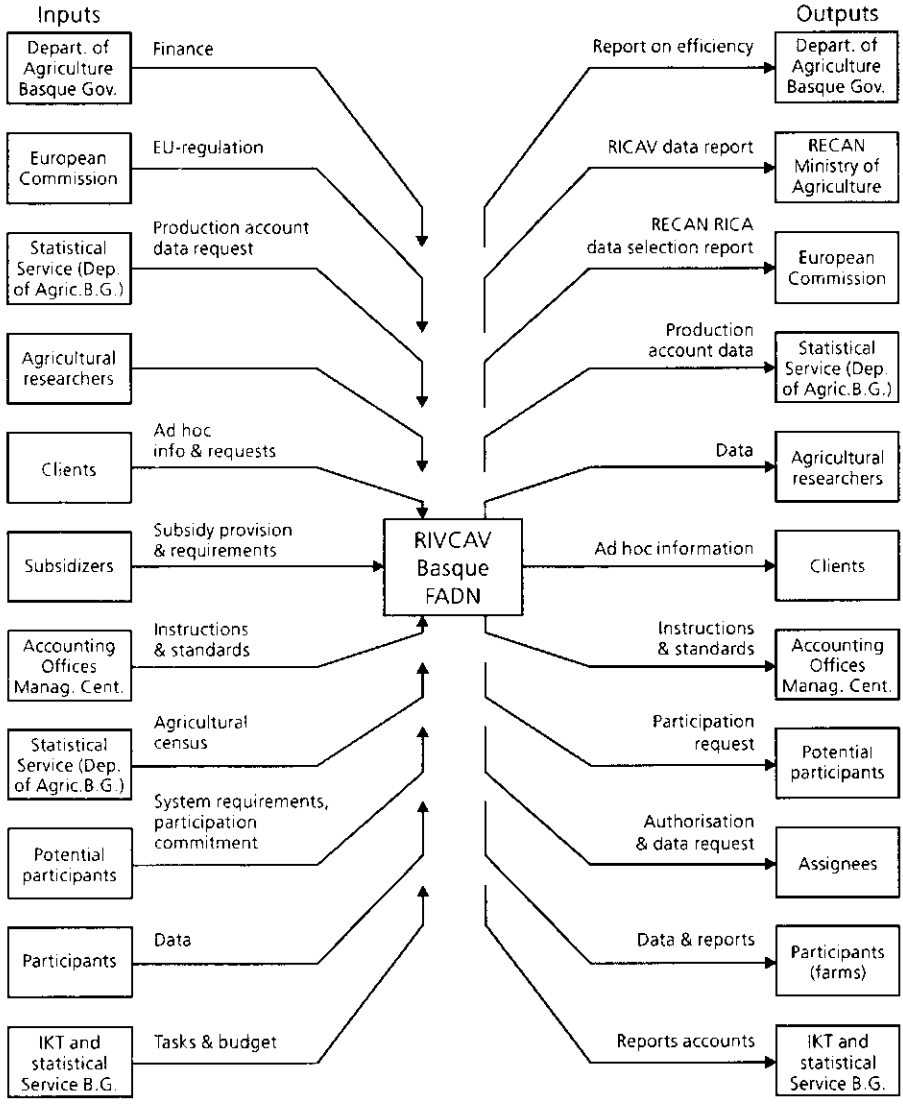
The specialists from the 3 Management Centers join together periodically. They also come together with the specialist (Coordinator) from the IKT to analyse the data that 'feed' the system, the methodology to follow in the fieldwork and in the elaboration of input data. These experts also have a close contact with the Agricultural Research Institutes and the IKT who transfer technology to them. They realise joint studies and analyses.

Management Centers are interested in using compatible methodologies with the RECAN, nevertheless in some cases they adopt more technical criteria since they allow to provide a closer view of the reality and have a greater utility for farmers. For instance, they do not estimate amortizations/depreciations in the same way RECAN-RICAV does, based on the replacement value, but they apply linear amortization/depreciation over the purchase value with an amortization/depreciation period close to the real operational life.

*) The RICAV is subordinated to the Spanish FADN's requirements, so the Strategic Management is in RECAN's hands.


RECAN
(Spanish FADN)
RICAV
(Basque FADN)
Technical management
Analyse information needs
Analyse developments
Elaborate a farm sample plan
Draw up a farm specification (by activities and economic size)
Decide methodology
Decide quality indicators and standards
Define control measures
Operational management
Draw up a plan of action
Keep agendas
Control progress
Manage equipment, software etc.
Obtaining resources
Select accounting offices
Canvass for participant farms
Accounting
Enter into agreements with accounting offices and participants
Gather data
1st check for errors
Get provis. results
2nd check data quality and coherence
Close accounts
Provide reports account offices and participants (iniv. & average)
Adapt file structure to Recan requirements
Provide results to RECAN
Using data
Make accounting data available
Annual publications (edited by Basque Gov. and MAPA)
Supply data models and standards
Application management
Take stock of RECAN requirements and wishes
Determine system requirements
Adjust software and instructions
Test software and instructions
Introduce adjustments
Support technical administrators

6.4 Stakeholder analysis of the RICAV



6.5 Innovations

1) The computing basis of the management system has been modified. Formerly it was composed of several independent programs by activities, but now it consists of a unique integrated program that incorporates all activities.
2) More flexible computer programs in order to help the unique entry of data for different computing applications such as: technical and econ. management, accounting, RICAV, grant and subsidy plans, etc.
3) The computing of technical data related to the management of grasslands for animal feed.

Driving Forces:

1) Experts from the Management Centers → Work becomes easier. They get a complete and easy to use 'Data Bank' for their analyses and studies.
2) Regional and National Decision Makers → They can get more accurate data.

Put on Brakes:

1) Farmers → They must gather more information. Sometimes they are reluctant if they do not see clear benefits for them.
2) Administrative labour of the Management Centers → They must gather and process more data when they carry a heavy burden of work specially in some periods of the year. (Not a serious problem till now).

6.6 Process-model Spain: remarks by the Netherlands and audience

Remarkable elements

Data gathering

	Farmers		Accounting services	RICA
1)	financial data	→ (no feedback)	financial data	→

Farmers are paid a small fee for this.

2)	financ. & techn. data	→ feedback on:	financial data	→
	← farm comparisment			
	← overviews			
	← advices			

Seventeen different regions, only three regions where second system (with feedback) is used. While the second system gives more reliable data!

* Large diversity in farm types, farming conditions.
* Problems coordinating regions → big effort to process data.

Chances and threats for future developments

* Control programme at the base; data verification as early as possible at level of accounting offices.
* Programme for analytical accounting to feedback management information to the farmer (to be used by accounting offices).
* Try to involve extension services more and universities.

Threats
* Budget cuts.
* Have to create win-win situation between farmers and FADN / RICA.

Annex 1 Accounting at farm level: Spain

	Unit	NL	FI	SW	SP	IT	UK	FR
Number of farms in country (* 1,000)	#	120			900			
Farms with on-farm PC	#	40,000 ?			5,000			
Farms with bookkeeping: total	#	120,000			10,000			
Farms with bookkeeping: on own PC	#	<5,000			<1,000			
Fiscal bookkeeping obliged by law ?	yes/no	yes			no			
Complexity of fiscal regulations	high/low	high			low			
Complexity of ownership situations	high/low	high			high			
Specialized agrarian bookkeeping software available on the market?	yes/no #	yes 3			yes 3			
Farms with production record system	#	40,000?			9,000			
Comparison of results between farms common? (# farms involved)	yes/no #	yes ?			yes			
Specialized agrarian accounting offices	#	25			30			
Average 'out of pocket' accounting cost per farm with bookkeeping	$	Dfl 4,600		office farm total	22,000 16,000 38,000*			
Specialized agricultural banks	#	1			3			
Market share specialized banks in the agricultural sector	%	90			40%			
EDI services available ?	yes/no	yes			no			

7. ACCOUNTING AND INNOVATION

Arne Bolin, Lars-Erik Gustavsson

Preface

Sweden became a member of the European Union on the 1 st of January, 1995. For delivering data about the Swedish agriculture in farm returns to the EU system Farm Accountancy Data Network (FADN) Sweden got a transitional period of three years from the income year 1996 to adapt the Swedish Farm Economic Survey - JEU 1) - to the principles of FADN. JEU of today will be executed up to the income year 1995, collecting, testing, summarisation and reporting data during the calendar year 1996. This means that Sweden not yet has an accounting system for executing farm returns for FADN. The description of the agricultural economic accounting in Sweden will therefore in this paper refer to an accounting system not adapted to the principles of FADN. From a methodological point of view there are however insignificant distinctions according to different concepts between the two accounting systems. These distinctions will be commented briefly.

As separate data concerned compared with JEU of today, a few variables will be added in JEU/FADN. On the contrary there are also variables that will be dropped.

From the income year 1996 JEU will be performed according to the principles of FADN and the sample will during three years up to JEU 1998 increase from 600 holdings to 1000 holdings. However, Sweden will in September 1996 for the income year 1995 deliver data to FADN from JEU 1995 for test purposes.

The adaptation of JEU into FADN will be executed according to the time table 7.1.

Table 7.1 Time table for JEU adapted to FADN

Survey	Publishing year						
	1994	1995	1996	1997	1998	1999	2000
JEU of today	1993 a)	1994	1995 b)				
JEU adapted to the principles of FADN				1996	1997	1998	1999
Number of holdings JEU/FADN (approx.)	535	500	600	750	900	1,000	?

a) Income year 1993, etc.; b) Farm returns to DG VI for tests.

1) 'JEU' is the acronym of the Swedish title 'Jordbruksekonomiska undersökningen'.

JEU is executed in a special section called 'The program for farm economic surveys' on Statistics Sweden. In this section also an other farm economic survey is executed - Income, expenditure and net receipts of holders (DU) 1) DU is based on data from assessment forms which Statistics Sweden borrows from local assessment authorities. On this program nine persons are employed of which 4-5 persons with JEU. The organisation of Statistics Sweden shows in appendix 1.

7.1 Introduction

7.1.1 Farm Accounting in Sweden - The Farm Economic Survey

Economists have during a long period of time been studying the economic situation of holdings on the basis of accounting data. In Sweden, such studies have gradually developed from a research project initiated in 1911 at

Period	Administration institution	Population	Sample size
1954-1975	National Board of Agriculture	Holdings in agriculture with arable land more than 10 ha (77,000-100,000) a)	1,000 - 2,000 holdings
1976-1987	Statistics Sweden	Selected classes according to mainly * type of farming * size of arable land (33,000-38,000)	1,000 holdings b) (860) c)
1988-1991	Statistics Sweden	Selected classes according to mainly * type of farming * size of labour requirement (20,000-29,000)	850 holdings (610)
1992-1995	Statistics Sweden	Selected classes according to mainly * type of farming * size of labour requirement (15,000-17,000)	600 holdings (520)

Figure 7.1 Some main characteristics of JEU
a) Number of holdings in the population; b) Number of holdings in the sample before non-respons; c) Number of holdings in the sample when non-respons is considered.

1) 'DU' = Deklarationsundersökningen för jordbrukare.

what to day is the Swedish University of Agricultural Sciences, into official agricultural statistics represented by JEU. Modern survey methodology and replacement cost principles were introduced in the survey 1954.

Statistics Sweden has administrated JEU since 1976. According to the Swedish agricultural policy the extent of the survey has changed over time. Figure 7.1 gives information about authorities in charge, population, sample and the changes in this issues since 1954. At Statistics Sweden 5-6 persons are engaged in JEU.

7.1.2 The management and funding structure

JEU has fulfilled several purposes. Originally, Swedish Parliament made funds available in response to a widespread interest in the economic development of Swedish farming. Up to the deregulation 1991 of Swedish agricultural market the use of statistics for agricultural policy purposes dominated, especially to questions related to various price support measures and, to some extent, also to farm rationalization and education.

A new management and funding structure of JEU was introduced in 1994. Instead of financing the survey by grants from the Ministry of Agriculture, the statistics are now 'ordered' and 'bought' by a governmental agency - the Joint Council for Economic Studies in the Food sector (LES) 1).

LES is one of twenty-five governmental agencies responsible for statistics in Sweden (GARS) 2), 3).

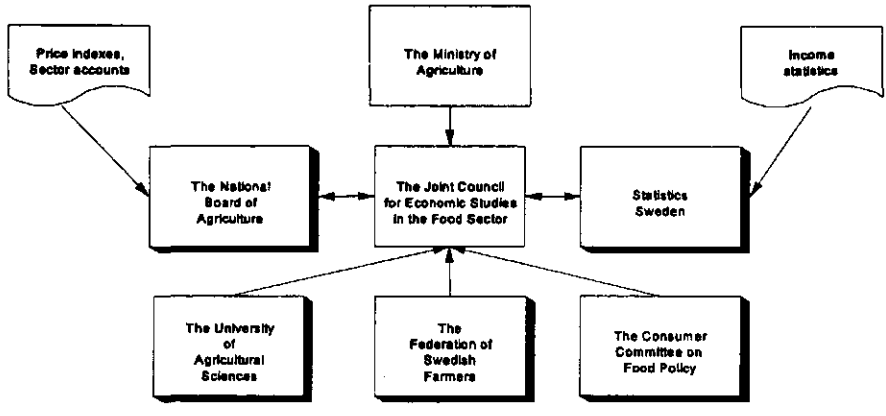


Figure 7.2 The management and funding structure of JEU

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1) LES= Livsmedelsekonomiska samarbetsnämnden.
2) GARS = Governmental Agencies Responsible for Statistics.
3) See Per Persson, Defining Information Requirements, Pacioli, Workshop 1.

A permanent expert group of representatives is responsible for methodological issues in JEU. This group consists of representatives from the National Board of Agriculture, Statistics Sweden, the Federation of Swedish Farmers (LRF) 1), the Swedish University of Agricultural Sciences and the Swedish Consumer Committee.

This group, supplemented with representatives from the Ministry of Agriculture and organisations co-operating with Statistics Sweden in the collection of data, will constitute the coming National FADN Committee for JEU/FADN.

It should be noted that Statistics Sweden and the National Board of Agriculture also have the task to supply the group with different data, for example income figures, price indexes, sector accounts, etc.

7.1.3 JEU of today (JEU 1992 - 1995)

JEU is a sample survey and covers some selected classes of holdings according to the type classification used in the Swedish agricultural statistics. The selection of classes has changed over time according to the agricultural policy in Sweden. At present only holdings focusing on production of field crops and dairy cows participate (see figure 7.3). According to special interest in agricultural policy of holdings in less favoured areas the sample of these holdings has been extended. Stratified sampling is used and every chosen holding participates on a voluntary basis for four years that means that 1/4 of the sample is replaced every year. This rule of renewal the sample is not applied in practice in JEU 1994 and JEU 1995 in order to prepare the enlargement of the survey for FADN. This means that every holding in JEU 1993 also participates in JEU 1994 and JEU 1995, regardless of how many years they have participated before.

7.1.3.1 The unit of investigation

The basic unit of investigation in JEU is defined as an enterprise, operating in agriculture, or agriculture combined with forestry, under one and the same management, owned or leased by a natural person or by natural persons in co-operation. An enterprise in the legal form of juristic person does not participate today, but in JEU/FADN, with some exception, all legal forms of enterprises will be covered.

In JEU there are no restrictions to participate according to the production value in forestry compared to the production value in agriculture. The reason for this is that the main interest in Swedish agricultural policy has always been concentrated on efficient, full-time family holdings. These holdings, especially in the northern Sweden, are in many cases a combination of economic activities in agriculture and forestry.

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1) LRF = Lantbrukarnas riksförbund.

7.1.3.2 The population

JEU is today based on a very small sample for reasons of economy and is mainly concentrated to farm categories of special interest for agricultural policy. The base for the sampling is the Swedish Farm Register (LBR) 1). Only holdings run by individuals below normal retirement age are included in the survey. Holdings with very large herds of certain animals or with large greenhouses are excluded. With the restrictions mentioned, JEU covers since 1992 the following geographical regions, dominant line of production and size classes according to annual requirement in work hours:

Region	Dominant line of production	Annual labour requirement in man-hours
Plain districts in Southern and central Sweden	Field crops	800-1,599
	Field crops	1,600-3,199
	Dairy cows	1,600-3,199
	Dairy cows	3,200-5,599
Forest districts in Central Sweden	Dairy cows	1,600-3,199
	Dairy cows	3,200-5,599
Northern Sweden	Dairy cows	1,600-3,199

Figure 7.3 The population of JEU

In JEU/FADN the population will cover all economic activities in agriculture according to the EU typology. The National FADN Committee will propose a threshold of 8 ESU.

7.1.3.3 The sample

The holdings in JEU are up to now expected to participate over a period of four years 2). With one quarter of the sample renewed each year, the survey can be characterized as a rotating sample with four rotation groups. Within the groups, stratified sampling is applied using a few strata based on the standard labour requirement as calculated for each holding in connection with the farm typology in LBR. As the period between the establishment of the sampling frame and the actual survey year is as long as 2-6 years, many changes appear in both the population and the sample. For that reason a post-stratification

1) LBR = Lantbruksregistret
2) When JEU is adapted to FADN the holdings are suggested to participate for six years.

based on the most recent LBR has been included in the estimation procedure. That procedure also takes into account non-response by means of weights used to correct for deviations from the proper distribution between strata. It may be pointed out that non-response represents a serious quality problem in the survey as participation is voluntary and many farmers selected do not participate. Another quality problem is of course that the small sample size inevitably results in fairly large sampling errors. It has therefore been regarded as particularly important to publish detailed error estimates.

7.1.3.4 Data collection, conversion and calculation of economic estimates

JEU is a system for collecting of quantitative data, predominantly financial data but also physical data. The accounting system in JEU gives a considerable freedom as to what can be collected and measured. Variables that are too difficult for other data collection methods can often be included in the survey. Considerable flexibility can be obtained in order to meet new statistical needs. The main disadvantage lies in the comparatively high costs.

JEU is based on extensive data collection of in all about 1,200 variables. Most data are coming from the part of the conventional accounting, often called the bookkeeping process. The physical nature of these data records may be anything from ledgers and journals to magnetic tapes.

In the data collection Statistics Sweden co-operates with local accounting organisations and with local Government authorities (see figure 7.4). Data on in- and outgoing payments comes from the bookkeeping in the conventional accounting that all Swedish farmers are obliged to keep according to the tax assessment rules. In- and outgoing values and quantities of stocks of products and commodities, benefits in kind, etc. are obtained through different forms. Most farmers in Sweden use the service of an accounting firm but some prefer to handle the bookkeeping themselves. In order to obtain a rational data collection, Statistics Sweden co-operates with a nation-wide accounting organization with constitutes part of the Federation of Swedish Farmers (LRF). About 20 local offices in this organisation are responsible for the collection. For valuation of farm buildings, standing forest and forest land, Government authorities at county level also participate.

As regards the valuation of farm buildings, the method will be simplified in JEU/FADN. Today different details of every farm building on the farm are estimated and this is not necessary for FADN.

All registered data are extensively EDP edited at Statistics Sweden. Some checks test whether values for all the relevant variables are registered and whether logical criteria are satisfied (for instance, if there is a positive value for milk sales, there should be a number of cows on the farm).

The following figures will illustrate the data flow of today.

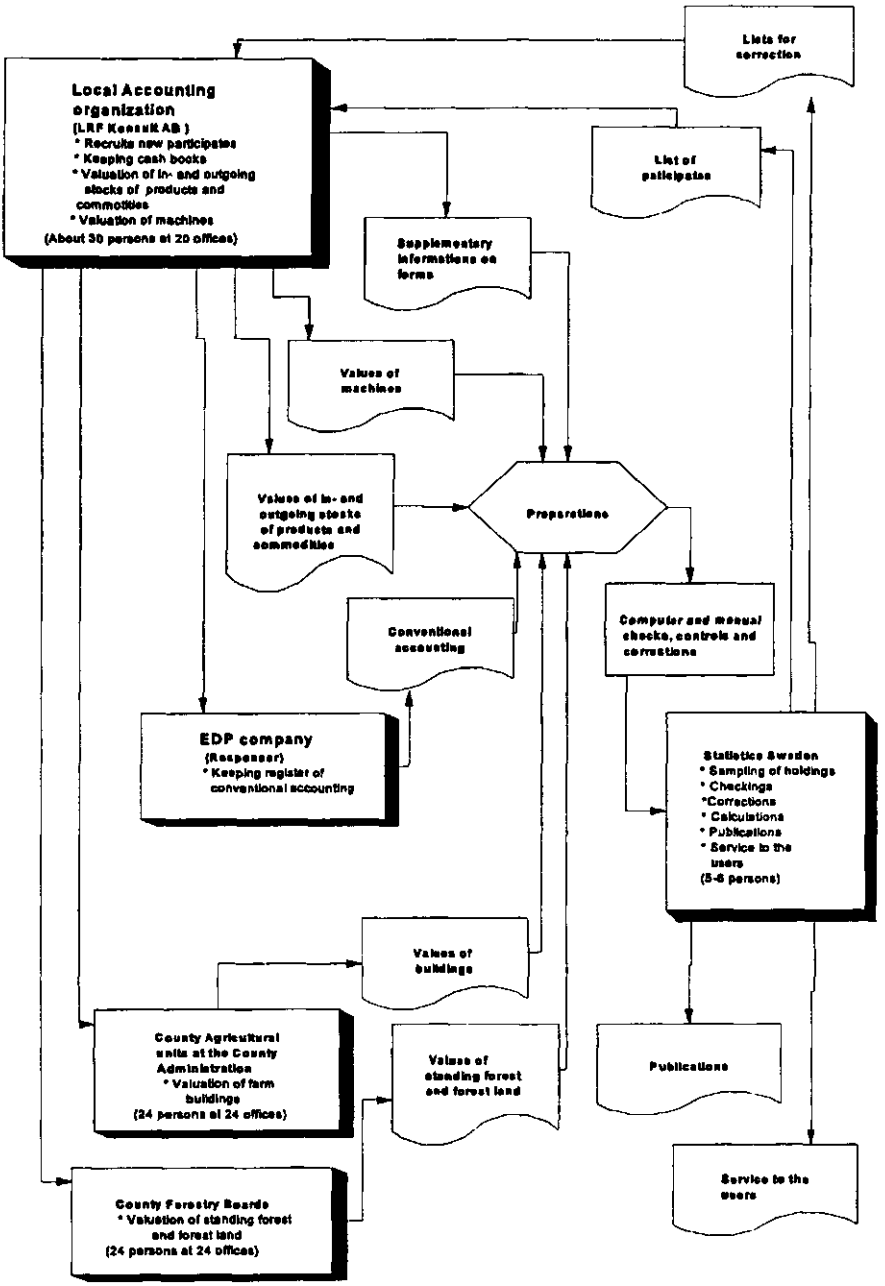

Figure 7.4 The data flow

7.1.3.5 The accounting concepts

In JEU separate income measures are calculated and published for agriculture and forestry. Up to JEU 1991 also figures of the non-farm income were published. Today the following accounting model is performed in JEU.

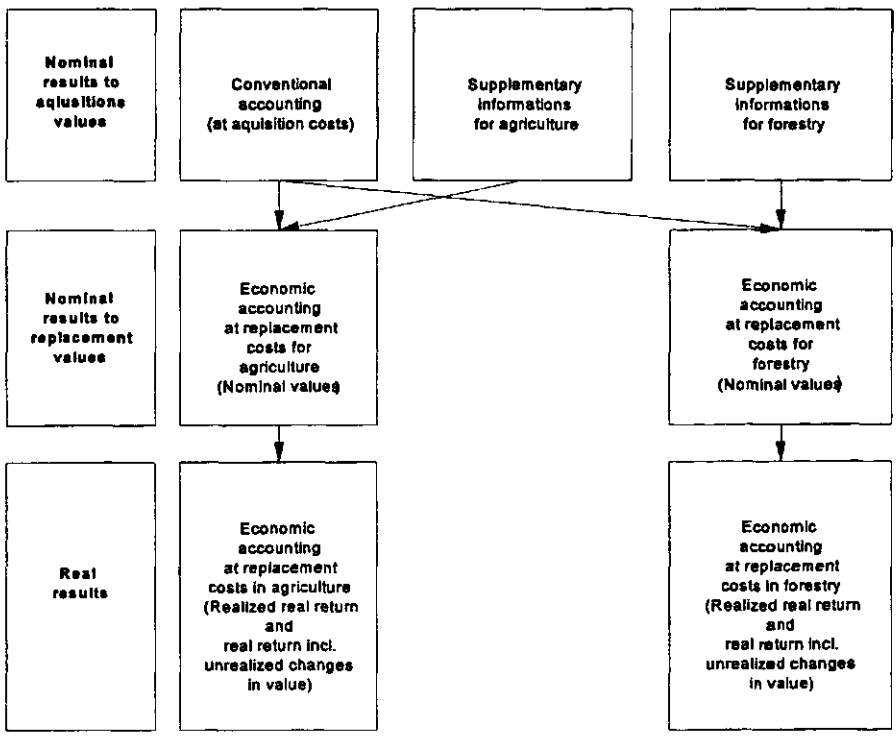

Figure 7.5 The accounting model

In the accounting model, the nominal economic results are calculated at acquisition value and at replacement value. In these two measurements the inflation in the meaning of changes in purchasing value is not considered. In the other two measurements - realized real return and real return including unrealized changes in value - the inflation is considered. These two measurements are dropped in JEU/FADN.

7.2 Accounting at farm level

Research studies in Sweden (Öhlmer, 1989 and Nordgren, 1995) verify the farmers need for different supports for the management of the enterprise. A

good mean of assistance in order to make the management easier is the PC with adapted soft-ware. In spite of all advantages few farmers use PC in Sweden. In 1990 about 1,500-2,000 farmers used the PC (Öhlmer), mostly in bookkeeping and to a certain extent in following up the results. The use of PC has since then increased in number up to 6,000-8,000 (Nordgren). This estimate is based on figures from sales of PC and soft-ware. Bookkeeping still dominates the use of PC (about 90%).

Table 7.2 Facts about farm accounting

	NL	FI	SW	SP	IT	UK	FR
Number of farms in country			90,000				
Farms with on-farm PC			6,000-8,000				
Farms with bookkeeping:							
total			90,000				
on own PC			> 6,000				
Fiscal bookkeeping obliged by law ?			Yes				
Complexity of fiscal regulations			High				
Complexity of ownership situations			High				
Specialized agrarian bookkeeping software available on the market ?			Yes				
Farms with production record system			?				
Comparison of results between farms common (farms involved)			Yes				
Specialized agrarian accounting offices			> 100				
Average 'out of pocket' accounting cost per farm with bookkeeping			7,600 Skr				
Specialized agricultural banks			1				
Market share specialized banks in the agricultural sector			45%				
EDI services available ?			Yes				

The above-mentioned accounting cost is dependent of the contents of the accounting services. The leading accounting company in Sweden, LRF Konsult AB, owned by LRF, offers the farmers a variety of services. If the accounting company only makes the income tax return it is cheaper than to per-

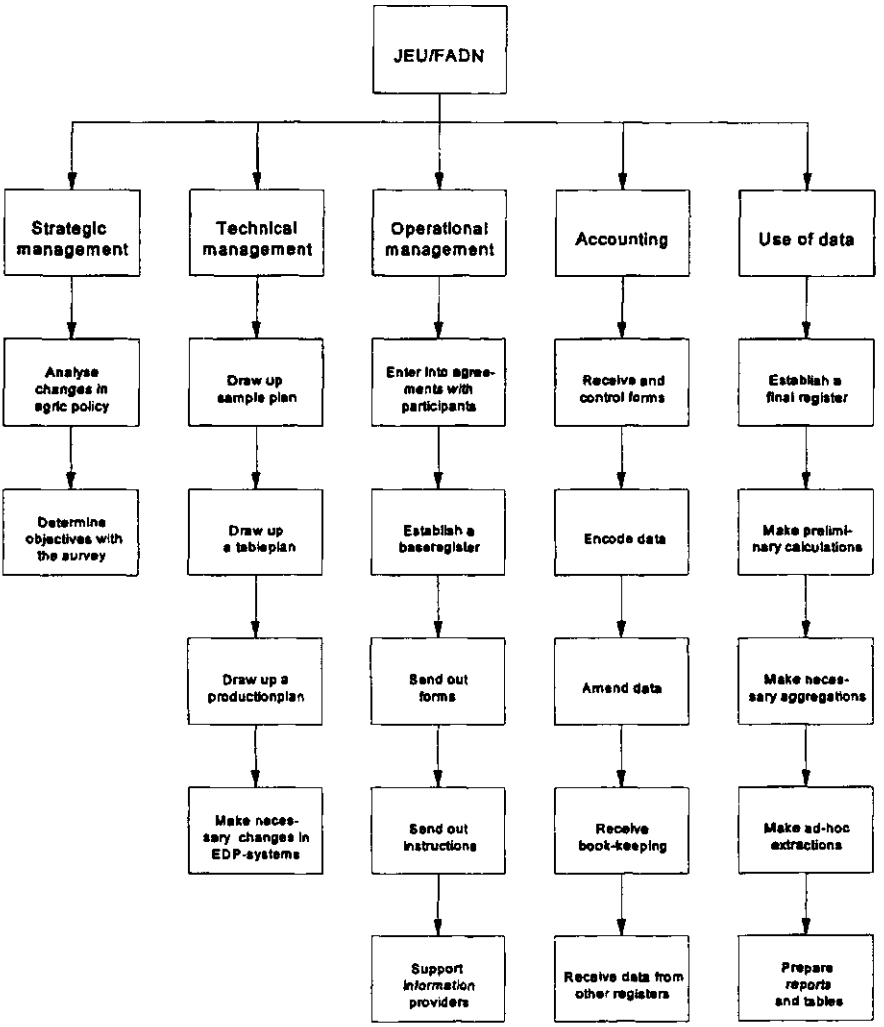

Figure 7.6 Process model for JEU/FADN

form the whole range of services, included analysis of the results. The median value of costs for accounting services was 8,100 Swedish crowns (Skr) for holdings in JEU 1993. Most farmers in Sweden keep the books themselves but pay for expert help to make the income tax return. The figures in JEU of accounting costs have a variation range of more than 25,000 Skr, the 1st quartile is 4,200 Skr and the 3rd quartile 11,100 Skr. Notice that this figures only represent some selected types of farm activity (see figure 7.1 above).

7.3 The process model

A process model is supposed to describe all activities in a business that are related to information and decision making. In a very simple way figure 7.6 illustrates the principal process model for JEU/FADN, as it is planned:

7.4 Stakeholder analysis of the FADN

In this section will only be given a summery of the objectives of JEU. For description of the public application in Sweden of data from JEU/FADN, see Per Persson, 'The use of FADN data on national level and in the Commission; present and future'.

The objectives of farm economic surveys in Sweden have always over time mainly been derived from government needs dictated out of current agricultural policy. In section 1.2 of this paper a description of the management and funding structure of JEU today is given. This structure is a result of political decisions.

Before the deregulation of the Swedish agricultural market in 1991 the figures from JEU were mainly used by consumer and producer representatives in negotiations about the prices of agricultural products. The figures were also used by government authorities in planning, in agricultural research and in education.

A 'broad' definition of the group of users was applied when the National Board of Agriculture was in charge of JEU up to 1975. When the survey in 1976 was transferred to Statistics Sweden for administration a tightening of the purpose was done. The main interest was then connected to full-time family holdings. A second constraint of the survey was done in 1985 when the population was adjusted to the requirement of model farm calculation for milk- and crop-production performed by LES. Special interest was then paid upon holdings in northern Sweden. This interest was strengthened after the deregulation of the Swedish agricultural market in 1991. Today the public need of economic accounting figures for the agriculture is mainly concentrated to this model farm calculation performed by LES.

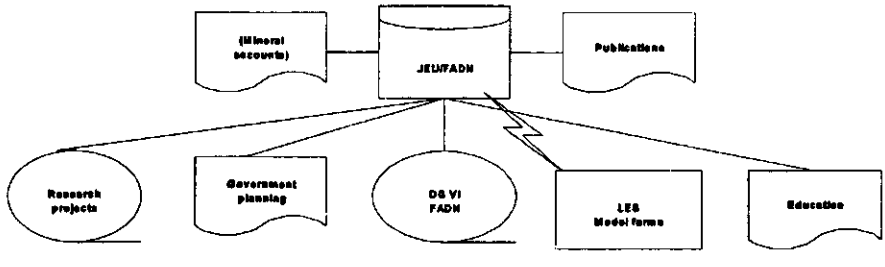

Figure 7.7 The application of JEU/FADN

Besides the use of JEU-figures in model farm calculation, data is often used in special ad-hoc projects. Due to the specialization in milk- and crop-production, JEU is a unique data base for studies of these branches (Lars Jonasson, 1995 and Ylva Olsson, 1995).

From JEU/FADN 1996 up to JEU/FADN 1998 the population will be built up in order to cover all lines of production of agriculture.

Figure 7.7 shows the application of data from JEU/FADN.

7.5 Innovations

7.5.1 Innovations due to deregulation of the agricultural market

JEU has been the object of many changes since the deregulation of Swedish agricultural market in 1991. The deregulation almost 'sentenced' the survey 'to death'. As most economic accounting surveys JEU is very expensive. This fact was embarrassing when the main application of the survey ceased to exist as a decision base in the negotiations between consumers and producers about the prices of agricultural products. Up to now the survey has run the risk to be dropped for good. The discussion in Sweden of an EU membership gave the survey a respite time while waiting for the referendum in 1994. During this respite time no preparations were done for adapting JEU to FADN, except for a restricted study of FADN in 1993.

Figure 7.8 illustrates innovations in JEU as results of political decisions from the deregulation of Swedish agricultural market in 1991 up to 1996. The period is divided into five parts. As regards the EDP system a new methodological approach will be implemented - the client/server technique. This technique is described below in section 5.2. Preparation has also started last year in order to supplement JEU/FADN in the future with mineral accounts.

7.5.2 Technical innovations

Statistics Sweden goes for new and modern technique when developing new EDP systems. Therefore these systems are based on general database solutions, among other things the client/server technique. The requirements concerning JEU/FADN should be fulfilled when using this technique. Each user could chose one from a number of various types of soft-ware tools, for example Excel for refinement of extracted data, Paradox for Windows for generation of reports and SAS for statistical analysis.

Excel and Paradox for Windows are convenient tools when making spontaneous extraction from the database. They have a built-in query language (SQL) that communicates with the database. In order to create more specialised and tailor-made production routines the program language Visual Basic may be used. Visual Basic allows Statistics Sweden to build user interfaces that are similar to those in other Windows applications.

Events	Effects upon		
	population	sample	methodology/ data, etc.
Deregulation of the agricultural market in 1991	Livestock production is dropped	The sample is reduced from 850 to 600 holding	Data about work-force in agriculture is dropped.
The financial structure is changed in 1993			Statistics Sweden to longer receives grants for JEU from the Ministry of Agriculture. Instead the GARS agency LES orders and buys statistics.
Sweden became a member of EU in 1994			The planing for adapting JEU to FADN starts.
JEU 1995			Statistics Sweden will deliver farm returns for 1995 to DG VI as tests.
JEU/FADN 1996	The survey will cover agriculture >= 8 ESU divided in three regions.	The sample will increase from 600 holdings up to 1,000 in 1998.	* Data about personnel in agricultural is back. * The FADN methodology is adapted * The income measures will be calculated to acquisition costs and replacement cost. Real results will not be calculated. * Implement the client/ server technique. * Make preparations for mineral accounts.

Figure 7.8 Innovations in JEU since 1991

The database will be equipped with controls and functions that guarantee data that are about to be inserted, to be 'correct', no matter which program that updates the database. This is possible since the database stores controls and functions and starts them when the database is about to be updated.

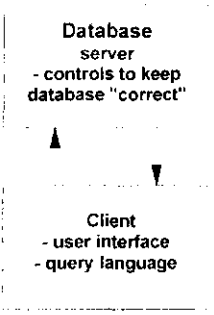

Figure 7.9 The principle of the client/server technique

7.6 Process-model Sweden: remarks by RICA and audience

Remarkable elements

Sweden will come to RICA in 1996. The basis of selection changed a lot (see page 3 global description). The sample will increase over the next two years.

Ability to accomodate changes:
* 1991: reduction leading to demise?
* 1995: expansion to fully representative
to 1999: new variables, adaptation to EU conformity

Chances and threats for future developments

* Complexity of institutional structure.
* Costs of expanded network.
* Multiplicity of organisations involved in assembling final data set (same as complexity of management structure).

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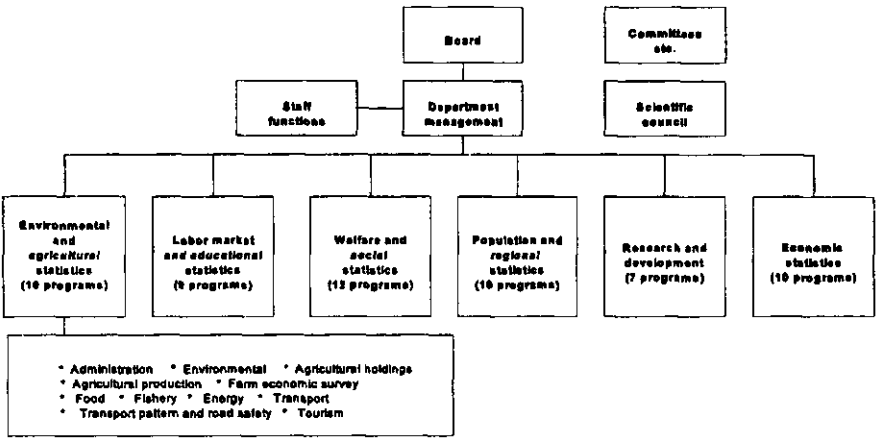
Appendix 1

Organogram of Statistics Sweden



Remark:

Statistics Sweden has in total about 1,400 employees, of which about 140 persons work on the program Environmental and agricultural statistics.

8. GLOBAL DESCRIPTION UK FADN

United Kingdom

8.1 Introduction

The UK FADN (the Farm Business Survey) is organised and funded by the Ministry of Agriculture. Each country within the UK has a different organisation. In England the surveying is carried out by seven universities and one college and data are submitted to MAFF in London. In Wales the data are collected by one university (Aberystwyth) and submitted to the WOAD in Cardiff. In Scotland the Scottish Agricultural College (with centres at Edinburgh, Aberdeen and Auchincruive) collects the data and sends it to SOAFD in Edinburgh - but note that the contract for data collection is to be put out to public tender. In Northern Ireland data are collected directly by the DANI in Belfast.

The English FADN is carried out by the following institutions or 'centres':

Cambridge University
Exeter University
London University (Wye College)
Manchester University
Newcastle University
Nottingham University
Reading University
Askham Bryan College

The work of the FADN is steered by a network of committees on which staff from the centres play a prominent part. The committees are frequently chaired by senior staff from the centres. Temporary working parties are also set up as the need arises. The committees provide a means to negotiate workloads, to develop accounting, sampling and statistical methods and to facilitate collaboration and consistency of techniques between centres.

The English branch of the UK FADN was established in 1936. Currently records from approximately 2,300 farms are collected annually. Co-operation in the survey by farmers is voluntary. Farms are selected from random sample lists supplied by MAFF and there are quotas for the various farm types. Any farm that has been in the sample for 15 years must be discarded and cannot be recruited again for five years.

There are approximately 85 staff based at the universities and colleges involved in data collection and analysis for the FADN plus other studies. The FADN concentrates on horticulture and agriculture but excludes forestry and fisheries.

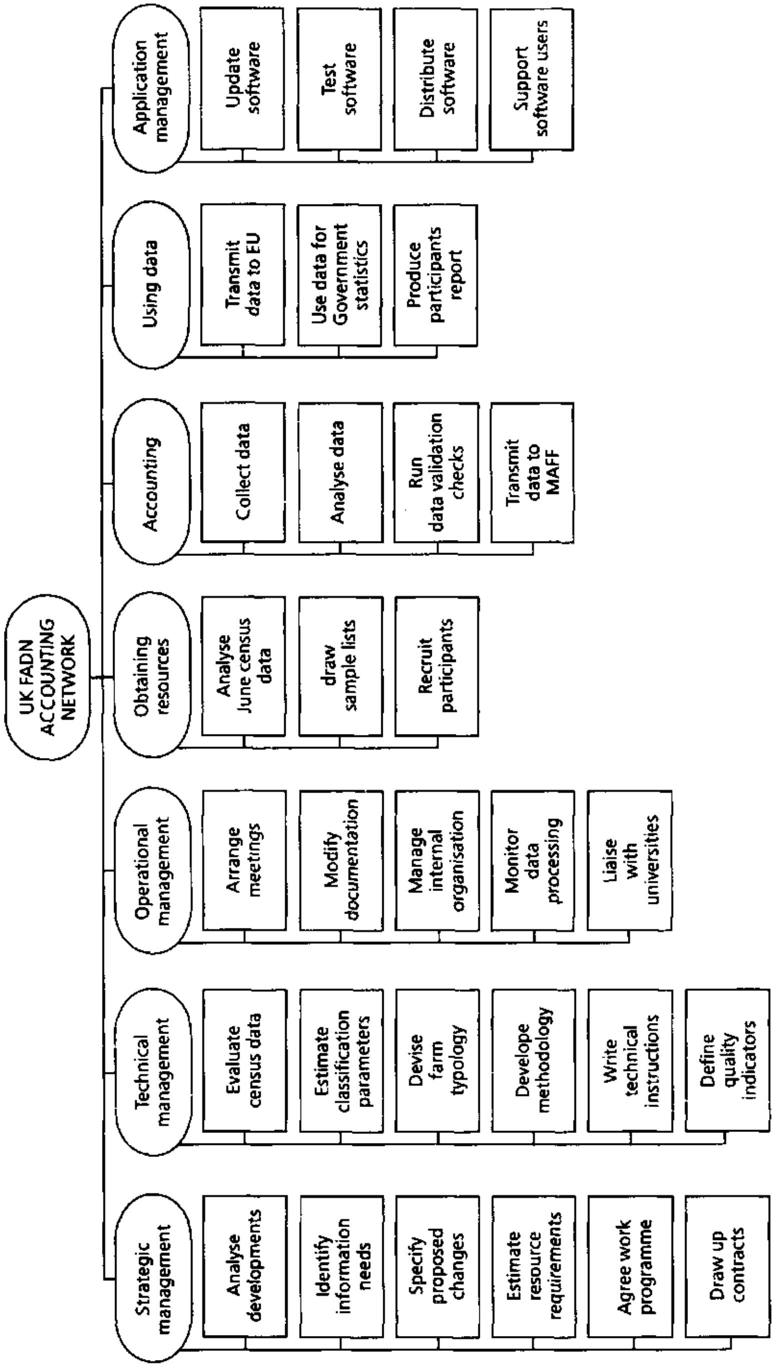


Figure 8.1 UK Process-model

8.2 Accounting at farm level

There are 240,000 agricultural/horticultural holdings in the UK, of which 100,000 are less than 20 ha. Estimates of the number of on farm computers vary from as low as 2% to 30% depending on the sample used. All farms are required by law to keep records from which tax accounts can be prepared.

Although there are many farms run by sole traders, a large number are run as partnerships (usually family) and some as companies. Differences in partnership law in Scotland make non-family partnerships more common there.

There are at least two commonly used specialised agricultural software packages and a number of less common or less complete systems.

Production records may be kept by the farmer using purchased software packages, by keeping manual records or by employing outside agencies. These can be specialist farm secretarial/accounting concerns, consultancy companies or input suppliers (e.g. feed companies).

Farmers tend not use recording data to make comparisons with other farms except at the enterprise level, e.g. dairy herd performance.

There are three national accounting companies who would claim to have specialised agricultural accounting offices. In addition there are many local firms, especially in rural areas, who *de facto* specialise in agiculture.

The cost of book-keeping varies enormously between farms. Typical accountancy costs per farm are £2,500 per year, while on-farm book-keeping (when making no charge for work done by the farm family) probably averages in the region of £2,000 to £3,000 per year.

There are no specialised agricultural banks in the UK, although all of them have a presence in agriculture and some employ specialist 'agricultural mangers' on a regional basis to back up their branch managers.

There are, as yet, no EDI services available to agriculture beyond a few 'home pages' supplied by MAFF and, for example, the Glasgow Vet School, on the Internet.

	UK
No of farms in country (1,000)	240
Farms with on-farm PC	35,000?
Farms with book-keeping - total	240,000
Farms with book-keeping - on own PC	?
Fiscal book-keeping obliged by law	yes
Complexity of fiscal regulations	high
Complexity of ownership situation	high
Specialised agrarian book-keeping software	yes
Farms with production record system	?
Comparison of results between farms	no
Specialised agrarian accounting office	50
Average cost of accounting per farm	£5,000
Specialised agricultural banks	0
Market share of agricultural banks	0
EDI services available	no

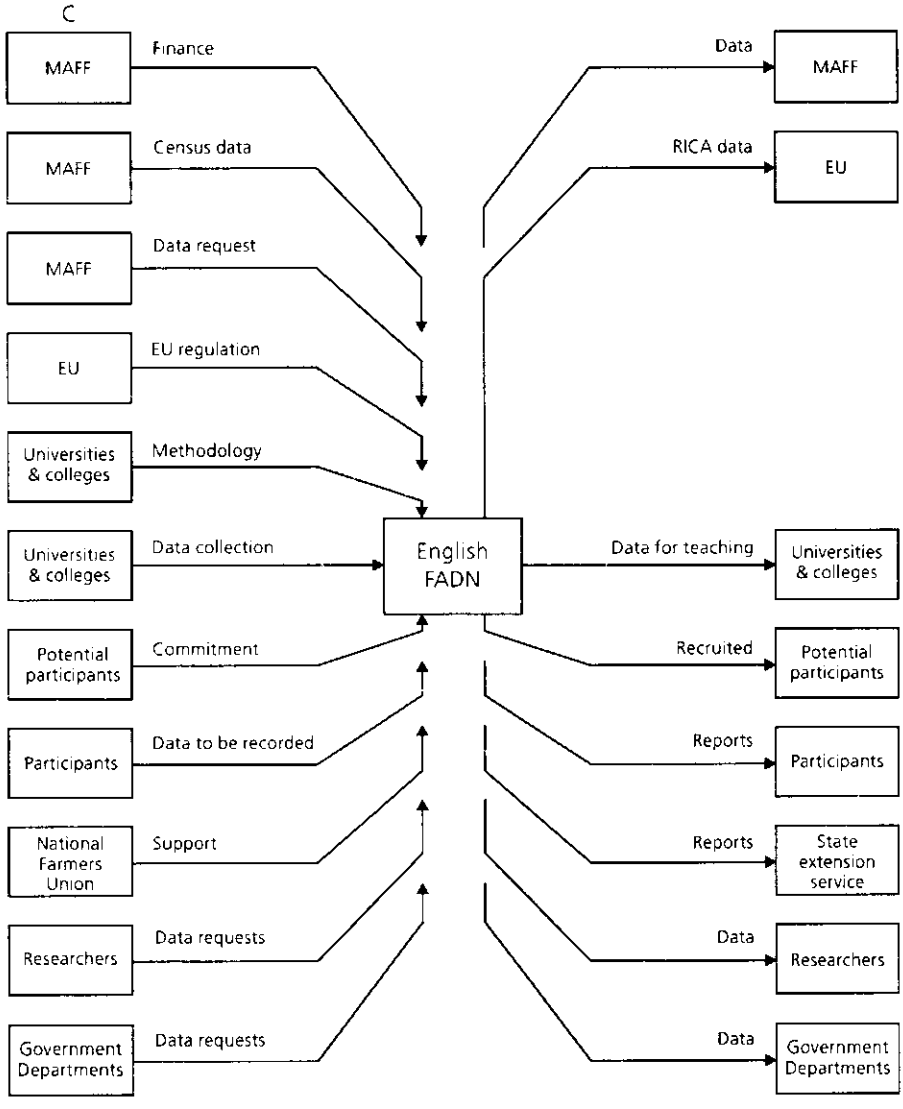


Figure 8.2 Data Flow Model of the English FADN

8.3 Stakeholder analysis of the FADN

Stakeholders in Dutch diagram that are not relevant to the UK FADN:

LEI researchers
clients
subsidisers
Organisation of agricultural accountants
LEI management

Stakeholders not mentioned before

INPUTS
Universities/Colleges - data collection
Universities/Colleges - methodology
University researchers - data request
Government departments - data request
National Farmers Union - support for survey (non-financial)

OUTPUTS

Universities/Colleges - data for farm management teaching
State extension service - data for farm management advisory work
Private accountancy/consultancy practices - data for comparisons

8.4 *Innovation*

There is little scope for major innovation within the UK FADN because the primary aim is to collect data on farm incomes. The complexity of the survey requirements means that it makes major demands on participating farmers' time and limits the opportunity for collecting data on other issues that may be of interest to other researchers.

Recent innovations include:

1) Recording of non-farming income
   description: Collection of data on income of farmer and spouse derived from non-farm activities.
   driving force: MAFF and NFU
   put on brakes: potential participating farmers

2) Fully integrated data analysis package
   description: spreadsheet based analysis automatically linked to farm return with all data automatically reconciled and carried forward.

driving force: MAFF cuts in funding
put on brakes: cost of re-equiping

8.5 Process-model United Kingdom: remarks by France and audience

Remarkable elements

Link between RICA and the university. The university is an input as well as an output in the stakeholder analysis of the UK FADN.

* input because: - data collection
  - methodology
* output because: - data used for farm management teaching

The sample is now part of the English farmer's culture

* sample is perceived as a possitive thing
* sample is used in the management field
* co-operation in the survey is voluntary (nobody is payed)

The length of data collection (since 1936).

RICA's sample is part of the national sample.

Chances and threats for future developments

Maintenance of the sample: a farm can not stay more than 15 years in the sample. Every year the sample needs to be renewed.

9. PROCESS-MODEL AND STAKEHOLDER-ANALYSIS BELGIAN FADN

Dirk van Lierde & Nicole Taragola

9.1 Introduction

The Belgian FADN was founded in 1946 and is since 1960 embedded in the Agricultural Economics Research Institute (LEI-IEA). This research institute, specialized in agricultural economic research, was founded in 1960 and is at present depending of the department 'Research and Development' of the Ministry of Agriculture. The institute has about 130 employees of whom about 80 work at the FADN. Collection of the data is carried out by LEI-IEA-personnel working in nine provincial offices for agricultural accountancy and in three offices for horticultural accountancy.

9.2 Accounting at farm level

Table 9.1 Accounting at farm level

Number of farms in the country	75,000
agriculture	66,000
horticulture	9,000
Farms with on-farm PC	?
Farms with bookkeeping: total	25,000
agriculture	20,500
horticulture	4,500
Farms with bookkeeping:on own PC	< 3%
Fiscal bookkeeping obliged by law?	no
Complexity of fiscal regulations:	
- use of standards	low
- fiscal bookkeeping	high
Complexity of ownership situations	low
Specialized agrarian bookkeeping software available on the market?	yes: 2
Farms with production record system	yes
Comparison of results between farms common	yes
Specialized agrarian accounting offices	yes: 151
Average 'out of pocket' accounting cost per farm with bookkeeping	90,000 BF
Specialized agricultural banks	2
Market share specialized banks in the agricultural sector	75%
EDI services available?	yes

Belgium has about 75,000 farms (source: Agricultural Census may 15th 1994), of which 44,000 belong to the observation field of the FADN. Farms are very often specialized and especially in horticulture ownership situations can be complex (e.g. partnerships between father and son).

In Belgium, the majority of the farms have no obligation of keeping books for tax purposes. The taxes are generally based on standards per hectare or per unit of production. At some types of farms however fiscal accounting is obliged by law. In this case the complexity of fiscal regulations is high.

Although there is no obligation for fiscal bookkeeping, farms can be obliged to have a bookkeeping (for management purposes) in order to get interest subsidies for new investments. These accounts must be carried out by accounting offices, approved by the government. For the moment 151 accounting offices are recognized.

According to the agricultural census of 1994 only 25,000 of the 75,000 farms, or 33% of the total, declare to have a bookkeeping. Bookkeeping is more common at horticultural holdings, where almost 50% of the holdings declare to have an account. At the 44,000 holdings belonging to the observation field of the FADN, 48% declares to keep books. The average 'out of pocket' accounting costs can be estimated at 90,000 BF (depending of the size of the farms a variation of this amount can be observed).

Concerning the use of PC's at the farms no exact figures are available. Most of the software applications consist of feed and production control. Accounting on PC is not very common, there can be estimated that at most 3% of the farms are using a PC for accountancy. Several specialized agrarian bookkeeping software packages are available on the market, but only two are recognized.

Production records may be kept by the farmer himself or by employing outside agencies, e.g. feed companies. Comparison of results between farms is common.

There are two specialised agricultural banks in Belgium, which represent 75% of the market in the agricultural sector.

9.3 Process model

The purpose of a process model is to describe all activities that are related to information and decision making.

The processmodel presented in figure 9.1 must be considered as the optimal and not the actual situation.

The processmodel is very useful to investigate the changes that can be done in the future in order to improve the practical organisation of the Belgian FADN. Comparing the process model of Belgium to the Dutch model shows that almost the same processes exist, although there are some differences.

Sample

The Belgian FADN is a sample survey based upon a stratified sample plan, drawn up yearly in accordance with recent evolutions of farm structure and dispersion of farm incomes.

The associated farms are participating on a voluntary basis and for free, however most of them are obliged to keep books in order to get interest subsi-

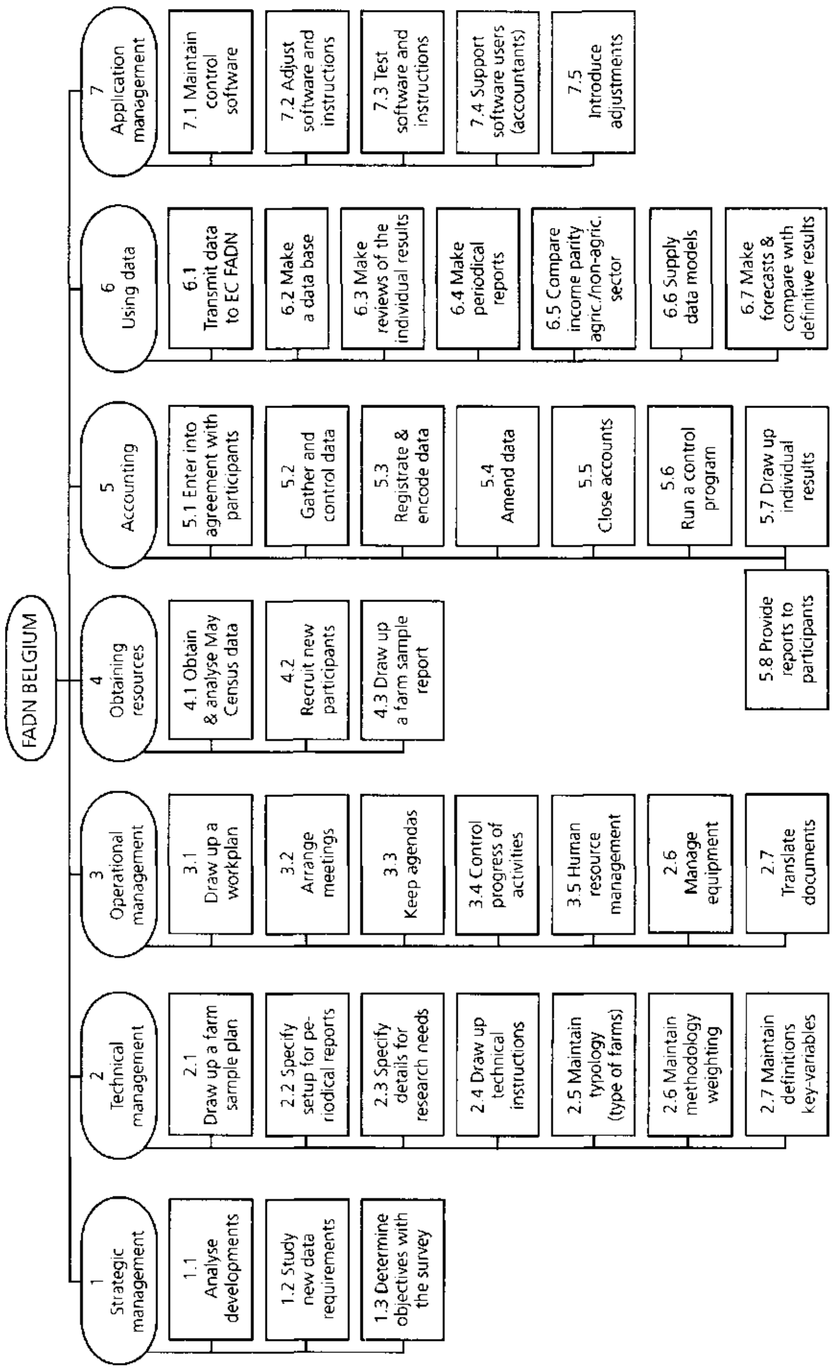


Figure 9.1 Process model of the Belgian FADN

dies. A system of replacement of the sample according to a rotation system is not applied.

In the Belgian FADN about 1,700 farms are participating, of which 1,200 are selected for the FADN of the European Commission.

Accounting

Noteworthy is that the accounts of the Belgian FADN don't have fiscal purposes. The main objective of the accounts is to gain a clear insight into the profitability of the farms.

The associated farmers are obliged to gather technical and economic data which are periodically sent to the accountant, who controls and registrates the data. Errors and omissions noted by the examination of documents involve inquiries that take place during the periodical visits of the farm.

At the end of each financial year, the bookkeeper closes the accounts and then writes down on file sheets the different figures needed for establishing the individual results of the farm. These file sheets are sent to the central office for encodation and data processing. After running a control program and correction of errors, the controlled data are recorded on magnetic tapes. Finally the individual accountable results are printed and sent to the provincial offices.

Operational management

Noteworthy for the Belgian FADN is that the activity of 'operational management' also includes translation of the documents. Since Belgium has three official languages (Dutch, French an German) all documents have to be available in the three languages.

9.4 Stakeholder analysis of the FADN

The stakeholder analysis in figure 9.2 shows about eleven groups of stakeholders. As the LEI-IEA is depending of the Ministry of Agriculture, this ministry is responsible for the finance. Data are coming from the farmers. The sample plan is based upon the data of the annual May-Census, which give a description of the population and are collected by the National Institute of Statistics (NIS). LEI-IEA-researchers should be responsible for methodology and instructions.

Most important users are the European Commission, National and regional ministries, LEI-IEA-researchers and of course the farmers themselves, who can compare their results with these of other farmers. Another group of users are universities, schools, information services, banks, farmers organisations,... Noteworthy is that all publications of the Belgian LEI-IEA are available free.

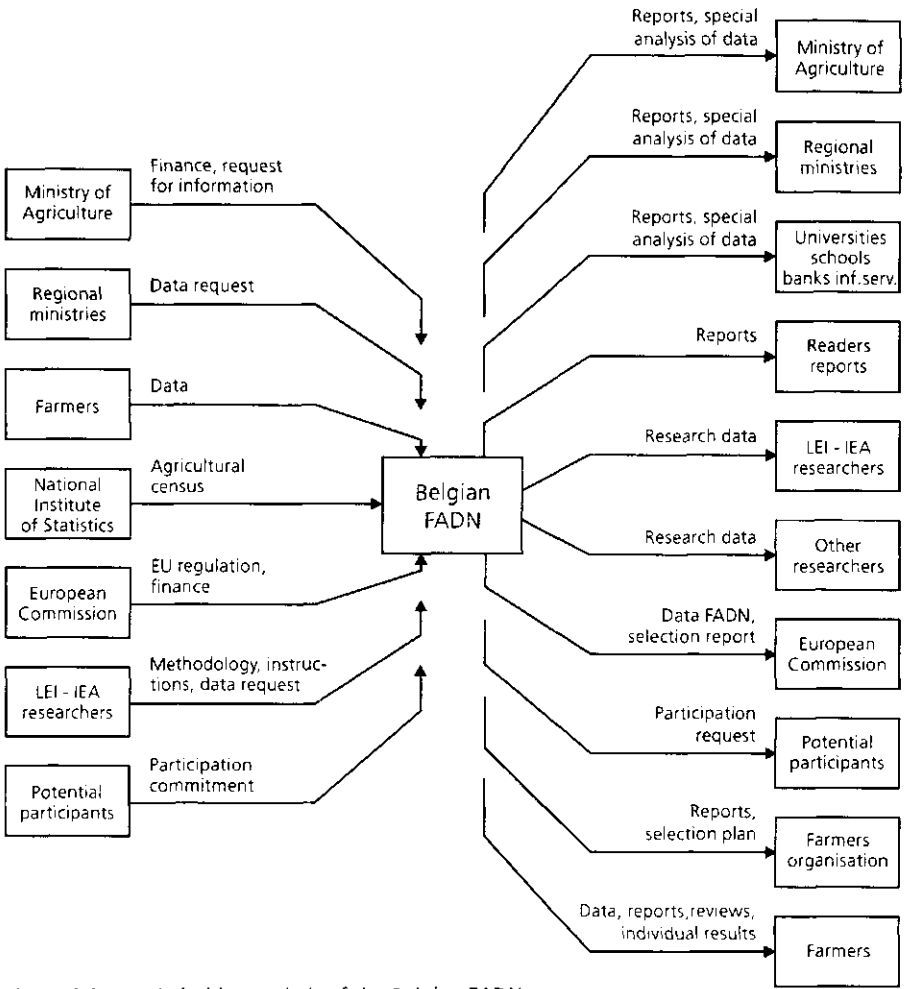


Figure 9.2 Stakeholder analysis of the Belgian FADN

9.5 Innovation

Restructuration of the institute

Description:

For the moment a restructuration of the institute is taking place . At the end of the year a change of name of the 'Agricultural Economics Institute (LEI-

IEA) ' into 'Centre for Agricultural Economics (CLE-CREA) ' can be expected. This change of name will be accompanied by a revision of the intern structure , which will also result in a revision of the different tasks of the departments and sections of the institute.

At preparing the revision of the intern structure the processmodel drawn up for the Belgian FADN can be a useful tool.

Driving force: Ministry of Agriculture

Put on brakes: Nobody

Computerization

Description:

A very important innovation that is taking place for the moment consists of computerization of the accounting process.

In this project a system will be worked out allowing the bookkeepers to introduce directly into a PC the data supplied by the farmers.

This will make it possible to increase the efficiency of accounting. It involves a greater homogeneity as well as a better quality of collected information; it gives the researchers numerous elementary data that exist now in the provincial offices but are not yet available in the central office. So the accessibility of the data will be improved and more detailed analyses can be performed.

The new system will make it easier to gather also environmental (minerals, pesticides) and more technical data.

Driving force: Internal, bookkeepers (accounting on PC will make the work easier)

Put on brakes: Bookkeepers (learning how to work with PC is difficult!)

Pig farms

Description:

At pig farms more detailed data will be gathered in the future. This will make it possible to gain a clear insight into the composition of the costs.

Driving force: Internal, researchers,...

Put on brakes: Nobody

10. CURRENT COST ACCOUNTING PROCEDURES IN THE FBS WITH PARTICULAR REFERENCE TO ESTIMATING HERD VALUATION AND DEPRECIATION

Nigel Williams

10.1 Current cost accounting

Current cost accounting (CCA) is a procedure that can be adopted to exclude the effects of inflation from trading accounts and balance sheets. The reason for wishing to do this is that conventionally prepared accounts can give a false indication of the amount that can be withdrawn from a business without reducing its income generating capability (Hill, 1977). Typically a set of accounts based on historic costs will understate depreciation (since this is derived from the historic prices of the assets being consumed rather than their current values) and understate the value of opening stocks that are being used up in the production process. The balance sheet will include many assets valued at their historic cost and so understate the capital invested in the business. After a lengthy debate by the Sandilands committee CCA was not adopted in the UK for taxation purposes. However, the Farm Business Survey (the UK arm of the EU's FADN/RICA) does incorporate some aspects of CCA in its procedures.

The basic premise of CCA is that assets should be included in the balance sheet at their 'value to the business' and not at their historic cost. In addition the profit and loss account should show the value of inputs consumed in generating outputs at the date they are consumed rather than at the date they were ordered/purchased. This means that, for example, depreciation should be calculated on the current value of a machine rather than its historic cost.

10.2 Value to the business

Estimating the value to the business is not straightforward as there are a number of different possible definitions. The definition favoured by the Sandilands Committee was:

'The value of a property to its owner is identical in amount with the adverse value of the entire loss, direct and indirect, that the owner might expect to suffer if he were deprived of the property.' (Bonbright, 1973)

Generally, the value of an asset to a business will be the higher of the net realisable value (sale value) and the present value of the income stream generated by it; the logic being that a rational manager will sell the asset if the sale price is greater than the present value of the income stream. The one exception to this is where the replacement cost is lower than either of the two values as

defined above. The rationale is that the replacement cost of the asset represents the maximum loss to the business if it was deprived of the use of that asset; hence in these circumstances the business can minimise its loss by replacing the asset.

The problem of calculating value to the business is simplified because the Sandilands committee recommended that 'in the great majority of cases' the replacement cost should correctly represent the value of an asset to the business. In practise the simplest way to estimate the current value of an asset is to revalue the original asset using price indices. This avoids the onerous task of discovering current prices of assets which may no longer be available, e.g. discontinued models of farm machinery. However, caution should be exercised as published indices may not be constant quality and so some of the apparent increase in price may be due to technological improvement rather than inflation.

10.3 Holding gains

Where an asset is revalued, the revaluation increment is termed the holding gain. These gains are a form of capital appreciation. In accountancy terms holding gains are not income as such and so do not form a part of 'profit'. In strict economic terms they do represent income, albeit with deferred consumption (often until the death of the farm operator). They certainly do represent an increase in the asset base of the business and will enhance the borrowing capacity of the business.

10.4 Asset revaluation

The next problem is which assets should be revalued. The most obvious are fixed assets such as land, buildings, machinery and permanent crops. Land can be revalued on the basis of readily available sales data while buildings and machinery can be revalued using published price indices (Hill, 1978). Permanent crops require estimates based on changes in the cost of young trees and stakes over time. In this case the position is complicated by the need to allow for the increase in the value of trees over the establishment period of several years. Once the data for such calculations has been collected the process of revaluing and calculating depreciation readily lends itself to computerisation (Williams).

10.5 Growing crops

The valuation of growing and harvested crops is another problem area. It has been argued that growing crops should be valued taking account of the change in price of the inputs between when they were purchased and the valuation date (Lewis and Jones). However, if the inputs are valued at the point at which they 'were, or could have been ordered, in the normal course of busi-

ness, for delivery at the valuation date' (Accounting Standards Committee 1976) then it is arguable that the goods (fertiliser, seed etc.) purchased for a growing crop should be valued at their actual, historic, cost as that was the point at which they had to be purchased in order to be applied to, and therefore included in the valuation of, the growing crop. Using this approach, the fact that the price of nitrogen fertiliser (for example) has increased between the autumn of one year and the spring of the next is of no consequence when measuring the cost of an autumn dressing to a crop. This is the procedure which is followed within the FBS. A contrary point is that the inputs should be revalued in order to reflect the increase in working capital required for the following year's crop. In practice this would frequently not be feasible since the valuation date would occur before the next growing cycle has been completed; this means there is incomplete information on the changes in the level of input prices between one year and the next and so the full extent of the revaluation required is not known.

10.6 Harvested crops in store

The valuation of a harvested crop in store is simpler as, under CCA conventions, it will be valued at net realisable value, ie sale value at the valuation date. This broadly coincides with the FBS approach (although note is taken of actual sale value after the year end to minimise profit on disposal of a previous year's crop). It is assumed that there are no holding gains since the inputs consumed in the production of the crop could not have been replaced at a later date (and higher price) for the reason given above; although the same contrary point also applies.

10.7 Valuing livestock reared for sale

Livestock reared for sale could be deemed to be analogous to harvested crops as they can be sold at almost any age and net realisable value is readily estimated. The problem revolves around the change in value of each category of animal between one valuation date and the next; is the change in value of a class of animal a holding gain or is it disposable income? For FBS purposes it has been decided that it should be treated as income. This is analogous to the treatment of harvested crops.

10.8 Breeding livestock

The treatment of holding gains in breeding stock differs according to their maturity. Young stock reared for breeding/production are treated in the same way as livestock reared for sale; no holding gains are recorded even though per unit values of each category of stock may change between valuation dates. The cost of production of a particular animal is deemed to be unaf-

fected by subsequent increases in the prices of inputs used in its production. In contrast, it is recognised that changes in the value of mature breeding livestock are holding gains rather than income. In this case the animals are treated as being more akin to other capital assets that can be replaced.

10.9 Depreciation

Once assets have been revalued, depreciation is calculated in the normal way. Thus machinery is depreciated by diminishing balance method and buildings and works by straight line depreciation. The optimum economic rates of depreciation for machinery under CCA procedures will be greater than implied under historic accounting procedures because of the asset revaluation that takes place each year. These have been estimated for the UK by Cunningham & Turner. The calculation of herd depreciation is also affected when CCA valuations are used. The remainder of this paper concentrates on the problems posed in the revaluation of breeding livestock and the subsequent calculation of herd depreciation.

10.10 The problem of herd depreciation

The calculation of herd depreciation in management accounts is a well established procedure. Briefly it is defined as the sum of the closing valuation plus the revenue from sales of cull and casualty animals plus the value of any transfers from the enterprise less the opening valuation and the cost of any purchases and transfers into the herd. Taking a simple example of a dairy herd where replacements are reared on the farm, the calculation of dairy cow depreciation is as follows:

Table 10.1 Calculation of herd depreciation - a simple example

Opening valuation	100 @ 500	50,000		
PLUS				
Transfers from followers	25 @ 700	17,500		
SUBTOTAL			67,500	
Closing valuation	100 @ 500	50,000		
PLUS				
Sales and casualties	25	7,500		
SUBTOTAL			57,500	
DEPRECIATION				10,000

The above procedure provides a sufficiently accurate estimate of herd depreciation in a situation where prices are relatively stable. There is no need to value animals individually and estimate depreciation on each one since the average age of the herd will remain relatively constant as, other things being equal, the oldest and hence lowest value animals will tend to be sold and be replaced by younger and more valuable animals. This simplifying assumption will not lead to significant error in estimating the valuation at the year end. The animals which remain in the herd for the entire year will of course fall in value over the twelve month period as they become older. Hence, using the same average value per head at the beginning and end of the year is acceptable. This is illustrated in the following example.

The herd structure and value by age cohort could be set out as follows with the herd divided into quartiles by value. The replacement rate is assumed to be 25 per cent and hence, on average, each animal remains in the herd for four years. It can be seen that each quartile approximates to an age group:

25 @ 650 = 16,250
25 @ 550 = 13,750
25 @ 450 = 11,250
25 @ 350 = 8,750

The depreciation on an animal in the period between it entering the herd and leaving it is given by the difference between the average purchase/transfer value and the average disposal value (including when the animals enter the herd they are assumed to depreciate by half of the annual depreciation, ie £50 per head. Although this is clearly a stylised model of reality it is helpful to use it in the following exposition.

10.11 Changes in market prices

A problem arises if the market price of the animals changes. This may be due to an change in supply or demand or be due to inflation. As has already been noted, inflation can cause serious problems when preparing management accounts. The manager has two choices: he can either value the asset at cost or value it at current market prices. If the asset is valued at cost then the closing valuation is understated and the net worth of the business is inaccurate. If the asset is revalued then the trading surplus is overstated because the increase in value of the asset is not available for the manager to spend - it can only be liquidated by depleting the capital stock of the business.

The most common occurrence of this type of problem is with breeding livestock such as cows, sows and ewes. It also applies to mature male animals. An example using the above data will serve to illustrate the problem. In a year where there is no price change in the breeding herd, the average value of the cattle in the opening and closing valuations will remain constant, other things being equal. This is the position illustrated in table 10.1. Now suppose that there is an increase in the price of mature cattle during the year of ten per

cent. If no allowance is made for the increase in the value of the mature stock, then the enterprise account will be as shown in table 10.2.

Table 10.2 Calculation of herd depreciation - no adjustment for inflation

Opening valuation	100 @ 500	50,000		
PLUS				
Transfers from followers	25 @ 770	19,250		
SUBTOTAL			69,250	
Closing valuation	100 @ 500	50,000		
PLUS				
Sales and casualties	25	8,250		
SUBTOTAL			58,250	
DEPRECIATION				11,000

The depreciation is accurate (it has increased by 10 per cent) as it does not include any appreciation in capital assets and so the trading surplus is not distorted, but the asset valuation in the balance sheet is understated. If, on the other hand, the mature stock are revalued in line with market prices, then the enterprise account appears as shown in table 10.3. In this case enterprise output is overstated (and depreciation is understated), but the valuation is more realistic.

Table 10.3 Calculating herd depreciation - valuation adjusted to reflect price changes

Opening valuation	100 @ 500	50,000		
PLUS				
Transfers from followers	25 @ 770	19,250		
SUBTOTAL			69,250	
Closing valuation	100 @ 550	55,000		
PLUS				
Sales and casualties	25	8,250		
SUBTOTAL			63,250	
DEPRECIATION				6,000

10.12 Profit on disposal

A further problem that can arise when assets are not revalued is that on disposal of the asset, (eg a herd dispersal) the animals are sold at the prevailing market price which may be far in excess of their valuation in the farmer's accounts. This can lead to a heavy burden of taxation, especially if there is a progressive tax regime in place. In the UK the taxation authorities have recognised this problem and under the 'herd basis' farmers are allowed to exclude their breeding stock from the calculation of annual profit and loss. This is particularly useful for farmers who are likely to dispose of all or a significant part of their herd due to dispersal or disease. While this removes the problem of taxation at the end of the life of the enterprise, it does not deal with the problem of obtaining accurate enterprise accounts on a year-by-year basis.

The solution to the problem is to revalue the breeding stock each year in line with market prices. Any gains due to such changes in market prices are then identified and excluded from the trading surplus. These holding gains are know as breeding livestock stock appreciation or BLSA. While it is relatively straightforward to identify the broad procedure, the calculation of BLSA can be complex in some cases.

10.13 Breeding livestock stock appreciation

BLSA is the gain in value in breeding stock during the year. It follows that all breeding stock in the enterprise may be subject to BLSA even if they are only on the holding for part of the year. It is important to recognise that even though the BLSA on a cull animal is realised when the animal is sold, that BLSA must be reinvested in a replacement animal and so cannot be consumed as income. If the herd is in a 'steady state', ie numbers remain constant during the course of the year, then the BLSA calculation is straightforward and any one of several alternative methods will give the correct answer. These can be briefly summarised as multiplying the increase in value per head during the year by the average value per head of animals in the opening valuation. This gives the gain or BLSA per animal. This gain per head must then be multiplied by the appropriate number of animals to obtain the BLSA for the herd. Where there is a steady state, the multiplicand can be either the opening numbers, the closing numbers or the average numbers through the year - all will give approximately the same answer. In the example shown in table 10.3, the average price increase was 10 per cent. Multiplying this by the average value per head at the start of the year gives a BLSA per head of £50. For a herd of £100 cows, the BLSA is therefore £5,000. Deducting this BLSA from herd depreciation increases it from £6,000 to £11,000, the same figure as in table 10.2.

10.14 Changes in herd size and quality

Although this solution is straightforward, problems occur where the size of the herd or the quality of the herd is changing. In the former case, the timing of the changes in herd size are important, particularly in relation to the change in market value of the animals. It is possible that the additional animals were bought after prices had risen. In this case their value should not be adjusted for BLSA. In other cases the BLSA may have occurred after the animals were purchased and all the animals should be credited with the BLSA.

BLSA may be estimated in the special cases identified above (and in the steady state model by using a formula as follows:

R x (Opening valuation + T1 x purchases - T2 x sales)

Were R is the revaluation fraction, T1 and T2 are factors varying between zero and one depending on when the transactions tookplace. If the purchases/transfers or sales took place before the majority of the price change then the values of T1 and T2 would tend to 1, if they took place after the price change then they would tend to zero.

Table 10.4 shows the situation where the manager increases the herd size by introducing additional heifers-in-calf, in this case 10 more. The crucial question now is whether the price increase in dairy cows occurred before or after the animals were bought. In table 10.4 the price increase occurrs before they are acquired, whereas in table 10.5 the price increase occurs after the animals are brought into the herd.

Table 10.4 Calculating herd depreciation - increase in herd size after prices rise

Opening valuation	100 @ 500	50,000		
PLUS				
Transfers from followers	35 @ 770	26,950		
SUBTOTAL			76,950	
Closing valuation	110 @ 550	60,500		
PLUS				
Sales and casualties	25	8,250		
SUBTOTAL			68,750	
DEPRECIATION				8,200

Table 10.5 Calculating depreciation - increase in herd size before prices rise

Opening valuation	100 @ 500	50,000		
PLUS				
Transfers from followers	35 @ 700	24,500		
SUBTOTAL			74,500	
Closing valuation	110 @ 550	60,500		
PLUS				
Sales and casualties	25	7,500		
SUBTOTAL			68,000	
DEPRECIATION				6,500

As is evident, the two situations lead to apparently different depreciation figures. However, if the data are adjusted for BLSA in each case, then the BLSA in table 10.4 will be £5,000, while in table 10.5 it will be £6,700. Deducting the relevant BLSA from each estimate of depreciation in tables 10.4 and 10.5 will lead to a consistent estimate of depreciation of £13,200 in both cases. The disproportionate increase in depreciation when compared to that shown in tables 10.1 and 10.3 is because the additional cows are valued at the same average as the rest of the herd. Obviously, the closing value per head should be increased to reflect any increase in the value of the herd as a whole because it now has a higher proportion of young and theoretically more valuable animals. This will reduce the herd depreciation, but will not influence BLSA.

Where the quality of the herd is changing, then the closing valuation should also be adjusted to reflect any change in value of the herd overall. Once again the estimate of BLSA will be unaffected. Thus for a given price change it is possible to estimate BLSA in a relatively straightforward manner provided the extent to which the price changes occurred before or after the purchases and sales of mature breeding stock is known.

10.15 Empirical effects of current cost accounting in the FBS

Examination of FBS data collected in the south east of England shows that there is considerable year-on-year variation in holding gains over the period 1987 to 1994. On dairy farms, BLSA was not always positive because of falling livestock values and ranged from -£30 per hectare in 1990/91 to £240 per hectare in 1992/93. Holding gains on machinery on specialist arable farms over the same period ranged from -£8 per hectare in 1991/92 to £40 per hectare in 1989/90. Current cost depreciation always exceeded historic cost depreciation over the same period. The ratio of the two estimates of depreciation on specialist arable farms varied between 1.44 in 1988/89 to 1.17 in 1992/93.

10.16 Conclusions

The effects of using CCA procedures within the FBS have been to give a more realistic representation of the costs of owning and using fixed assets (via depreciation provisions) and hence of income. This also gives a realistic measure of the capital assets invested in the business. There is still room for debate on whether the valuation of inputs used in the production of growing crops and rearing livestock for sale or breeding on an historic cost basis is the most appropriate procedure.

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11. INNOVATION AT FARM LEVEL: THE ADOPTION OF FARM ACCOUNTING SOFTWARE

K.J. Poppe

Abstract 1)

The adoption of farm accounting software in the Netherlands is low, compared to other countries in Western Europe and North-America. The existing literature on adoption is not of much help to explain these differences: it focuses on the characteristics of farmers that adopt and not on market and institutional factors.

This paper presents the decision to adopt in a framework that includes the need for accounting and derived information (influenced by tax regulations) and the supply of information from alternative sources (like off-farm services and production record systems). It suggests that the Dutch fiscal regime and the efficiency of the agricultural accounting offices heavily influence the rate of adoption.

Recent and future developments (like EDI, environmental accounting and integration with production records) are discussed in the light of the framework developed. Some suggestions are made for further common international research to test the presented hypotheses.

11.1 Introduction

According to a 1993 estimate, 2,600 farmers in the Netherlands use on-farm accounting software (table 11.1). As every Dutch farmer is obliged by tax law to keep books, that number seems extremely disappointing: it represents a penetration of 2%. Accounting software is also not the main type of software used by farmers. Only one in four farmers with a PC for management information uses the PC to keep accounts.

Specific Dutch agricultural accounting software dominates the market. Non-agricultural accounting software is mainly used in integration with software for production records or by farmers (e.g., in tree nursery) who need to keep track on inventory or accounts receivable.

If we would like to comment on such data from an international point of view, problems will arise. Two problems stand out: the lack of harmonized data to compare countries and the lack of theory to explain differences between

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1) This paper is a slightly modified version of a paper presented in a closed U.S.-European workshop on farm level information systems in 1993 (Poppe, 1993b).

regions and countries. This paper focuses on the second problem: how to review markets for farm accounting software and to assess the future developments in such markets. More in particular to the example in table 11.1: why is the use of accounting software in the Netherlands so low, compared to other countries and could this phenomenon even influence comparison between countries on the adoption rates of computers and services as such?

Table 11.1 Use of on-farm management information systems (PC-based) in Dutch agriculture

Type of farming	Number of farms b)	Number of users	
		1992	1989
Arable	6,187	1,100	600
Horticulture	13,273	2,050	1,250
Dairy	24,665	2,700	800
Pigs	4,160	3,700	1,400
Poultry	1,056	480	150
Combined a)	4,868	.	.
Total	54,209	10,030	4,300
of which with accounting		2,600	.

a) Number of users included in specialist types of farming; b) 1992, excluding farms smaller than 50 Dutch size units, the size necessary to provide work for at least one person under efficient circumstances.
Source: CBS and ATC, 1993.

After reviewing the literature on adoption of farm software (section 2), this paper argues that the decision to adopt accounting software can only be understood by studying the need for and the availability of accounting services in general and in a more institutional framework (section 3). This is presented as a point of departure for an international comparison. Besides this insight, section 4 discusses the developments in Dutch farm accounting. The paper ends with a discussion on some issues for further research.

11.2 Previous research

Most studies of the adoption of computers or computer software by farmers have focused on the characteristics of the farmers that adopt. Predominant variables that have been studied are farm size, size of the enterprise in operation, educational level, age, tenure, information needs and - incidently - cost/benefits (Rehman, 1992).

Lazarus and Smith (1988) found an inverse relationship between adoption rates and the age of the farmer in their study of New York dairy farms. Farmers that adopted computers had a higher education and a larger farm. High indebted farms were less likely to own a computer, but more likely to use it for

accounting. That is in line with a tighter internal control over finances or with more external reporting. Putler and Zilberman (1988) obtained almost similar results for Tulare county, California.

Jarvis (1990) showed that not only size and complexity of the business influence adoption by Texas rice producers, but also the number of peers using computers and the children's experience with them. She also raised the point that computers and their intangible values are not as observable for farmers as e.g., new varieties or other production technics. That could hamper adoption.

Ohlmér (1991) reports 1987 data from Sweden that show that on-farm computer owners use almost the same management methods as before the adoption. The main difference is that they substituted services by do-it-yourself computing. Education is therefore an important factor. Almost all computer owning farmers in Sweden used it for accounting purposes.

Huffman and Mercier (1991) discussed the fact that on-farm computers and purchased (computer) services could be complements as well as substitutes. Using 1982-1984 data from Iowa, they showed that the characteristics of a farmer (schooling, age and off-farm work) are important variables for explaining the adoption of purchased computer services only, micro-computers only or both technologies. Schooling has a bigger effect on adopting micro's only, but the complexity of the business has the largest impact on the odds of adopting a combination of micro-computer and purchased services.

Bonny (1992) reported that French farmers who use computers for management are first correlated with a higher educational level, and to a lesser extent with economic size, investment level, age and size of the dairy herd. Some categories (higher education, wine growers, older farmers) prefer on-farm computers, others (livestock farms) prefer off-farm services. About 75% of the farmers use accounting software, followed by spreadsheets as the second most popular application.

All the American studies that reported on computer applications, found accounting software to be a very important application, in general over 60% (table 11.2). That is much more than the 26% for the Netherlands. This country seems out of line with other European countries too.

'For many farmers, computerizing the farm accounting system may be the chief incentive for computer adoption' (Batte et al., 1990). These accounts are mainly used for external reporting. In the survey of Batte et al. (1990) only 20% of the Ohio farmers reported internal management use of farm records. Ceteris paribus, such farmers are 12% more likely to use a computer. Farmers who own a computer (compared to farmers who use time-share or mail-in services) are more likely to cite accounting applications as more useful than planning applications. Farmers who spend above-average amounts for farm information were more likely to own computers. As these amounts include acquired software, this finding is hard to interpret.

Table 11.2 Percentage of farmers that use the on-farm computer for accounting software

Source	Country	Year	Type of farming	Percentage
Putler & Zilberman	California	.	.	76
Jofre-Giraudo a)	New York	1986	dairy	89
Farm Futures b)	USA	1988	.	72
Ross b)	Ontario	.	.	68
A. Anderson b)	.	.	.	79
Batte et al.	Ohio	1987	all	67
			grain	78
			dairy	48
			mixed	46
Bonny	France	1988-89	all	73
Ohlmér	Sweden	1987	all	97
MAFF c)	England	1984	.	70
ATC	Holland	1992	all	26

a) Interviews with 27 DFBS computer users, reported in Lazarus et al. (1989); b) Reported in Batte et al. (1990); c) Reported in Ohlmér (1991).

The low use of accounting systems for internal management could limit their profitability. Lazarus et al. (1989) surveyed four years of financial data of New York dairy farms. The introduction of an on-farm computer for accounting was accompanied by a rise in income in the first year of use, but with a drop afterwards.

French farmers that use on-farm computer management aids mention time-saving and rapid available results as the main motive, followed by being more up-to-date, reduced accountancy costs and simplification of the accounting process (Bonny, 1992). The last motive is a bit strange as it is often assumed that farmers are not very interested in the accounting process as such (see Poppe, 1991a for a survey) and the fact that purchased computer services require less skill of the farmer than on-farm systems (Huffman and Mercier, 1991). Discussing the situation in Alberta, Waldie (1989) noted that the total hardware and software costs of an accounting application would be Can$ 1,500.- a year, compared to Can$ 600.- for a local bookkeeper. That implies an eight year pay-out period, without putting a value on the time of the farmer.

Overbeek (1992) carried out a survey in Dutch dairy farming. She concludes that the added value of the use of data from an on-farm computer for tactical and strategic management is (still?) low. Dairy farmers that use information technologies (process-computers or management computers) more often use management accounts than farmers who did not adopt such technologies. That relationship is stronger for farmers with process-computers only. Then the complex management accounts that is a typical product to be acquired from a central service, are not a substitute for PC-based production records. From the farms with a PC for management purposes, 35% uses management accounts, but only one in six does so on his own PC. Fifty percent of the (now and future) non-users of a micro computer, does not see much advan-

tages in it. 43% thinks that better or quicker information could be an advantage. These are the most important advantages for current (64%) and future (72%) users too. Like in France (Bonny, 1992), reduced accountancy costs are mentioned as a motive: 11% of the current users even calls it the main motive (Overbeek, 1992:58). As a rule Dutch accounting offices doubt this. Some savings can be made on cheap data entry, but often extra checking and auditing (at a more expensive rate than data entry) could be needed.

In conclusion, the reviewed research pays much attention to the characteristics of farmers that adopt on-farm computers. Manager characteristics are more important in explaining computer adoption on farms than in non-farm agribusinesses (Baker, 1992). It looks difficult to pay attention to the profitability of adoption. Especially in recent years more explicit attention has been paid to services (off-farm systems) that provide information that acts as a substitute or complement to the on-farm PC. Institutional and market factors (other than characteristics of the farmer and his business) that could influence adoption in a region are not taken in account in the reviewed literature.

The reviewed research also shows that accounting is an important application for on-farm computers in the USA, France and Sweden, but not in the Netherlands. Although Ohlmér (1991) discussed his results for Sweden in comparison with that of other countries, a systematic international comparison has not yet been carried out. It seems necessary to take institutional and market factors into account in such an analysis. Next section will discuss these aspects more in detail for farm accounting software.

11.3 Decision to adopt: specialisation and substitution at work

The induced innovation theory (Hayami and Ruttan, 1985) states that innovations (like farm accounting software) can be explained by the relative scarcity of production factors. Relatively high prices (as a measure for scarcity) will induce a quest for improved technology that replaces the scarce production factor by a more abundant one.

Application of this theory suggests that adoption of farm accounting software will take place especially in countries where the cost of external services is high compared to the (opportunity) cost that a farmer faces when he keeps his own accounts. More detailed comparison of both sides of this equation is needed to comment on differences between countries in the adoption of on-farm accounting software (figure 11.1). Such a comparison should stress the differences in costs and benefits of adopting farm accounting software. If such differences exist, the induced innovation theory suggests that research and extension will put more emphasizes on the introduction of farm accounting software in those countries where on-farm accounting can be made profitable.

The costs of external services are probably different between countries. Partly this is due to differences in the product concerned. Especially the complexity of fiscal regulations is of interest here. Regulations in the Netherlands

(and perhaps Germany) are much more complex than those in the U.S.A., where cash accounting is allowed 1). The Netherlands not only demands accrual accounting, but also has a quite complicated fiscal regime. Many farms in the Netherlands also face complex accounts because they are organised as a partnership between father and son (for financing succession) or husband and wife (for fiscal reasons).

Partly based on these differences, farm organisations in the Netherlands, Denmark and Germany long ago established specialized agricultural accountancy offices. The next section discusses the developments in these offices in more detail. The question to be raised here is that such organisations perhaps provide services that are hard to get in other countries at all or at a comparable price.

When it comes to the costs of on-farm accounting software several factors influence these costs. First there is the price of the accounting software itself. That will be lower in large markets. This is especially the case if non-agricultural software can easily be used for the farm business. Here again the complexity of fiscal accounting can play a role. The use by American farmers of highly popular, low priced general accounting software like Quicken underlines this point.

A second factor is the availability of an on-farm computer. If a computer is already available on the farm or in the family, installing an extra program is cheaper and will be easier. In a society where computers are more wide-spread (like the U.S.A. in the eighties), doing the accounts yourself is more attractive. However, now that farmers in the Netherlands have bought PC's for other applications, this argument applies in reverse.

The third and main factor is the opportunity cost of the managers time. The Dutch dairy farmers interviewed by Overbeek (1992) mentioned the costs of their time and out-of-pocket costs as the main disadvantage of using a PC. These opportunity costs have two aspects: investment in accounting and fiscal knowledge and the labour income in an alternative use of time. Sharing out of the accounting task seems more attractive for farmers who face a heavy work load, like bigger dairy farms, and less attractive for farmers in crop production, who often have some slack periods with a low opportunity cost of time. The investment in accounting and fiscal knowledge depends of course on the institutional setting.

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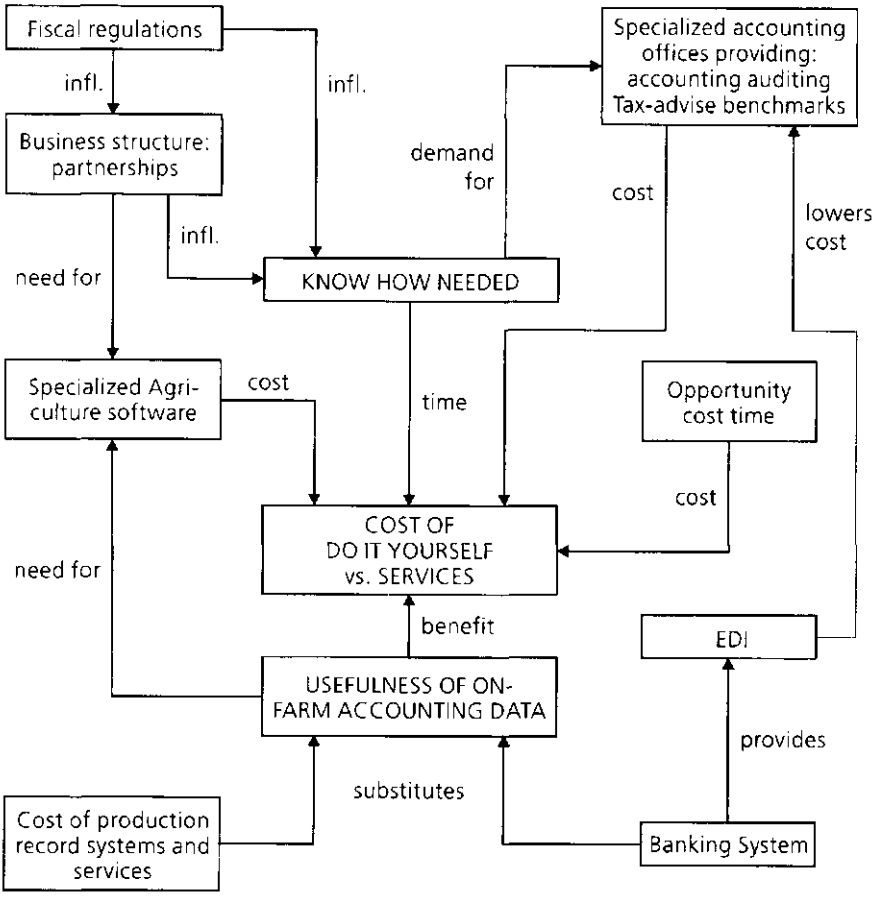
1) In the discussion that followed the presentation of this paper at the PACIOLI-workshop, the French delegates pointed out that experiences in France point in the same direction. Now that (fiscal) paper work has become more complex, farmers doing their own accounts source this work out (again) to specialised accounting centres. They hypothised that a repeat of the survey by Bonny (1992) would show that adoption in France of on-farm accounting is decreasing and 'following the Dutch way'. The workshop suggested that the relation between the level of on-farming accounting (y-axis) and the complexity of administrative regulations (x-axis) can be mapped as an S-curve: if regulations are introduced, accounting takes off, but if it becomes (too) complex, the adoption stagnates or even drops.

A fourth factor could be the extra cost for auditing if one chooses a do-it-yourself approach. Otherwise one could be confronted with tax-bills that are too high or with missed subsidies. This risk should be treated as extra costs from an economic point of view. Sometimes the signature of a certified auditor is obligatory.

The fifth and last factor is that a do-it-yourself approach of farm accounting could lead to extra costs of (tax-)advise and data on other farms. Advise and farm-comparison (bench mark data) are often sold as a complement product to farm accounting. A split of these products could lead to higher costs for advice and group comparisons: the advising accountant still has to get grip on the data of the farm, that he otherwise would have got by doing the accounts.



infl. = influences

Figure 11.1 Aspects that influence the adoption of farm level accounting

These two sides of the equation throw more light on the specialisation/integration decision that is taken when a farmer evaluates the buying of farm accounting software. However, to understand the outcome of this evaluation the substitution aspects play a role too. In an international comparison these should not be neglected, as they will differ between countries too.

The central issue is the usefulness of the accounting data: keeping the records on the farm is more interesting if they have a direct and clear meaning for the day-to-day decisions that the farmer has to make. If services for production records and enterprise accounting at gross margin level are available as an off-farm service at relatively low prices (which is probably a good description of the situation in the Netherlands), on-farm computers will be less available (see above) and the need for detailed accounting data (on- or off-farm) will be less. If on-farm software with the same function is in use (which is also the case in the Netherlands), on-farm accounting faces severe competition.

If, in such a situation, accounting software provides only financial data such software will only be successful if the extra work load is small and fiscal demands are relatively easy. Otherwise sharing out this task is attractive. The other option for farm accounting software is to include all the functions of production records (or to be integrated with it) to prevent double data entry. Again, this will only be successful if additional useful information can be generated and if fiscal demands are not prohibitive. As information on fixed costs has a low information value, information from production records including gross margins will often be viewed as satisfactory.

Banking system

In the previous paragraphs it was argued that the processes of integration/specialisation and substitution are heavily influenced by the complexity of the tax-regulation and organisational structure of the farms (partnerships). There is a third institutional factor that influences the equation between the costs of external services and on-farm computing: the banking system.

Two aspects of the banking system are relevant: the method used to transfer payments and the number of banks. The method for transferring money from one person to another differs between countries. In the Netherlands and Germany farmers have a checking account with one or more banks. Nearly all business payments are done through such an account: after receiving an invoice the farmer writes a payment order (with the amount and the number of the bank account to which the amount must be transferred) and sends it to his bank, which takes care of the transfer itself. Every week or so the farmer receives a document with a listing of all the executed payment orders, including those written out by others that lead to an incoming transfer. In the USA the payment system is quite different and resembles much more the process of recording cash transfers. There the farmer hands over check to a vendor, or receives a check. These are sent to a bank, which also returns a document with the transactions and the proceeded checks.

One effect of the banking system is the level of information value of its documents. The document with all the payments is in essence a kind of cash

flow statement that competes with simple accounting. This is especially true if a farmer uses only one bank for his payments (which is normal in the Netherlands, but probably not in Germany) and when banks exploit this opportunity. The Dutch RABObank for example provided at low cost the service of a monthly cash flow statement (but not coded and sorted to types of output and input) besides weekly or daily documents. In Minnesota, Farm Credit Services runs a complete accounting service on basis of the payment systems by providing farmers the opportunity to cross a simple accounting code at the moment they fill in their checks or send received checks to the bank. So, the boundary between financial information from banks and those from accounting offices is misty and products compete.

Another effect could be that farmers in a check-based system have an incentive to track their payments in more detail themselves. A Dutch farmer who sends all his payment orders once a week to his bank, knows that they will be processed next day. An American farmer that writes out checks daily is dependent on the behaviour of the other company when it will be cashed. On the income-side the Dutch farmer doesn't have to do anything. He can rely on a monthly cross-comparison of the invoice received and the amount received on his banking account. His American colleague must keep track of a valuable paper, sent to his bank. Thus it is more likely that a farmer in a check-based system will keep track of his payments and accounts receivable than a farmer in a system based on payment orders. This is even more true if accounting software offers check-writing functions (like in the U.S.A.). The banking system also influences the possibilities to introduce Electronic Data Interchange, a subject to be discussed in the next sections.

These differences also shape the menus and functions of accounting software, as a comparison between a Dutch, a German and an American farm accounting programme showed (Poppe, 1991b). More in general, it could be interesting to investigate how the market circumstances and institutional factors shape the farm accounting packages. In effect such packages could be unravelled into 'attributes' 1). It is also interesting to try to explain the different choices that farmers make when they design their accounting system (Schnitkey and Sonka, 1986; Sonka, 1985) with the help of positive accounting theory (Watts and Zimmerman, 1986).

Implications

The decision of a farmer to adopt farm accounting software is influenced by many factors. Most of these factors have a more or less equal influence within one region. However, between regions and nations equality is not guaranteed. This leads to two important conclusions:

* comparing adoption rates between regions (and farm types) does not make sense, unless explicit attention is paid to the factors discussed;

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1) Readers more interested in this technique might consult a standard text book on marketing management.

* a low adoption rate does not suggest backwardness; it is possible that specialisation leads to cost-efficient off-farm computing and without hurting the quality of decision making by the farmers.

An empirical test of this analysis should be a priority in an international research co-operation.

Next section discusses some actual developments in farm accounting in the Netherlands, compared to the German and Danish situation 1). This is done in the framework developed in this section. That makes it possible to speculate on future trends in the adoption rate. It also shows that a low adoption rate of on-farm accounting is accompanied by a high rate of innovation in off-farm accounting.

11.4 Current and future developments in Dutch farm accounting

11.4.1 EDI

Using a PC at the farm costs money and time, and requires preciseness in working, according to the Dutch dairy farmers interviewed by Overbeek (1993). These two complaints count for 60% of all disadvantages mentioned. Both can be solved by automation of data entry.

The main example is the electronic data exchange of data from the bank to the farmer. This option is available in nearly all accounting packages (SIVAK, 1992). Diskettes or the telephone line are used as transfer. Often it is also possible to create files with payment orders for the bank. Electronic data entry saves time and prevents mistakes. Economizing on labour could even be bigger if automatic coding would be supported, as is now implemented in accounting offices. Several payments can be given a code from the chart of accounts automatically, based on the bank account of the supplier of the service or the materials (e.g., the electricity company has a fixed account number with its bank).

An additional saving of time could occur if other data flows, as milk receipts, invoices from feed suppliers etc., become available in electronic form. In the general ledger these invoices are often split into different accounts. This can be automated (as is done in accounting offices) by providing a table that gears the codes of the suppliers' articles (or the defined values of certain attributes in the data flow) to a standardized chart of accounts. In addition more technical data (volumes) will be available, which improves the competitiveness compared to production records.

This strategy of electronic data entry solves the main bottlenecks (required time, accounting knowledge and accuracy in data entry) for on-farm accounting. So, will it improve the adoption of on-farm accounting? The

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1) Information on the German and Danish experience is based on information exchanged in a workshop organised in February 1993 by Dr. H.H. Sündermeijer of Agrar-Daten G.m.b.H. in Kiel.

answer is not a firm 'yes' and perhaps even a 'no', since the competitors are benefitting from the same development too, or even more.

The production record systems, often with a strong economic component on gross margin level, are using the same strategy of electronic data interchange. More important is that EDI is now more profitable for accounting offices than for on-farm software. The quick adoption of EDI between the RABObank and agricultural accounting offices proves this. Some offices (including the Agricultural Economics Research Institute) are now using electronic coding (see above) and receive data from farm-suppliers and auctions. This raises productivity. At the moment it seems that EDI is much easier to implement between big organisations than from and to the farm.

The adoption of EDI by accounting offices differs between countries, again partly for institutional differences. In Germany most of the accounts are still made in batch production on central located mainframes. In the new Länder (the ex-DDR), a much higher percentage of the accounts are made on PC's in the office of the accountant. This suggests that a further automation of the accountants' office in the West of the country could be attractive. However, experts wonder if this would include EDI. The structure of suppliers, buyers and the banking industry is very fragmented. Farmers have often checking accounts with two or three banks. That makes it hard to kick off EDI.

In Denmark the agricultural accountants and the advisory service are connected by terminals with a big central mainframe. This is located in an organisation that also serves the cooperatives. Data from suppliers and buyers are (after permission of all parties involved) therefore swapped from cooperatives to the accounts of the farmer. Tables that gear the article codes to the chart of accounts are maintained centrally. In 1993 the organisation was said to hesitate starting EDI with the banks. There are several of them and their electronic data does not steer productivity as much as in the Netherlands because all the data from complex transactions with the cooperatives are already available. And when one starts paying the banks (as in Holland), this could trigger the cooperatives to ask money for their data too.

11.4.2 Environmental data

At the top of his list on predicted factors that will generate new demands for computer technology, Harsh (1990) put the growth in regulatory measures affecting agriculture. This will require additional record keeping. The issue of environmental accounting has also been raised in Germany (Köhne, 1991; Doluschitz et al., 1992).

In the Netherlands this prediction is now almost a reality. There is a common point of view in politics that a so called 'mineral record system' should be made obligatory as quick as possible and that it should be used for a regulating levy on mineral surpluses. To avoid other painful policies, farm organisations are even more in favour of it than environmental lobbies.

The mineral record system is a set of accounts to register the supply (inflow) and removal (outflow) of minerals. Livestock, compound feed, roughage and fertilizers are examples of inflows. Outflows are livestock, products and

manure removed from the farm. Supply and removal, corrected for changes in inventories, together give the so called 'mineral balance'. It is however not a balance sheet but a statement of flows of minerals, resulting in a net surplus.

Now the records are kept voluntarily for management purposes, advisory and public relations. They are manual systems, stand alone programs or additional modules to production record systems. When the accounts become obligatory, a formal check with the fiscal accounts will be required too. That makes auditing possible. A farmer who 'forgets' to record a transaction on buying minerals cannot deduct it as a cost in his fiscal profit and loss account either, and is faced with an implied levy at the level of his marginal tax rate. This formal check could and will lead to integration of mineral accounts with the fiscal accounts, but this is not an obligation. It is viewed as important that there is no 'form over substance', as this could hamper future developments and efficiency.

An integration of environmental data in traditional farm accounting is not difficult to realize. Besides the data on minerals, the Agricultural Economics Research Institute has experience in recording 1,600 types of crop protection chemicals, allocated to arable crops, in its Farm Accountancy Data Network. Poppe (1992) described this case in detail. It shows that farm accounting software can be adapted easily. As a result it can distinguish itself from non-farm accounting software.

Confronted with this situation and the framework developed in the previous section, we could speculate on the influence of obligations to keep environmental records on on-farm computing. Harsh's statement suggests that this could be an important effect.

It is often argued that farmers are more interested in bio-technical aspects, especially for operational control, than in accounting. Environmental data will therefore be more interesting than data on depreciation. There are however two reasons to be more sceptical. The first is that this new obligation resembles the old one of fiscal accounting, and (in the Netherlands) is even tied to it. It is clear why farmers need this data in external reporting and tactical planning but not why they also need it in operational control. It seems that most of the arguments that Hardaker and Anderson (1981) summed up in their provocative article 'Why farm recording systems are doomed to failure' apply here too (see also Richardson, 1982): the data are not needed in day-to-day decision making. The second one is that the accounting offices have a comparative advantage in the registration of the data by using EDI, and that they will be involved in auditing. It is likely that they will try to exploit this advantage by selling more services.

11.4.3 Integration with production records

A third development in farm accounting could be the integration between production records and accounting. For a Dutch farm accounting package, options to record technical data are important to be successful. Farmers have expressed the wish of one-off recording of data. That applies to data used

in both production record systems and in accounting systems, regardless if these systems are on-farm or off-farm (or a combination of those).

Some projects have been carried out but it is not clear if this will lead to a cut in costs. Often (perhaps except the data on individual animals) the amount of data is small, and questions on definitions and reliability arise when data from production records are forwarded to the general ledger.

For the future it could be more interesting to handle this problem the other way around: instead of using production record data in the general ledger, the normal accounting system of a non-agricultural business could be used. Van Laar (1991) described such an integration between technical and financial information systems for the modern dairy farm. Figure 11.2 shows that the technical solutions are available to control the operational process in an accounting framework, with once-only (electronic) recording of data. This could provide the manager with integrated reports on the quantities (stocks and use) and value of the flow of materials (inputs and output) on his farm. A real-time daily calculation of the gross margin of the individual cow is technically feasible. The question will be if such data would have an information value.

The accounting process could be handled (literally) behind the windows. Therefore such an approach of the integration problem should be seriously investigated. The suppliers of farm accounting software will not by definition benefit from such an approach. Accounting knowledge and software codes are easier available than the technical knowledge of operational farm management and process-computers. It is therefore not unthinkable that (if the integration has a future), suppliers of production record systems will benefit most. If they do, and they leave out fixed costs, it could even hurt the position of complete farm accounting packages.

Transaction	Electronic source	Level of detail in farm accounting (profit centres or specific ledgers)
(compound) feed:		
Order	EDI-order	per type of feed
Delivery of feed	EDI-receipt	per type of feed / storage
Receipt invoice	EDI-invoice	per type of feed
Payment invoice	Telebanking	-
Use of feed	Feed computer	per type of feed per animal
Milk production:		
Milk yield	Milk robot	per cow
Delivery of milk	EDI-receipt	-
Receipt invoice	EDI-invoice	-
Receipt income	Telebanking	-

Figure 11.2 Transactions on a dairy farm that could be integrated in on-farm accounting software, based on electronic data entry from process- and management-computers (based on van Laar, 1991)

11.4.4 Strategy of accounting offices

The last development to be discussed is the strategy of the accounting offices. In the previous section it was shown that the quality and costs of their service has a large impact on decisions of farmers to adopt farm accounting software. So, it makes sense to look if and how they will improve their position.

The number of farmers declines every year with about 2%. Agricultural accounting offices operate in a shrinking market, and therefore find it difficult to realise growth. It is not easy to attract new clients from competitors. Farmers cannot easily judge the quality of their accountant (an agency problem), and the relationship is often one of confidence. And if farmers change their accountant, the agricultural accounting offices are sometimes also losing. International accounting companies are interested in the top of the market, the big (horticulture) farms and small cooperatives. Buying small private accounting offices is not an easy strategy either.

That leaves two other strategies available: attracting non-farm businesses or selling the farmers more services. Keeping accounts and fiscal advice are the cash-cows in the current product portfolio of the agricultural accounting offices. These products could quite easily be sold to small business too, and several companies are following this strategy. This has also lead to an interest in general accounting software for these accounting offices. A hot topic for discussion (also influenced by negative experiences with a few of the current packages) is the question if it still makes sense to have special farm accounting software or if a general accounting package with some additions would do too.

Table 11.3 Number of clients (diffentiated to type) per staff member for the main Dutch agricultural accounting offices, 1992 and 1989

	1992			1989		
	agri-cult.	other busns.	total a)	agri-cult.	other busns.	total a)
Abab-ncb	11	3	20	13	3	23
Ltb	10	4	21	11	3	22
A+A	10	4	25	14	3	30
Abtb	10	4	25	15	4	32
Flevoland	13	3	27	15	3	36
Cbtb	14	4	32	20	4	38
Avm-cclb	8	7	40	10	7	44
Gelderland/Zuid-Limburg	14	6	41	15	6	40
Wea	11	6	42	15	7	48
Producent	17	4	45	23	5	51
Olm	16	3	55	19	3	50
Nau	13	6	55	15	7	58
Total VLB	11	4	31	14	4	34

a) The column total includes agricultural and other businesses as well as private persons.
Source: VLB, 1992 and 1993.

The agricultural accounting offices improved their market share in agriculture with 4% between 1989 and 1992, but this meant a decline in the number of clients from 49,415 to 49,058. The number of small-business clients increased from 15,059 to 19,102. As the number of staff increased sharply (from 3,440 to 4,339), the number of clients per staff member decreased (table 11.3). However, the income (total sales) per client increased with nearly 30% to DFL 3,000.-. This suggests that the strategy of selling more services to the farmers has been the most important one. Research by Poppe and Jager (1994) indicated that the increase in accounting costs per farm of 70% between 1985 and 1991 could also have been influenced by a more business-like approach of competitions like the (privatized) extension service, higher administrative demands from the government and lower (regional) service levels of the government. It is also known that some accounting offices are catching up back work, to report more in time. Thus it remains unclear if farmers have been confronted with price increases, or that they indeed have been demanding extra services.

Data from the FADN showed a huge distribution in the accounting costs per farm: the 20% of the farms with the lowest costs paid *f* 1,750.- against *f* 9,025.- on the 20% farms with the highest cost. Multiple regression could explain about one third of the variance, with farm type (arable, dairy and intensive livestock) and farm size as the main indepent variables. In intensive livestock the solvability (negatively) and in arable farming the age of the farmer (positively) were correlated with the cost of accounting. Regional differences also occurred. The existence of a farm level PC and the year of taking over the farm were not significant.

The service level is decisive for the effects of the accounting offices' strategy on future adoption of farm accounting software. If accounting offices are not providing the services that farmers need (e.g., because they turn their attention to small businesses or are not able to shift from accounting to advise) the adoption will increase. This is also the case if the accounting offices are able (due to regional market power and agency problems) to inflate prices without improving service. But if the rise in fees per client is a sign of improved and extra services, it is likely that the adoption of farm accounting software will stay low. This even if accounting organisations promote the use of on-farm accounting software (as some of them do).

11.5 Concluding remarks

The decision of a farmer to adopt farm accounting software is influenced by many factors. The studies carried out up to now, hide market and institutional factors that are different between regions and countries. This makes the comparison between countries of adoption rates of farm accounting software meaningless. As accounting software is the main computer application in many countries this even backfires a comparison of the use of computers.

A low adoption rate of farm accounting software does not implicate backwardness in the decision making process of farmers. The developments described for the Netherlands even shows that a low adoption rate of farm

accounting software and innovations in the industry's information systems can go hand in hand. Decision making is not necessarily improved when farmers do the accounting themselves.

Future international research on the adoption of farm accounting software could test and quantify the ideas described in this paper. It is also suggested that future research should more focus on decision making by the farmer and his information sources than on software adoption only.

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WORKING GROUP SESSION: FARM ACCOUNTING

Group division: random

In this first working group session section 2 of the global descriptions of the national FADNs are discussed.

From the tables of section two an overview was made of some relevant elements which were helpful while discussing farm accounting. The objective was to discuss this tables and to try to formulate the three most important reasons why there are differences between the countries.

The results from the five working groups are grouped together and presented below.

1. Farm accounting: an administrative burden?

	FI	FR	IT	NL	SP	SW	UK
Average 'out of pocket' accounting costs per farm	270 ECU	2,500 ECU		2,200 ECU	240 ECU	800.. 5,000 ECU	6,000 ECU

2. Farm accounting: a management tool?

	FI	FR	IT	NL	SP	SW	UK
% farms with bookkeeping	100	75		100	1	100	100
% farms with own PC	15	6		30	0.5	30	15
% farms with bookkeeping on own PC	8	4		< 4	< 0.1	30	?

1. Farm accounting: an administrative burden?

Taxation system: wether or not there is a legal obligation to prepare accounts.

- Size of farm effects the amount of work
- Complexity / business structure
- Number of transactions to process

The data processing system: * manual / computerized;
* possible (state) subsidies (costs are the same but farmers receive subsidies: that is why the costs differ).

Figures are not comparable; no clear definition of 'bookkeeping', 'amount of services' and 'out of pocket'.

- Complexity of farming system and legal structure
- Subsidy for accounting
- Differences in definition

Business size: * Larger businesses incur higher costs;
* Differences in farm size between countries.

Some farms have 'standard tax' system: * France output < F500,000;
* Spain 3 size bands.

(*some have auditing, others not*)

- Some subsidy, but insignificant

Differences between the services included in these figures:
* government support?
* labour costs?
* feedback and guidance.

- Sizes and types of farms differ
- Complexity of the accounting systems differ
- Fiscal complexity and farm complexity increases the price

Competition: ratio of number of accounting firms to number of farms. Relationship with 'producer groups'.

Different farm size structure of countries.
* larger farms pay more tax: have most to gain;
* MC = MR;
* SGM size!

2. Farm accounting: a management tool?

- Differences in taxation system

Complexity / intensive or extensive / number of transactions

Education in information:

* Rate of technological advance, software innovation;
* Technology / age / structure.

(computers are expensive, you have to learn how to use them)

- no standard definition for farm (1% Spain is not right), legal structure

- the behaviour of organisations around farmers

- costs for accounting services. The level of usefulness of bookkeeping as a management tool

- % farm bookkeeping: tax laws (see previous) and farm structure

- own PC: linked to farm size and business complexity

- bookkeeping on PC: low because of specialist nature of work, need for official verification

Legal framework for bookkeeping and accounting: what is required, how complicated?

* usefulness

Level of management: business or a way of life? (makes management very different!)

* size of farm, age of farmer, etcetera.

Level of the use of PC's in general

* availability of software

Fiscal complexity generates use of PC up to a point

- Age and education structure of farmers: do other farmers use a PC, can they help?

- Business complexity

12. REFERENCES AND RICA

France

12.1 Introduction

In France, the current approach to optimizing the management of a farm relies above all on the modelization of the decision-making process 1). Researchers in the area of farm management try to understand how a decision is taken by a farmer in order to modelize human reasoning. Their aim is to build a logical pattern for decision making. The process is first of all divided into several different steps, which are the main phases of decision making. Then, researchers try to identify the event(s) which generates each step. Finally, they work on the Information System (IS) to define which information is used in this process.

To sum up, this approach defines the decision-making process before studying the information required: in fact, this is what can be called a « Top to bottom approach » (see annexes). The decision model is induced by the IS. Therefore, the adding in of information constitutes the last step in this methodology and information itself is, so to speak, in the background.

However, it should be noted that information is not neutral and has an essential influence on the decision making. We believe information should not play a secondary role in decision making but should become real « locomotive » of this process. This means that the IS induces the decision model: we can speak about real « data-driven piloting » in farm management. In this approach, the decision model becomes dependent on the IS. The latter will evolve and become richer and, therefore, will determine a great part of decision making. This is why we propose to adopt a new approach, which we have named the « bottom to top approach » (see annexes). The idea is that the optimization of farm management is dependent on the optimization of the farm IS. Research must be carried out so as to directly work on information.

This idea comes from a previous study which concerned the automatization of a farm management diagnosis through an expert system 2). The relevance of the diagnosis produced by the expert system, indeed, depends above all on the IS on which it is built. Having adopted a « bottom to top » approach, it seemed worthwhile to our team at the E.N.I.T.A. 3) to study a specific

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1) Attonaty, J.M. & L.G. Soler, Aide à la décision et gestion stratégique : un modèle pour l'entreprise agricole. -Revue Française de Gestion, Mars-Avril-Mai 1992.

2) Del'Homme Bernard, Jérôme Steffe, « Computer-based management diagnosis on the agricultural concern: advantages, limits and perspectives. », 43rd EAAE Seminar on 'Farmers in a new perspective'.

3) Ecole Nationale d'Ingénieurs en Techniques Agricoles.

kind of information: the reference, in order to show how decision making is dependent upon it.

The RICA is often described as an IS which produces references. Therefore, it is interesting to see how it can be used in decision making at the farm level.

In our presentation, we will first define the term « reference » before showing that, for the moment, RICA is not relevant in providing the farmer with usable references.

12.2 Definition

12.2.1 Definition of information

Before defining what a reference is, it is necessary to describe more precisely what information is. In fact, the term, which is ambiguous, can be broken down into two aspects 1) (Peaucelle,1988):

- a material part, the « signifier », which is the 'visible' and transferable part of information (words, codes, symbols...).
- a conceptual part, the « signified », which represents what we understand from the information (we use the terms of sense, semantic content, idea...).

According to G. Bateson, 'une information est une différence qui crée une différence' ('information is a difference which creates a difference'). That means information can be defined as the difference brought about by a message which changes the receptor's behaviour, which is adapted to his new state of knowledge. J.C. Courbon 2) shortens this definition of information by the following:

Information = Data (sign + code) + Interpretation model.

We can therefore say that information is different from data in so far as it isn't neutral.

12.2.2 Definition of references

References have the same characteristics as information: they have a material and a conceptual part but they also play a special role in so far as they allow for an explanation and an interpretation of a situation. Two main characteristics of references should be noted. Firstly, as opposed to 'internal information' (technical, accounting or financial data), stemming from the farm itself, references are 'external information'. Secondly, the use of a reference depends not only on its semantic content but also on its value. The two parts (material

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1) Peaucelle, J.L. 1987. -Informatique pour gestionnaire. -Paris. Vuibert. 200 p. France.

2) Courbon, J.C. 1993.- Système d'information: structuration, modélisation et communication .- Intereditions .- 288 p. France.

and conceptual parts) of the reference must be clearly differentiated. The definition of the conceptual part must include not only the semantic content but also the value of the reference.

Therefore, references are technical, economic or financial information whose value is used as a measure of comparison in order to explain the results of a farm. To interprete a result, most of the commentary comes from a comparison with references. In the management commentary, references are essential because they are used to assess the results. They are the basis of the evaluation, which depends on the comparison of farm indicators with references. This is why it is necessary to define more precisely what a reference is and to distinguish standard references, which are a representation of a phenomenon (they result from a statistical calculation) from normative references, which include an extra value.

* *standard references*: they represent indicators from the average of a set of farms. For example, the average profit margin for all corn farms whose turnover is more than 1 million. To define these standards, we use the same indicators as those noted on the farm. A statistical average of all individual indicators is calculated.

* *normative references*: they are the result of the reasoning and the experience of the experts and are not necessarily the result of a sample average. In most cases, normative references are built upon farm indicators. These references can, moreover, be produced from new indicators which are not used at the farm level. For example, to assess the current profits of a farm, the average of all current profits is not used but rather two new ratios: current profits/gross profits and production/gross profits which represent the material part of the reference. Thereafter, each ratio is attributed a specific value which is the conceptual part of the reference and, at that point, it is possible to say whether the current profits figure is good, quite good, quite bad or bad. To obtain such an evaluation, it is necessary to establish a certain number of thresholds. They correspond to values chosen by the experts to determine the level at which the commentary must change. For example, in the E.N.I.T.A. software, for current profits, one of the thresholds is fixed at 15% and 15,000 FF. This means that the result is judged good if the current profits increase by more than 15% and more than 15,000 FF.

Unfortunately, the difference between these two kinds of references is rarely made: people often use averages, which they call either standards or references. In our opinion, it is one of the problems of the RICA's system, in which these notions do not seem clearly distinguished.

12.3 The weakness of the RICA's system in providing the farmer with references

12.3.1 Standard references in the RICA cannot be used at a micro-economic level

If we apply our definitions, we can say that, today, RICA provides only « standard references ». Moreover, these references were defined in order to be used at the macro-economic level (in France, there is no micro-economic use of the RICA. This explains why there are so many management data networks.)

Therefore, references used in the RICA do not seem to be suitable to management use at the farm level. The main problem for using standard references at the farm level is that of representativity.

For standard references, the value is the result of a calculation: it is determined by means of a statistical tool which provides the average of an indicator for comparable farms. Standards can vary from one farm to another. For example, the wheat yields standard comes from an average of data collected on wheat-cultivating farms. But this average is different for each geographic area, so this disparity reappears in the values of standards.

A standard can be universal concerning its material part but its value can not be definitely fixed. Standard references are 'external information' but they are linked to the farm in so far as the specific geographic and economic situation of the farm determines the value of the standard. Therefore, the relevance of a standard reference depends on the sample from which it has been calculated. Representativity is a major problem which has, as yet, rarely been treated in agriculture (Sebillotte, 1991). In most cases, the sample is often taken from heterogeneous situations. For the moment, the diversity of all micro-economic situations cannot be treated at the RICA level because it raises too many problems of representativity.

12.3.2 *Farmers need normative references that the RICA does not produce*

Even if we solve the problem of representativity, a standard reference is not enough to help the farmer in decision making. Indeed, the standard reference is only the representation of a phenomenon. With this reference, a farmer knows only if his result is above or below the average. The farmer makes an observation only. This observation should not lead to pass any qualitative judgement on his farm situation. To make the comparison with his farm indicators effective, the farmer needs to assess the value of the standard reference. This is what we call a normative reference 1). Contrary to a standard reference, a normative reference is not neutral: it includes the point of view of the experts and is, therefore, more effective than a standard reference in comparing farm indicators with references. A normative reference includes an extra value.

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1) However, a normative reference does not necessarily result from a standard reference.

For normative references, the conceptual part is defined by the experts. It is a result of human reasoning divisible into two parts:

The first is the objective part. The value is determined by the experts relying on their experience and their knowledge of the problem. Even if this value does not precisely correspond to a statistical calculation, the result is quite similar.

The second part is the subjective reasoning. The expert actually gives his opinion about the value of the normative reference. Having an idea of the performance the farm should achieve, he consequently assesses the optimal value of the reference. Therefore, the expert establishes the value more on a feeling (based on his own IS) than on a calculation.

From the comparison between the value of the normative reference and the value of the farm indicator there results an explanation (increase or decrease) or an assessment (good, quite good, quite bad...). It is obvious that the RICA does not provide such normative references. There is no extra value in the references obtained.

Therefore, one might ask whether the RICA can produce these normative references. If we want the RICA to provide the farmer with a more evolved IS, it is necessary first to carry out work on the setting up of such references. This means to carry out work on the information modelling of the RICA.

Once the problem of the normative reference value is solved, there still remains one further problem which is the use of this normative reference. This means the comparison between its value and the value of the farm indicator. This comparison raises, indeed, a specific problem. It concerns the fixing of boundaries which mark the intervals between expressions of evaluation, creating variations in the judgement when these values appear. For example, if we fix a threshold of 15% to assess the rise of current profits, a rise of 16% will be considered as an increase whereas a rise of 14% will be considered as stable. Moreover, a profit of 50,000 F will be considered as an increase only if it rises by 7,501 F. So the changes appearing in the judgement when the threshold is crossed are often unsatisfying and somewhat arbitrary. Two techniques are used to reduce this problem:

- *the combination of two boundaries.*
  A percentage boundary and a calculated one can be crossed to set up a more relevant judgement. For example, the rise in the profits is identified by an increase of more than 15% and more than 15,000 F or by an increase of more than 50,000 F.
- *the fixing of several thresholds.*
  Instead of changing our judgement as soon as a boundary is crossed, several intervals can be defined with their own judgement. Two kinds of threshold can be distinguished: level and variation thresholds A variation threshold describes the evolution of farm indicators, using 'internal information'. For example, a variation threshold of 5% in expenses means a rise if expenses increased by more than 5%, a stagnation if expenses varied between -5% and +5%, and a decrease if expenses varied by more than -5%. A level threshold describes the comparison of a farm indicator with the standard. For example, if the wheat yield is 105% higher than

the standard, it will be considered good. If it is between 95 and 105%, the yield will be considered to be at the same level ...

Therefore, if one of the aims of the RICA is to produce management references at a micro-economic level, it will be relevant to know whether we include this threshold and boundaries step the information modelling.

12.4 Conclusion

Since its beginning, the RICA has always been defined as a micro-economic data network which is used at a macro-economic level. References produced are, therefore, what we call standard references at a macro-economic level. The topic today is to decide whether the use of the RICA is possible at a micro-economic level. Obviously, the RICA network is defined in a way which allows one to imagine such a use.

As we described earlier, a data network for management at the farm level requires the definition of both standard and normative references. This means structured work on the definition of references is necessary. Such work suits the « bottom to top approach », in which we assume that the IS induces the decision model.

However, it seems obvious that the setting up of this work will lead to important changes in the RICA. Will it be possible to build an IS which will be usable on both micro- and macro-economic levels ? The answer to this question is not only technical but also contains a political aspect. Such an IS would, indeed, raise the problems of the proprietorship of information and its cost.

Even if we don't consider such an evolution for the RICA, it seems however worthwhile to keep this « bottom to top approach » to references to provide EU officials with a more evolved IS at a macro-economic level.

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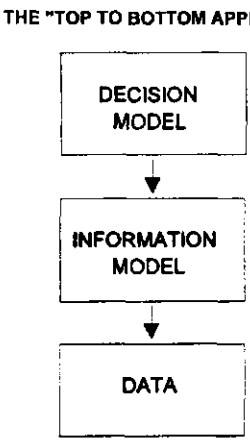
Annex


THE "TOP TO BOTTOM APPROACH"
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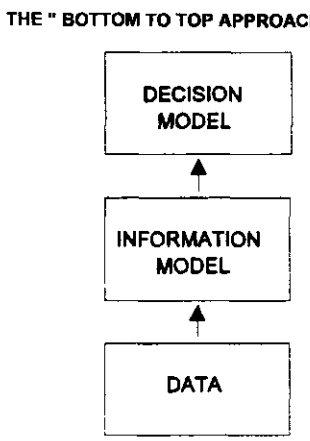
THE " BOTTOM TO TOP APPROACH"
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13. THE USE OF STATISTICS FROM BOOK-KEEPING SURVEYS FROM A SWEDISH ANGLE: PAST AND FUTURE

Per Persson

13.1 An overview of the present situation and forecasts

13.1.1 The situation in Sweden up to now

If you only look upon the demand of statistics for public activities during the last two decades there is a fairly easy way to describe the situation in Sweden. The most interesting thing has been to provide information for political decisions in the agricultural field. The production of statistics for this purpose has been so big that other public needs, such as education, research, general information and contribution to OECD, FAO and other international institutions that work with statistics, have been covered automatically. After the 1st of January 1995, when Sweden became a member of the EU, the situation has changed a bit. The need of statistics for international purposes have increased which of cause is a consequence of all the regulations from Eurostat and DG 6 that Sweden like other members of the EU have to live up to.

For other than public purposes the needs of statistical information have mainly focused upon the situation for an individual farm in comparison with a comparable group of farms. In the following only needs for public purposes will be dealt with.

If we go back to the Swedish agricultural policy, which mainly has dictated the need of agricultural statistics, we can divide the last two decades into three main periods, namely

a) The 'old system' which was in force up till 1990. The main points in this system were 1) to automatically compensate the farmers for higher costs which were related to inflation and 2) to give them the same lifts in incomes as some other socio-economic groups.

b) The partly deregulated system which was in force from 1990 to the 1st of January 1995 when Sweden became member of the EU.

c) EUs CAP (from the 1st of January 1995).

If we now focus upon the demands for statistical information from book-keeping surveys and other microeconomic surveys, the differences over time can briefly be described as follows. During the old system there was a need for a broad view for a great number of groupings of farms (from the smallest ones

to the largest). This need was covered up by the Swedish book-keeping survey (JEU) and also by another microeconomic study which was based on information from the farmers' income-taxations (DU). In the beginning both these surveys covered almost the whole farmer-population. Later JEU got more narrow and covered only middle-sized farms with specialised milk production or crop production.

The most interesting questions during the period of the old system were changes in profitability (real and nominal) of farm enterprises over time and changes in income levels and mixes of incomes (incomes from the farm and from other different sources) of farmer-households. Another question that also was of some interest was how the incomes of agriculture households changed in comparison with other types of households (for example workers). Apart from JEU and DU the so called HINK was used for these comparisons.

In the beginning of the 1990's there was a big change in the agricultural policy when the Swedish agricultural reform was introduced. The agricultural sector should now be more market oriented and interventions from the government should be kept on a low level.

The reform was to be introduced during a transitional period of a few years length. From a statistical point of view many motives for producing a great part of the agricultural statistics now disappeared. Statistical information was no longer demanded in the same extent as earlier.

In the perspective of a coming membership in the EU some 'unnecessary statistics' were still produced. Sweden was aware of EUs demands for some type of statistics, especially statistics from structure and book-keeping surveys. Therefore the Swedish book-keeping survey, JEU, was kept on the same level as before. The other microeconomic survey, DU, was however sharply reduced. Which later will be described JEU was used as a base source of information for evaluating the consequences of the CAP reform during the reform period 1990 to 1994.

13.1.2 Future demands of agriculture statistics in Sweden and in EU

After the Swedish membership in the EU there has been no clear picture of the future needs of agricultural statistics. For the time being the demands have to a great extent been regarded as being equal to what Eurostat and DG 6 request. In the nearest future a big task for the Joint Council, as the responsible agency for a large part of the agricultural statistics, will be to define the different national needs and the priority of those needs. An interesting point to take into consideration is the parlamentaric work that recently has started in Sweden in evaluating the CAP system. There will probably be special demands of statistics for this purpose.

If we look upon the Swedish book-keeping survey there is a job going on at present with adapting this survey to EU demands (that is FADN). The biggest change is that the survey will be broadened so that it covers a larger population than today. However for national purposes the Joint Council still sees the middle size holdings with specialised production as being the most interesting groups of holdings in the survey. There are two main reasons for this. The first

reason is to keep the sample for those groups in order to produce comparative data over time. Secondly it is important to have good statistics for the most important and most typical groups of holdings in the country when evaluating the CAP reform. The sample plan that will be presented for DG 6 will thus be designed so that the old groups of holdings still will have a good representation in the survey. In the long run the design and the size of the sample may be changed as Sweden gets more knowledge of how the survey is used in the commission and what impact that has on the national demands. For the time being, Sweden has too little knowledge about what information that is regarded as being interesting in the work inside EU. This also goes for statistics produced for Eurostat. The answer of the question of future needs and use of information from different surveys which are asked for by the commission can therefore only be speculations. A short discussion on this topic follows below.

Both the national Swedish demands and the demands for EU should in principle be governed by what is requested for policy-making within CAP. However the system is not flexible. A lot of regulations concerning statistics dictate what statistics that should be produced by each member state. The system is in a way locked up by these regulations. The flow of data produced can't change rapidly as needs and demands change.

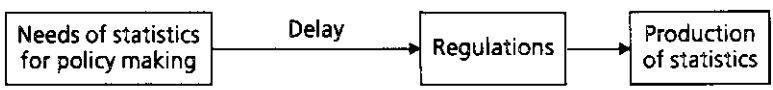

Figure 13.1 Link between needs and production of statistics

Another disturbance between need of statistics and production of statistics might be the principle of decision-making in Eurostat and perhaps also in DG 6 (the FADN-unit). Some committees within these institutions are used for decision-making concerning what statistics should be produced in the future. One main problem with this system could be that the members in these committees to a great extent are statisticians who have little or no contact with the political system. This lack of contacts goes for both national politicians and people who work with political questions in the commission. The conditions that now are mentioned seem to generate a conservative system when it comes to production of statistics. From a statistical point of view it is easier to continue to produce the same type of statistics as before. There are routines already built up as well as networks of contacts etc.

What is said above does indicate that there is almost no link at all between the political side and the production side. That is of cause not true. Employees from the commission who works with political questions do participate in some committees and give their view upon what shall be produced. However the signals given are vague and brief. Even they seem to think that things are good as they are. One might think that the rapid change in the common agricultural policy should have some influence on the production of statistics.

In the light of what is said above an easy answer to the question of what is needed in the future could be that it will be the same type of statistics as we have today. The basic view is then that the same mechanisms that now rules the system for producing statistics will continue for a future period. However there are efforts made to take new approach on the statistics. One good example is the Pacioli-project which brings up a lot of interesting questions. Other examples are articles etc. written in DG 6s newsletter 'Farm trends'. Hopefully such activities can improve the adjustment of the statistics to future needs.

If you loosen yourself from restrictions etc. that eventually lays within the present system there are some questions that should be interesting to throw light upon in a future perspective. In the rest of this chapter I will point out a few such issues. The basis is the present discussion in Sweden in this matter. As I see it the questions pointed out should also be of interest in an EU-perspective.

One big issue that earlier has been mentioned is the need for statistics that shows how the reformed CAP functions. If we limit the question to need of microeconomic information (book-keeping data etc.) and some structure statistics the following questions are good examples of what this type of statistics can be used for.

- How does EUs quota-system influence the farmers incomes and the agriculture structure.
- How does the direct support -system (general, LFA, environmental) influence the farmers incomes and the agricultural structure.
- Effects on the agriculture structure of the support for landscape-care.

The above listed questions could be of interest not only from a national point of view but also from an international point of view. Questions like 'What importance have the quotas and the different direct support for Sweden in comparison with other comparable countries' could in this perspective be of interest. Another comparison, that is a bit apart from microeconomic and structure surveys but still interesting, is how member states practise CAP and what impact differences in practices have on the structure etc.

Questions like 'What type of farmers get the biggest share of the cake (commercial farmers, part-time farmers, milk producers etc.)' could here be of relevance.

An important question that are under discussion at the present both in Sweden and in other countries is the environmental impact from farming. A big problem in almost all countries is the leakage from nitrogen and phosphor. Information from different surveys are here important. Especially data for making nitrogen and phosphor balances. Such balances could be set up both for individual farms and/or whole regions. Of special interest is also the handling of farmyard manure (spread-system etc.).

An other 'new' question is the effect of different environmental restrictions that farm holdings have to follow. In Sweden we have compulsory rules concerning stock-capacity for manure. The capacity must be higher in the coast-area than in the inland. To get certain types of environmental support farmers are forbidden to use chemical stuffs on the land concerned. One question here

could be how this restriction effects the farmers economy and/or the output for the whole sector.

A method to answer the last questions could perhaps be to widening up the book-keeping survey a bit or just analyse the figures from another angle. In the next chapter some aspects on this last remark will be given when describing the model for analyses that has been used in Sweden for the last ten years. An important input in this model is data from the microeconomic studies. The model has been designed to deal with questions that have been considered as being interesting from a strict national point of view. However in the future it should be possible to use it even for other purposes.

13.2 Model for analyses

13.2.1 Basic components in the model

One big problem with the book-keeping survey is the time lag between the year when the survey is carried out and the moment when the results become available. For the Swedish book-keeping survey, JEU, this time lag has been about one year from the end of the book-keeping year. An other problem has been that the method used for taking in data has been costly and has also demanded great efforts which has lead to a low sample size. For certain special analyses the statistical errors have been unacceptably high.

In order to get around some of the problems with JEU a model has been used in which data from JEU have been linked with data from other surveys. In this way a lot of information has been available for the holdings included in the study. The model is called the *type-farm model*. Apart from JEU the most important surveys used in this model are DU (the income taxation study), the structure survey, statistics over crop production and also price-statistics. The last source plays, which will be explained later, an important role in the model.

For the time being the future of DU is under investigation. For 1995 this survey will only be carried out in a small scale. For the type-farm model figures from JEU therefore will be used to a greater extent.

The figures in the type-farm model refer all the time to the *averages for certain groups of holdings with homogenous production (mainly milk-producers)*. In brief terms the model is built up as follows. In a first step all economic figures in DU and JEU is 'translated' into a price part and a volume part. This is done by dividing income and cost figures from these two surveys with corresponding prices. For example the income-figure for milk is divided with the milk price. The result is a milk volume figure. For some incomes and costs indexes is used. For direct support data is available from both the structure survey and from administrative sources (amount of money per cow, per hectare etc.).

When all incomes and costs have been divided in a price part and a volume part a projection is being done of the volume part with one year. Several sources is used for making this projection. One important source is the structure survey, where figures showing the number of hectares, number of animal etc. for different type-farms are available for the projection year. The time-lag in

the Swedish structure survey is relatively low (about three months from the counting-day). When figures from the structure survey over number of hectares of cereals is linked with figures from the crop statistics the quantity cereals for sale can be estimated for the projection year. In doing that fodder balances is also used for cereals used for fodder. When estimating milk production figures from the structure survey is used for determine the number of cows on the type-farm holding. Statistics from Swedish Dairies'association are used for estimating production per cow. For some incomes and costs there are no statistics over volumes available. In these cases pure judgements are being made.

After estimating all new volumes for the projection year these volumes are multiplied with prices for corresponding year. Data from the price statistics is then again used. The time lag for price statistics is low (about two month). When the volumes for the projection year are multiplied with corresponding prices new incomes and costs become available for one more year from the latest year of JEU and DU. The type-farm calculation is as a rule produced in February-March each year. For example in February 1993 figures from JEU and DU were available for 1991. With the help of the type-farm model it was possible to put up calculation with fairly good precision for an extra year (1992).

From a political angle it is important that the material used is as actual as possible. The type-farm model has been of great help in achieving this goal. The need of actual material is of cause a function of the fact that political decision-making has to be footed on the present situation as good as it could be measured.

In the future it could be possible that data from IACS 1) also could be incorporated in the model. This register contains all types of direct-supports

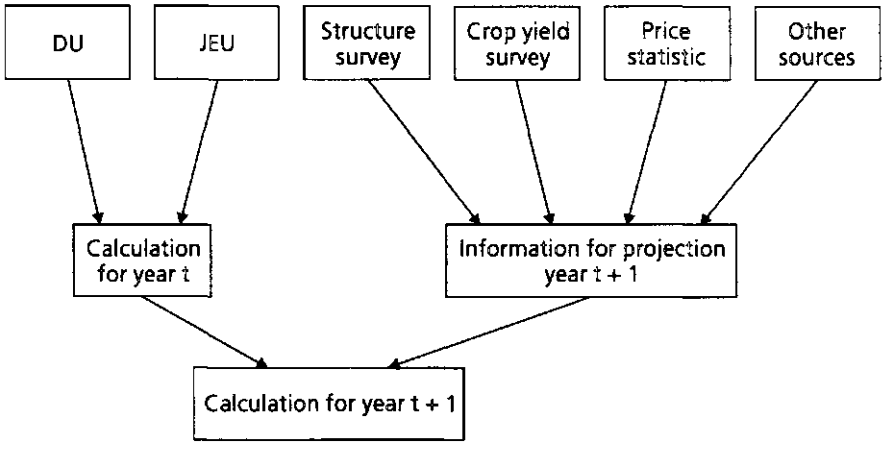

Figure 13.2 Scheme over the type-farm model

1) Integrated Administration and Control System.

and milk-quotas on an individual level. For many farmer-enterprises incomes from direct support is the main source of the total income. From a type-farm point of view it would be of big interest to have access to this information for above all analytical purposes.

13.2.2 Result measurements

In the past there has been a lot of discussion in Sweden about real results versus nominal results. This debate actually started when some voices were heard during the national price support negotiations claming that the farmer made a lot of profits on the inflation which during this time was high in Sweden. One result of the debate was that real results were introduced in JEU and even in the type-farm model. After 1990 the new agriculture policy was introduced and the interest for real results dropped. In the type-farm model only nominal results have been calculated thereafter. However in JEU still some real results exist.

In the type-farm calculation two result levels are used, namely a) production result which stands for incomes minus running costs and b) a result that stands for what is left for own labour and own capital. To get a common base for comparison between groups of holdings with different sizes and productions, so called cover-ratioes are also calculated. Two different kinds of cover-ratioes exist in the type farm model, which are defined below.

Cover ratio 1 — Production result divided with depreciation and calculated cost for all labour input and calculated rate for all capital invested

Cover ratio 2 — Result b) divided with calculated cost for own labour input and own capital

In the past a lot of comparisons for political purposes have been made between different type farms 1) in terms of differences in covering rates. The changes in covering rates over time have also been considered as being of interest.

13.2.3 Examples of use of the type farm model up to now

You could say that the latest available type-farm calculation constitute a sort of a base for different sensitivity calculation concerning items that for the moment is considered as being of interest from a political angle. The economic consequences of different political decisions for typical farms are hereby the basic topic for the calculation. During the latest years several such questions have been dealt with within the type farm model. In the following some examples are given.

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1) A type farm is the average of a group of homogenoes farms.

- introduction of direct payment to certain animals in 1989;
- introduction of direct payment to cereal-acreage in 1990;
- dropping of fees on fertiliser;
- dropping of fees on protein-fodder;
- introduction of the CAP system for Sweden.

One use has also been to evaluate how different solidity affects the farmers changes to survive as a farmer. This was done in connection to a special study in 1993 concerning farmers with high debts.

In 1992 there were big losses of cereals and rough fodder caused by a severe drought. The government wished to get information about how the farmers profitability was affected by this. With the help of somewhat updated figures from the type farm model for 1991 the profitability could be calculated under the condition of normal yield and also for an expected low yield for 1992. The difference between these two alternatives showed the losses caused by the drought.

If you look upon CAP a lot of work has been spent on judging what effects on the profitability of the farm-enterprise the shift from the national system to the CAP system would have. An important question was also which options for national applications Sweden should give priority in the negotiations with EU. In the internal work several such options were evaluated. The type-farm model was here used as well as data from the structure survey. When using structure data figures for animals and crops etc. were multiplied with assumed EU-supportamounts and comparisons were made with corresponding outcome from the national system in 1994. In that way the number of 'winners' and 'losers' were estimated and also how much money in absolute terms they were gaining or losing.

13.2.4 Possible future use

From a national Swedish angle there are good reasons to believe that profitability questions will be of interest even in the future and that the type-farm model will be a good tool to use for this purpose. At least as long as there are enough background-material to support the model. The model costs almost nothing to run. Most of the background material is anyway produced to fulfill other demands, for example EU-demands. One exception is DU (the taxation survey). At present the future for this survey is uncertain. It is possible that the only source for economic base data for the type-farm model will be JEU. This will lead to a more limit use of the model. DU was earlier based on a big sample. The statistical reliability in the figures were high. For JEU with its small sample the statistical reliability is lower. On the other hand the sample in JEU has long rotation time which means that changes over time could be fairly well estimated which is important when time series analyses are being made. One disadvantage is that it is almost impossible to restructure the sample in the short run. This means that if you want to study a special new group of farmers one year (for example ecological farmers) you can't rapidly take them into the survey. A lot of preparation must be done and also a lot of recourses are necessary to provide to make this possible.

Apart from JEU and DU there is another way of getting microeconomic data for farmers in Sweden, namely through the accountancy organisation LRF-Konsult. This institution has around 25,000 clients of which a great part have their accounts on central data medium at LRF-konsult. The Joint Council is discussing with LRF-Konsult the possibility to use data from this base to make some analyses. For middle size and bigger farms LRF-Konsults clients represents a great part of the total population.

Apart from national comparisons over time and between different groups of farms there will in the future also be of interest to make international comparisons. Mainly with countries in our immediate surroundings (like Denmark, Finland and Germany). However this demands comparable data for these countries. The database in FADN could here be of importance.

In connection with the Swedish evaluation of CAP there will probably be of interest to make some sensitivity analyses regarding the effects of milk quotas etc. Even the effects of turning over from the national system with 'simple' direct supports to EUs more complicated system will probably be of interest to study with help of data from book-keeping survey and the type-farm model.

As mentioned earlier environmental questions will probably be of big interest in the future. One use of book-keeping data or data from an other microeconomic survey could be to compare the profitability between enterprises with conventional technic and ecological farms. If it is difficult to change the sample in the surveys in order to include specialised ecological farms there could be a possibility to instead use sensibility calculations where data from the base surveys are synthetically changed to correspond to the conditions of a ecological farm. In the same way sensitivity calculations could be made to study the effects on the economy of landscape efforts.

The above mentioned questions shows that there are a lot of 'new' questions that could be of interest in the future. One important thing about the book-keeping surveys or other microeconomic survey used is to take in enough variables so that they permit a flexible use. As an alternative data from other surveys could be linked to data from microeconomic surveys so that the total picture of the studied farms will be as complete as possible.

14. ACCOUNTING AND THE ENVIRONMENT

Ph.D. Carlos San Juan

14.1 The main distinguishing elements of RECAN (Spanish FADN)

The method for collecting accounting data is coordinated by the Ministry of Agriculture (Microeconomic Analysis), but the information derives from 30 accounting offices which manage the computerized accounting programme as external consultants.

Therefore, these offices fulfill an important counselling role for agricultures in data collection, since the majority of these do not handle their accounting directly and it is estimated that less than 10% have a computerized programme.

The accounting offices first sift through the data and once an 'accounting file' for each exploitation in the sample is elaborated, it is sent to the regional statistics office (one in each 'Comunidad Autónoma').

The file in every case collects the information required for RECAN, which is somewhat wider and more dispersed than that for FADN, but in some regions (such as the Basque Country) the information collected is even wider. In particular, the Basque Country collects some interesting technical aspects which are useful in environmental analysis and which are not collected by the RECAN file nor by the FADN file. The problem today is that it is not available in every region, and neither is it homogenous when it is does exist. It is therefore necessary to first homogenize the information.

At present, the projects which take into account environmental variables in economic analysis have had to use as their basis either experimental data with no statistical value or related to a small number of geographical areas), or proxy financial variables.

Following is a brief summary of my experience in the use of FADN data to determine the level of adaptation of exploitations to the natural environment. I will later present the main defects in the information available for environmental analysis.

14.2 Typology of production and the use of inputs

To formulate and evaluate environmental strategies, we need to know the relationship between the principles of environmental management, technical level and private exploitation profitability.

San Juan's 1995 paper examines the possibilities for generating key indexes for the environmental adaptation of farms which allows the measuring of both economic results (private profitability) and external economies for agricultural activity.

The target is to generate a classification of the farms' joint production function related to the index of deterioration of resources and positive external economies, and, in this way, to improve the information available to policy-makers to explore the contradiction between agricultural income, food price and long term effects in the loss of soil and water quality, as well as the atmosphere's inability to absorb air pollution.

The methodology proposed is applied to a farm account data base of Spanish agricultural enterprises, to elaborate the adaptation of natural resources associated with different joint farm production functions.

The results reveal contradictions, possibly because the emphasis of agricultural price policy is on meeting social and income objectives, rather than on ecological ones. But these also show the shortcomings of microstatistics in the progress of environmental analysis of productivity.

14.3 The needs for progress in information

In order to make progress in the analysis of environmental aspects it is necessary to not only have financial data, BUT ALSO physical data, which would allow a simultaneous analysis of monetary and environmental productivity for exploitations.

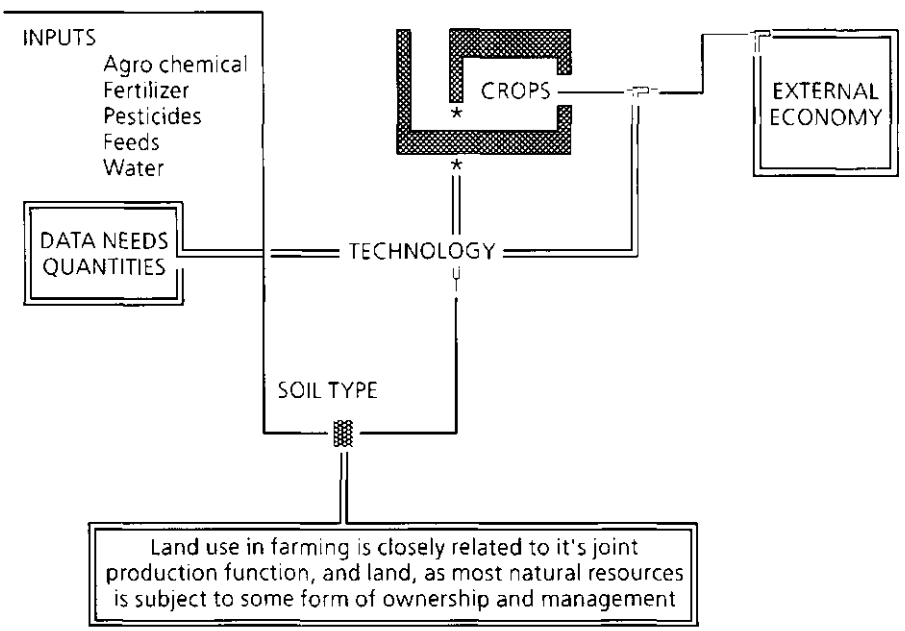

Figure 14.1 Micro data needs for environmental analysis

In Spain, as opposed to the Netherlands (Poppe, 1992), tax legislation does not require the presence of accounting in agricultural enterprises, and neither does environmental legislation require the registration of mineral flows. Nevertheless, there is the possibility of gathering this information by altering the present FADN file for data collection.

In the opinion of experts, this would require an adaptation of the present experience available and greater financial resources to finance the extra cost of collecting environmental information.

This option seems preferable to establishing an independent information system. It is cheaper and makes it easier to obtain coherent information for *decision-making on agricultural policy.*

It seems preferable that FADN information be extended in order to study these aspects, since at present the difference in statistical information sources creates insecurity in decision-making and occasionally gives rise to clear conflicts in the aims of the programmes.

Nevertheless, it is necessary to overcome certain institutional slowness in order to promote these changes. This is still a pending matter. Regulating at a EU level could be an important factor in promoting this task.

14.4 Codifying the environmental variables

One of the most urgent matters is to determine the changes in the accounting programme and the RECAN file in order to collect the information on the inputs used. At present, this information is only collected in values but not in quantities.

Some regional experiences (the Basque Country) and European experiences (Netherlands, Germany) may be useful, e.g. fertilizer list, pesticides list, etc. Nevertheless, some adapting will be necessary to collect specific problems on Mediterranean agriculture and silviculture? Likewise, the lists of products should be codified, taking into account the commercial names adopted by each country.

14.5 Task list on Spanish FADN (trial)

1. Draw up a new farm sample plan
2. Specify details for research needs
3. Keep agendas
4. Improve financial support to accounting offices and farms
5. Software and hardware development
6. Improve regional coordination
7. Define lists of chemical inputs
8. Define lists of waste outputs
9. Expert systems
10. Modification of traditional accounting rules (environmental concerns, diversified enterprises, ...)

14.6 Final comments

The use of FADN as a means of obtaining environmental information on farms offers some potentially important advantages, regarding the elaboration of specific statistics for collecting environmental information.

Amongst these advantages one can point out the economy of means and the coherence in economic information traditionally obtained on farms, as well as new information requirements on external economies and diseconomies of companies.

Without a doubt, this will facilitate decision-making in economic politics, since it enables one to consider the effects of the measures taken, both regarding agricultures' incomes and the natural environment, employing impact evaluation techniques, cost-benefit analysis, and the balance of minerals or others.

In Mediterranean countries, there are environmental problems which partly differ from the ones reflecting a greater intensity in Northern Europe. Amongst these problems one can point out soil erosion, blighting, fires, particularities in the exploitation of Mediterranean forests, the problems related to irrigation and alternative uses for water.

It is important that the accounting information contained in FADN should simultaneously allow the evaluation of external positive economies for agricultural, cattle and forestry activities, as is the case for diseconomies.

The alterations which are necessary to include environmental variables should not (nor do they have to) affect the continuity of historical series.

The expansion or use of data collected by the network should be organized by a computerized system of windows (or menus) which allows the choice of moving on to more scattered information without disturbing the principal flow of information.

This order will allow to progressively incorporate information without disturbing the 'conventional' flow of data. This task entails an important role for experts systems and other computer techniques, which, to some extent, is ready being developed in certain member states of the EU and could be generally adapted to FADN.

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15. THE FARM ACCOUNTANCY DATA NETWORK AND POLICY MAKING

Nigel Robson, DG VI A.3

The European Commission division 'Analysis of the Situation of Agricultural Holdings' is the tiny pinnacle of a vast pyramid of people and resources, from the 60,000 participating farmers, through local and regional accounting offices, and services of Ministries of Agriculture or specialised Agricultural Economic Research Institutes, to the national liaison agency, and finally to Brussels. Here a handful of officials (5 graduates, 4 technicians and 3 secretaries) tries to manage the functioning of the pyramid, and exploit the Gigabytes of data which the FADN collects each year, as part of their overall responsibilities.

15.1 What does the Commission do with all this data?

Although the production of 'standard' tables is a minor part of the analysis which is made of the data, the large number of permutations of classifications means that several hundred tables can be created of standard presentations. The typical 'standard' output is a set of tables presented in varying degrees of detail, from 15 to 20 key variables to a 4-page version of over 100 variables. The data presented are group averages for farms classified by type and/or region and/or size of farm. The essential feature of such data is that it is *comparable* between groups and between Member States, since the definitions and treatment of the data are systematically the same. From this 'standard' treatment, analyses of income distributions and quantile classifications are derived, for different groupings of farms (EUR12, Member State, Region, size of enterprise, etc).

Another use of the data is to estimate costs of production and margins for a range of crop and animal products, from which the distribution of production by cost level can also be derived.

Because accountancy data is by nature for a *past* time period, the estimation of the situation of farmers' incomes in the *current* year is of interest to politicians and economists. Early estimates of current incomes by type of farm are produced with a 'forecasting' model, which starts from the last *real* results, applies a series of coefficients of changes in quantities produced, prices, input costs, labour utilisation and changes in grants and subsidies, to produce estimates of all the key variables of the farm account at the present time.

FADN data is extensively used for a large number of *ad hoc* analyses to reply to many questions from departments in the Agricultural Directorate-General, the Cabinet of the Commissioner for Agriculture and Rural Development, the European Parliament, the EC Court of Auditors, and many other organisations.

Because of the complexity of the data, the device of presenting certain features on MAPS is used to simplify it and to help the non-expert to better understand the relationships presented.

In all of these uses of the FADN data, the essential feature is that the FADN is *representative* of commercial farms in the E.U. The other great advantage of FADN data is that, being micro-economic data for a large number of farms, it can provide information on the *distribution* of economic and structural characteristics. This feature is always the basic starting point of any examination of a (market) policy which is being studied with a view to reforming or modifying it.

A further advantage of FADN data is that analyses or data extraction 'à la carte' is possible. Because the data is stored in 'flat files' and the data extraction and processing system is extremely flexible and fast in its treatment of individual data, farms can be selected by ANY variable or combination of variables. Thus, the economist can specify the farm 'profile' which he wants, and select *only* farms which correspond to the specification he made.

In addition, for a certain purpose, NEW variables can be created, such as stocking rates per hectare (for eligibility for livestock payments), for example.

For purposes of analysis and presentation of results, the farms in the data base can be classified by any variable or combination of variables, or plots can be made of the distribution of individual holdings by some criterion which the economist wants to examine.

15.2 Advantages of the FADN over analyses carried out at Member State level

The E.U. FADN has certain STATISTICAL advantages. Firstly, *national* FADN systems are not harmonised in their definitions, procedures or income indicators. In fact, to make valid international comparisons, Member States use E.U. data, even for their OWN country. There are also private sources of data at national or international level. These also suffer from lack of rigorous harmonisation, but above all they suffer from their non-representativity.

The E.U. FADN confers certain POLITICAL advantages by being an in-house data base. The *confidentiality* of analyses which are carried is protected. Given the sensitivity of certain research which DG VI may wish to carry out in considering the reform of agricultural policies, this confidentiality is important in avoiding alarm and reaction by (self) interest groups. The FADN allows the Commission to *verify or contest* statements by Member States or professional bodies, using a data base which is under the Commissions' control (evolution of incomes, consequences of proposals, costs of production, etc.). Another advantage is that of *rapidity of reaction* when a question arises, and the ability to work interactively with the service concerned. Being close to political developments, the FADN is under a degree of pressure to *adapt to new needs*, such as detailed items for the new compensatory payments following the 1992 CAP reform. It is also politically important that the *quality of the FADN data* is not questioned. As the information comes from accountancy sources under the

responsibility of Member States, the quality is normally superior to data derived from classic statistical sources (surveys, returns by businesses, etc.). Because the Member States and their services, and research institutes, also *use* the data, there is a high degree of control on its accuracy. For these reasons, the FADN has a certain *prestige* and its quality is NOT questioned by policy makers, professional groups and scientific researchers.

15.3 The use of FADN data in a 'political' context

Originally the FADN was very clearly intended to provide data directly linked to the political process of price determination, by monitoring changes in farmers' incomes by type of farm, region, and, to a lesser degree, size of farm (since almost no policy instruments were size related). The so-called 'objective method' examined changes in farm incomes as the basis for price proposals, with a nominal 'productivity' element being incorporated in the calculation. Farm incomes were 'adjusted' by price changes with little regard for the situation of the supply and demand in the markets. The emergence of substantial and virtually permanent surpluses which cost vast sums of money to store and dispose of caused the then Commissioner for Agriculture (Finn Gundelach) to abandon the 'objective method' forever.

Apart from the general use of FADN data to monitor the evolution of farm incomes and profitability, a number of more specific applications can be cited as examples.

When the policy of voluntary set-aside was first under consideration, the question arose of the appropriate rate of premium to attract farmers into the scheme, without encouraging excessive participation to the detriment of supplies for the market. The starting point for assessing the correct level of premium was the margins being earned on a range of farm products under the current conditions, by country and/or region. This led to the proposal of a series of premium levels which were largely accepted in the Council. However, certain Member States contested the levels as being too low, and further examination was made, in collaboration with national experts to determine more relevant premium payments.

When the E.U. Court of Justice decided in favour of compensation for the 'SLOM' milk producers (who were in a voluntary non-delivery programme when milk quotas were introduced and were ineligible for quotas), the Commission legal services turned to the FADN for the development of an appropriate methodology for establishing compensation, and to determine the appropriate levels of compensation, on the basis of the quantity of milk previously produced by these farmers. This was successfully achieved, and only about 10% of farmers refused the compensation offered and opted for individual arbitration, which is still going on.

The reform of the CAP proposed by Commissioner Ray Mac Sharry was a VERY significant change from a regime of general market price support and protection, coupled with intervention buying and storage/export of surpluses, to a system of payments to individual farmers on the basis of their actual areas

of crops (linked to past yields at a certain geographic level) and the actual numbers of certain livestock.

The research and preparation of these proposals was perhaps one of the most important uses of the FADN in its history, because ONLY the FADN could examine detailed distributions of crop areas and livestock numbers in an interactive dialogue with policy development services. Not only was a lot of work and assessment done in preparing the proposals, but after these were made, a lot more work was done to estimate the impact of the new policies. Faced with 'end of the world' predictions of the consequences produced by farmers' organisations, a 'CAP reform model' was developed to indicate what would happen to selected groups of farms when the price changes and compensatory payments were applied, in a 'post reform' situation. This work indicated that the result would be nothing like as disastrous as the farm lobby predicted. The Commission has since been proved to be right (and the farmers have gone curiously silent about this).

In this context, the results of the FADN early estimates of farm income by type of farm were used by the Commissioner to claim that the sectors which were reformed had benefited farmers, while the non-reformed sectors had experienced poor income results.

The FADN was also used to determine the production level at which farmers could opt for the simplified 'small producers' regime under the CAP reform, thus avoiding a certain amount of form-filling and bureaucracy.

The so-called accompanying measures under the CAP reform included measures for afforestation of farm land, and the FADN unit was asked to examine crop gross margins to estimate how much land may be attracted to the forestry scheme at different levels of premium per hectare. The idea was to avoid making forestry so attractive that the demand would far exceed the finance which was attributed to this measure. The FADN was able to provide a satisfactory answer to this problem.

The Regulation which allowed Member States to compensate farmers for the income loss resulting from various policy changes (Reg. 768/89) also brought the FADN into analysing claims for income loss presented by Member States over a series of years. Several of these claims were disputed and were subsequently modified.

Costs of production and margins are widely used in many analyses. However, the use of margins to plot the distribution of production according to costs of production are particularly interesting. This was done for tobacco production in response to questions from the E.U. Court of Auditors when they examined the tobacco regime. The same technique was used to produce an aggregate supply curve for cereals in order to examine the 'efficiency' of various policy options, which led to the conclusion that the obligatory set-aside of the CAP reform was more equitable politically than the 'pure' economic solution, and that the 'loss of efficiency' was determinable and relatively small.

Other requests which are frequently addressed to the FADN unit concern standard data, broken down by (for example) size of dairy herd or production unit. These questions imply economies of scale, or simply different cost and margin structures, but are pertinent in examining the relative economic effi-

ciency of certain sectors between Member States or regions. The comparability of E.U. FADN data is very important in such analyses.

Of the total number of requests the FADN unit receives, about one third is for DG VI services, and two-thirds for other organisations, but the internal requests are for substantial analyses, while external requests are more usually for data (the analysis being done by theresearch organisation itself).

15.4 FADN data and policy

It is clear from the above that analyses of FADN data for DG VI and other E.U. or Member State bodies has a direct influence on policy decisions. This was particularly true of the reform of the CAP adopted in 1992 (setting thresholds for the application of policies and limits to their eligibility). It is also true of reforms of any particular sector, where production structures, costs and margins are the basic elements on which proposals are founded. Thus the link from the FADN *upwards* to policy is strong. The question then arises of *how policy influences the FADN itself.*

This happens in a number of ways:

The most obvious recent example was the necessity of changing the Farm Return following the adoption of the Mac Sharry reform of the CAP in 1992. This was done in order to introduce a number of new variables so as to identify the source of the many new direct payments which farmers would receive as a consequence of this policy change. Failure to adapt the Farm Return would have resulted in a substantial part of farm income being unidentified with regard to its origin and its link to specific enterprises. Thus any attempt to examine the economics of individual enterprises would have been doomed to failure at the outset, as the all-important direct payments could not be linked to the enterprise in question.

Policy indicates priorities for current work and for developments (costs of production, updated income estimates, etc.). Policy also indicates areas where NEW developments are needed (non-farm income, pluriactivity and rural development, environmental variables, regional specialisation, *observed* costs of production instead of costs estimated from whole farm data, physical input quantities, etc.).

This process of new developments may be structured in the sense that the FADN is given a political instruction to include new variables by a certain year, and clear forward planning can be set in motion, but *more usually* it is the FADN unit which follows political events and consults with units in the Agricultural Directorate-General with a view to initiating changes in the data collected. There are thus forces *for* change, but there are also forces *against* it. These can be political forces, as witnessed in 1994 when one Member State and COPA formally objected (by letters to the Commissioner) to the proposal for the inclusion of non-farm incomes and activities in the FADN. There is a more practical resistance to change, which is the complication and consequences of modifying such a detailed survey. Farm Returns, coding, computer programmes

and data bases all have to be changed, and there is a period of disruption and sharply increased resource requirement which may be quite long. In addition, any change may result in loss of continuity in the data series.

Policy also indicates the importance of certain developments which are *not* necessarily dependent on the current FADN network and its partners. A current example is that of Central and Eastern European Countries (CEEC's) where work is going on to establish whether farm accounts or costs of production are collected, assessments of the extent and quality of the data, preparing the data obtained in tables of standard format for these countries, and building up a network of contacts with persons and institutions which may be part of the FADN at a future date, for countries which are at this moment a long way from being part of the E.U. FADN. We have not yet integrated three new Member States which joined in 1995, nor even the 'Fünf Neuen Länder' of Eastern Germany yet, but nevertheless 'policy' indicates that resources must be committed to Eastern and Central Europe *now* !

15.5 Conclusion

The European FADN provides a 'goldmine' of micro-economic data for analysis and use in the context of agricultural, rural development and other policies. It is exploited in many different ways in the policy context. The FADN is itself influenced by policy considerations and needs, and is subject to change in order to meet the information requirements of evolving policies.

16. POLICY-MAKING AND FARM ACCOUNTANCY DATA-NETWORK

G. van Leeuwen 1)

16.1 Introduction

The goal of the PACIOLI project is to investigate what kind of innovations in the data network are necessary. It is crucial to take users' experiences into account. One group of users are policymakers.

This contribution gives a vision on developments in policymaking and the consequences of these developments for the network and describes some developments that influence the volume and organization of the network from a policymaker's viewpoint.

16.2 The place of the data network in the policymaking process

In all the European countries, politics greatly affects what happens on the farms. One of the objectives of the European Agricultural Policy is to ensure a fair standard of living for the agricultural population. The income of the people working in agriculture has to be improved. This also influences the farm data network. This network has to give 'objective and relevant information on incomes in the various categories of the agricultural holdings and on the business operation of holdings'.

This information is used in several phases of the policymaking process.

We can distinguish the following steps in a policymaking process:

step 1: individuals and groups (often action groups) perceive an undesirable development;
step 2: organizations and political parties become conscious of this unwanted development and place it on the political agenda;
step 3: possible solutions are worked out and the consequences of the possible choices are evaluated ex ante;
step 4: one of the solutions is chosen;
step 5: a monitoring system gives information about the gap between the actual situation and the political goal.

Since the farm accountancy data network is a monitoring system, it can be placed in phase 5 of the policymaking process. It can also be used for step 1 (it gives information that is perceived by small groups) or in step 2 (it helps to make conscious a greater organization of a problem). It can also be useful

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in step 3: it gives background information that is used in the decision process or it gives data that are used in political simulation models.

The data network has existed since 1965. The network is unique because it produces data direct from the farms and because all the farms in a certain population are represented.

The conclusions are that policymaking greatly affects farmers and that the information that is collected with the network is of considerable importance in the policymaking process.

16.3 Data used in the policymaking process are changing

Many political decisions influence the income situation of farmers.

The need for information in the policymaking process is not constant but changes. When the European Community started in the sixties, there where many discussions about prices: by means of price policies the governments tried to guarantee a reasonable standard of living for the agricultural population. This is still an important topic, although the instruments used to reach an income improvement have changed. For sugar there is a two-price system. For dairy farming we have the quota system since 1983. Towards the close of this century, we have new methods for a volume-policy like set-aside and in the last years Mac Sharry-premiums have been introduced for some categories of producers.

Changing policies mean that there is a need for data to monitor the effects. The FADN system changes but it could change faster: information about production rights like milk quota, the set-aside area and so on have to be included as soon as policy changes and such measures are introduced. Quota data for instance have been collected in the network since 1993 (costs and so on): the quota themselves were already introduced in 1983!

Agricultural policy does not only concern prices and subsidies. We have known regional policies (think about objective 1 and objective 5b zones) since the end of the last decennium. Agricultural policy also increasingly affects other aspects of farming. In policymaking the economic function continues to be important but other functions of agriculture are increasingly so. There is the function of agriculture as a preserver of the value of nature and landscape. For many years we have known the measures for hill-farmers and less favoured areas: farmers get premiums per ha or per animal to preserve the landscape. There are also subsidies for nature preservation: years ago under regulation 2378, now, since the Mac Sharry-measures under regulation 2078. Farmers produce nature: they cultivate their farm or a part of their farm according to described methods or according to a contract and they get premiums for this function. Regulation 2078 also gives other possibilities for agricultural methods that are more environment-friendly like subsidies for agricultural methods with less use of pesticides or nutrients.

Another subject that gets increasingly more attention is the effect of agriculture on the quality of soil, water and air. Farmers have considerable influence on the environment by their use of pesticides, nutrients, energy, and water and by improving the soil and water economy.

Another issue that is receiving increasingly more attention from policymakers is the quality of the agricultural products: consumers want information about the agricultural products they buy, or about the production method used. This is were agricultural codes come in. Everybody knows the code of biological farming, which has already been standardized by the European Community. Each country probably has its own codes for good agricultural practice or standards for production methods. In the Netherlands we have increasingly more of these codes such as integrated agriculture in arable farming, environment-conscious horticulture and agro-environment certificates (agro-Milieukeur) and so on.

Besides prices, then, relevant issues are now: regional development, nature/environment, and quality of agricultural products.

A data network in its ideal form is a network that collects data on the farms that are relevant for policymaking. Agricultural policy is not only or in the first place income policy, but a policy that pursues a good balance between the different wishes that exist in society about the countryside. The countryside has to give a maximum contribution to the goals that society formulates. So, if possible, also data about nature, environment and agricultural practices should be included: the accountancy network could in the long run develop into a farm registration system.

Society's wishes and consequently those of policymakers are not constant but always changing: themes increase in importance and other themes become less important. This brings about changing needs for information and data. More and better use is made of the farm accountancy data network as long as it supplies this information. The message for the network is that it should be more flexible. Changing attention of policymakers causes the need for collecting other data. It also can be helpful that data are stored in such a manner that it is possible to make new analyses if a new theme increases in importance and that it is possible to regroup the data. The data network can then be a source for many special studies. It is of course difficult to tune the networks of the different countries and to gather the same data in all the countries of the European community. And surely it is difficult to make a flexible network that meets the changing needs of policymakers, but it is a challenge that should be discussed: which data can be collected in the network so that the network best meets the demand of the data consumers.

16.4 Reduction of the costs of the central government and reduction of paperwork

Two trends in the field of policymaking that influence the FADN are the reduction of costs of the government and the reduction of paperwork.

One policy trend in the Netherlands but probably also in other countries is the reduction of government costs. Government organizations will be smaller and more efficient. There will be fewer tasks for government organizations and more for non-governmental organizations and the private sector. Organizations that are now part of the government will be independent of the government and self-supporting. The budget of the ministries will be reduced each year and the number of employees will be decreased.

This means that there is less money available for research organizations. Consequently, organizations have to evaluate their activities: how is the balance between benefits and costs? Is it possible to work more efficiently, so that the same task can be done by less people? Is it possible to sell research products and to earn money on the market? Is it possible to reduce the quantity of research that can be done? These questions will also be raised for the farm accountancy data network in the Netherlands. The data network is brought up for discussion: is it possible to work more efficiently by using modern technology? Is it possible to reduce the number of farms that is part of the network? Is it possible to improve the use of the network? Can network users pay a higher price for the data and so on?

Another policy trend in the Netherlands is to decrease the administrative burden for the enterprises and producers, 'the great and the small stones in the backpacks of the entrepreneurs'. They are side-effects of government regulations and these burdens will be limited as much as possible. An administrative burden is sometimes the time an entrepreneur needs for paperwork. Sometimes this work is done by service-institutions and the entrepreneur has to pay. These are the costs he has to make to meet the administrative and procedural obligations of regulations. Many ministries in the Netherlands have defined goals for reducing the administrative burden of these regulations. Also within the Ministry of Agriculture a programme will be drawn up to determine which administrative burden will be reduced. The ministry will reduce the administrative burden for farmers by 10%. Administrative burdens in the Netherlands are the registration of animal medicines, of pesticides, of animal manure and so on. One of the administrative burdens in agriculture is also the farm accountancy data network. The network relates only a sample of the farms so the administrative burden will be small.

16.5 Quality of the farm accountancy data network

In addition to the trends that have been described from a policymaker's viewpoint, some remarks are made about the quality of the network and of publications.

An important aspect in future work such as PACIOLI is the time difference between the end of the year of data collection and the moment of publication. By definition, a data network gives data covering a period in the past and the ensuing processing and publication cost time. In policymaking the discussions often concern questions and situations at this moment or in the past year. The older the data, the less accurate the description of a present situation, such as

data of the farm accountancy network in the yearly report of the European Community over 1994, which cover 1992/1993. These data are not useful for actual policymaking: so much can happen in two years! (Though it is not useful for actual policymaking it can be useful from a statistical viewpoint!). It should be possible to make a publication between 3 or 6 months after the year in question: all kinds of enterprises, including large enterprises, succeed in publishing their report within a reasonable time.

A second point is the accessibility of the data. Accessibility, for instance, means easy concepts. Sometimes one gets the impression that the different researchers cannot agree on the right terminology. For instance, in the Netherlands there are at least four ways of describing the income situation in agriculture. The users have to make a choice between the different concepts, so they make the choice that is the best for their interests. Also, in the yearly report of the European Union alone there are at least six different concepts that denote income development. This is confusing and one needs expertise to interpret the results.

It is also important that there is not a great influx of information. Computers enable the printing of many data. It is impossible for policymakers to read all this information and to make sound choices based on it. It is a task of the information suppliers to reduce to essentials what they want to diffuse. Sometimes it is possible to improve the accessibility by graphics or diagrams.

A third point that can improve accessibility is reliability. If you make a trip and you have a reliable map you can reach each point in the region you want to visit. If you have doubts about your map it is more difficult. A point in the farm accountancy data network is the threshold in European Size Units (ESU): this varies considerably between countries: the Netherlands has a high limit of 16 ESU. Other countries have a limit of 2 or 4 ESU. The population that is represented also varies: if one makes a comparison between the results you can easily draw wrong conclusions. Also the quality of data collecting can affect the reliability: for instance, how are the agricultural working units calculated? To what extent is data collection harmonized between countries (for instance depreciation on milk quotum)? If you compare different years you can make mistakes because there are different calculation methods for the standard gross margins and so on. In fact you need much experience to draw conclusions from the FADN. With the national data network there are far fewer problems than with the EU network.

To summarize: more attention is necessary for timely publication of results and for the accessibility of results (concepts/limited information/reliability).

16.6 Conclusion: innovations are necessary

Conclusions are summarized:

- policymaking demands good data and the farm accountancy data network can have a good function;

- the issues that are topical in policymaking change and consequently the required data change. This necessitates a flexible network. Special studies can be useful;
- cutting government budgets and the government's policy to decrease the paperwork for entrepreneurs can affect the possibilities of the accountancy data-network;
- the accessibility of the data network can be improved;
- the quality of the work can be improved.

17. USE OF THE BOOKKEEPING SYSTEM IN FINNISH AGRICULTURAL POLICY

Jouko Sirén

In Finland systematic agricultural bookkeeping was started in 1912. The aim was to obtain concrete data on the economic aspects of agriculture, which could be utilized in extension / advisory work and which would also benefit the farms themselves. The basic principle of the system has been the same up to today.

In the 1950s agriculture started to shift more and more towards the market economy, which increased the significance of economic issues like the profitability of production. Agricultural policy began to assume the shape that prevailed in 1950's - 1980's. Income policy became a central aspect of agricultural policy.

Up to the membership in the EU (1995), the cornerstone of Finnish agricultural policy was an agricultural income system that was based on the law. The first Farm Income Act was passed in 1956. The main outline of the income system remained almost unaltered for the next 40 years.

The purpose of the Farm Income Acts was to secure a reasonable income level as well as income development that was comparable to that of other population groups to the farm population. The system was based on a total calculation of agriculture prepared annually, in which the net farm income, i.e. the wages and interest on own capital, was calculated on the basis of the total return and total costs of agriculture. This income was developed annually so that the income changes followed those in the other sectors of the economy. For this purpose almost fixed target prices were set for agricultural products, and the income development was secured and the increase in the production costs was compensated for by raising the target prices or increasing the support. The target price level was maintained by exporting the surpluses or, in the case of a shortage of supply, through imports.

Since the 1950s the economic data and results of the bookkeeping farms have been a very important means in managing the income system. The number of farms included in the system has been about 1,000 - 1,100, which today is about 1% of all farms, and the farms represent different production lines and farm size classes. By means of these it has been possible to follow the development of the farm income, the development of the use and productivity of the labour input, and the income disparities on farms of different sizes and practicing different lines of production. Without the bookkeeping data it would not have been possible to maintain the income system of Finnish agriculture as efficiently as has been the case.

Data on results of the different production lines from bookkeeping farms has been used continuously in determining the target prices for different products. Through these it has also been possible to follow the profitability of the

production of different agricultural products as well as to realise a price policy that directs and regulates the production.

Results from the bookkeeping farms have frequently been used for forecasting the effects of the different alternative policies. Special farm models have been developed at the Agricultural Economics Research Institute, which make it possible to estimate the effects of changes in the prices and inputs on the economic result of farms in advance.

The bookkeeping data of agriculture have been important basic data for research at the farm level. The research work made on the basis of these has influenced the decisions on agricultural policy a great deal.

As a member of the EU the significance of the bookkeeping data increases in Finland. The common agricultural policy (CAP) is also applied in Finland, but certain national special measures are allowed. The data from the bookkeeping farms is going to form very important basic data for evaluating the effects of the common agricultural policy at the farm level, for planning measures concerning the economy of farms that are considered necessary, and in the development of strategies for the application of the common agricultural policy in Finnish agriculture.

As a summary, different fases of the use of bookkeeping data in the Finnish agricultural policy can be illustrated as follows:

Up to 1966: Taxation based on average net revenue per hectare
- net revenue estimates from bookkeeping farms
- land values in property taxation based on average long term capitalized net profit

From 1956 - 1994: Agricultural income acts
- income level
- income variation according size and production line
- labour productivity

From 1995:
- National and international needs
- income level and variation
- forecasts, models
- adjustment, transitional period

All the time: Research work serving agricultural policy making

18. FADN/RICA AND THE REQUIREMENTS OF FINANCIAL INSTITUTIONS

Sandra Dedman 1)

18.1 Introduction

This paper considers the links between the Farm Accountancy Data Network (FADN) and other external commercial organisations or 'financial institutions'. The main focus is upon the accountancy profession as a stakeholder, due to their particular importance to the FADN.

18.2 The accountancy profession as a stakeholder in FADN

The accountancy profession is a potentially important stakeholder in FADN because of its common interest in accounts preparation. Despite this common interest there are contrasting approaches to the use of accountancy records prepared for tax purposes. Within the U.K. much of the FADN data that are processed are taken directly from the farmers' books and records rather than their tax accounts. This is mainly due to differences between the agricultural accounting techniques that are used in the FADN and those that are used by the accountancy profession. In contrast, in some other countries the FADN data are taken directly from the farmers' tax accounts. In these cases the agricultural accounting techniques that are used by the accounting profession will impact directly upon the FADN data.

Recognition of the importance of the accounting aspects of FADN was identified in the initial objectives listed in the first workshop. The accountancy related objectives included the following:

- Harmonise accounting definitions between FADN and non-FADN systems This would assist communication between the different groups of FADN stakeholders.
- Improve agricultural accounting software so that it meets the requirements of both the FADN and the taxation systems This should improve the use of accounting by farmers and could also lead to improvements in the reliability of FADN data.
- Assess the need for and the feasibility of projects on innovation in farm accounting and its consequences for data-gathering on a European level through the FADN.

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- Set up a new way of thinking about the conceptualisation of the agricultural concern with the emphasis on information, the possibilities of information technology and on standardisation

These objectives were then reflected in the final aggregated objectives which included:

Objective	%
Improve the quality of FADN data	37%
Stimulate the use of FADN data	22%
Need for and feasibility of follow-up projects	13%

Within the U.K. several of the national accounting firms actively promote their involvement in agriculture as a niche market, as do a number of smaller provincial firms. In addition individual offices in rural areas rely upon agriculture for a significant percentage of their fee income. The main banks also have specialised agricultural sections. These firms sell their services to farmers by emphasising that:

- they recognise agriculture has important characteristics that distinguishes it from other general commercial industry;
- they have a particular understanding of agricultural accounting issues; and
- they can provide specialist tax advice in the agricultural sector.

However, a significant proportion of accountancy firms do not recognise agriculture as being particularly distinct from other industries for accounting purposes and will have advised their farming clients to install recording systems that produce financial statements in a 'turnover: cost' oriented format (Williams, Bailey, Dedman, March 1995).

18.3 What information are agricultural accountants currently using?

There are a range of general publications are used as a means of comparing performance, including; the John Nix Farm Management Pocketbook published by Wye College, the Scottish Agricultural College Handbook, and industry/enterprise special studies. Some of the accounting firms with an active interest in agriculture provide their clients with additional data on their performance in comparison with other similar businesses.

18.4 What information do agricultural accountants need?

There are three main uses for farm financial statistics by the accounting profession.

- **As a reference point** to check whether figures included in conventionally prepared sets of financial accounts appear reasonable.
- **As a source of statistics** to be appendixed to clients' annual financial accounts for comparative purposes.
- As a marketing tool to illustrate their specialist interest through the production of regular **bulletins and newsletters** on current developments in agriculture.

18.5 Why aren't agricultural accountants using FADN?

There are a number of reasons why accountants do not use FADN data. Some of these are relatively straightforward to resolve, while others are much more complex. These problems arise, not from any weakness in the FADN itself, but from the fact that are a large number of accounting issues in agriculture that have not yet been resolved by the accountancy profession.

18.5.1 Lack of awareness of FADN

Although each of the sets of FADN data produced by the regional collection centres originates from a common start point, the final published products vary significantly in terms of style of presentation and format. This means that 'external users' are not aware of the importance of the FADN as a national collection of agricultural financial data, and may not even be aware of the underlying links between the different reports.

18.5.2 The need for current and forecast information

The information needs of accountants include the need to check figures on recently prepared financial statements, to compare performance achieved for the latest financial year and to forecast future events in the industry. While FADN data is ideally suited to fill this need, the results from the FADN are published late by necessity because accounts cannot be closed until the accounting year has ended. There is then a time requirement for the gathering and collation of the data.

18.5.3 Differences in the performance measures used

Unfortunately the statistics used by the accountancy firms do not always mirror those produced by the FADN/RICA. The problems of the lack of comparability are compounded by the fact that FADN data includes adjustments which are not universally recognised by the accountancy profession. Examples

include the calculation of depreciation on a current cost basis, the valuation of some items of stock at market prices, and the inclusion of a notional charge for unpaid family labour.

18.5.4 Departures from GAAP

Perhaps one of the most significant blocks to a more widespread acceptance of FADN by the accountancy profession is any departure from Generally Accepted Accounting Practice. Generally accepted accounting practice will normally be employed by members of the profession and will therefore conform with fundamental accounting principles.

In the U.K. there are a number of significant areas where the FADN results depart from GAAP.

	U.K. GAAP	FADN
1	Valuations at cost of production	Valuations at market prices
2	Depreciate on historic cost basis	Depreciate on current cost basis
3	Balance sheet based on historic cost	Current market prices
4	-	Notional rent for owner occupied land
5	-	Notional charge for farm family labour

18.6 The importance to FADN/RICA of the accountancy profession as stakeholders

There are a number of potential benefits that could arise from the active development of closer links between FADN and the accounting profession. These include:

- increased awareness of FADN
- promotion of the interests of agriculture as a specialised industry facing specific agricultural accounting issues
- a means of influencing the type of recording system that accountants advise farmers to install
- liaison in the development of farm accounting software so that it meets the needs of both FADN and the taxation system
- links via the profession with other 'financial institutions' such as banks.

Where tax accounts are used as a source of data for the FADN the accountancy profession has a fundamental importance for FADN because any technical developments in agricultural accounting will have a knock-on effect on the data which are input to the FADN. Unless FADN develops links with the accountancy profession, it will be forced to continue to follow developments in agricultural accountancy rather than to set the way forward. Closer co-operation will lead to benefits at the international as well as the national level.

18.7 Current developments in agricultural accounting

At present, the various guidelines which have been developed covering specific agricultural issues vary from country to country. In an attempt to overcome this the International Accounting Standards Committee (IASC) was set up. The IASC is the main accounting body involved in the setting and promotion of accounting standards in an International context. It represents all the major countries in the world. The objectives of the IASC are:

- 'to formulate and publish in the public interest accounting standards to be observed in the presentation of financial statements and to promote their world-wide acceptance and observance';
- 'to work generally for the improvement and harmonisation of regulations, accounting standards and procedures relating to the presentation of financial statements'.

The IASC is currently involved in developing a specific standard on accounting for agriculture, and the first meeting of the steering group was held in May 1995 in London. The initial meeting of the IASC defined the scope of and the approach to the project. The Steering Committee agreed that it needed to:

- balance the claims of industry differences against IASC's objective of harmonisation; and
- establish a logic which flows conceptually from special industry characteristics towards a Standard.

So far the Steering Committee has focused upon three basic frames of reference. These were:

1) How to define agriculture
2) Classification of management systems
   Four basic categories were identified within this frame of reference:
   - **continuous** where plant or animal life is maintained and products continuously harvested from maturity
   - **discontinuous** where plant or animal life ends with the harvest of the product at maturity
   - **sustainable** where output levels (of herd or plantation, for example) are maintained through ongoing planned replacement or management of multiple generations,
   - **limited life** where a single generation is managed to the end of its useful life.
3) Features significant to agriculture but not unique. For example, the variability in the length of production cycle, the large number of small enterprises, some degree of vertical integration, quotas, subsidies, grants, and an accounting perspective which is dominated by compliance reporting.

The way forward?

The next meeting of the IASC Agriculture Steering committee takes place in November in New Zealand. It appears that the way forward is to be based upon the development of an accounting model for agriculture that recognises the special characteristics of the agricultural industry and also meets the requirements of the IASC's own framework. Current developments will be considered including areas such as; environmental reporting, accounting for intangibles (e.g. goodwill) and segmental reporting (for example, of different types of agricultural enterprise). Although the IASC standard for agriculture cannot have an obligatory application to countries participating in FADN it may well provide a reference in the future for the development of standards on agriculture within individual countries.

18.8 Summary

There are many issues to be considered in trying to extend the usage of the FADN. The accountancy profession must be an important focus in this context because it has links with farmers who are the source of the initial data for input to the FADN, and also to other potential users such as banks. Most importantly, if the FADN/RICA is to reverse its current situation of tending to follow agricultural accounting it will need to be actively involved in guiding developments in agricultural accountancy. This will mean participation in agricultural accounting standard setting wherever possible, as well as raising the awareness of the accountancy profession in general to the particular distinguishing features of agriculture.

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19. RESEARCHERS INTERESTS: MODELLING THE ECONOMICS OF PRODUCTION AND PRODUCER

Alastair Bailey 1)

Abstract

This paper discusses the advantages and disadvantages of using the FADN/RICA data set as a basis for economic model building. This data set has, until now, been relatively under utilised by researchers as a basis for estimating economic production parameters. This under utilisation is a function of the sheer size and complexity of data manipulation itself, the econometric problems encountered in estimation and possibility of bias within the sample. In addition, it is argued that the presence of 'data disparities' severely limits the methodological approaches available to the applied agricultural economist. This arises simply because only data upon monetary costs are recorded on the input side of the account. From such data, farm level price, quantity, information is lost. This leaves the researcher to either, make his or her own assumptions about how factor prices vary, or to imply more restrictive behavioural assumptions. This in turn places limitations upon the econometric modelling techniques available to the researcher. Potentially more serious, however, in common with most large scale farm surveys, is the lack of input allocation data. This deficiency restricts the applied researchers ability to assess the impact of commodity specific support policy changes.

19.1 Introduction

Empirical production economics, to a greater or lesser extent is concerned with the estimation of the changing demand for factors of production and the supply of outputs. The agricultural economics field is no exception. These relationships are of use for the analysis of change in farm and agricultural policy, and in the assessment of the impact of changes in the general economy upon the food sector. The advantages of using the *FADN/RICA* data set for economic studies are that the data embodies variation over a cross section of farms and, when combined with previous samples, through time. This facet allows the analysis of the impact of changes upon the activity of different sub groups within the agricultural sector and to assess differential behaviour within the

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sector. The utilisation of *FADN/RICA* through both time and space has the additional advantage of providing, in most cases, a large number of degrees of freedom with which to work. This data source is not without its limitations, which are noted in Williams Bailey and Dedman (1995) and Hallam (unpublished). However, some researchers have successfully employed these data in production analysis.

This paper will attempt to introduce the reader to the basic limitations within the data and suggest their implications and consequences for econometric modelling.

19.2 FADN/RICA data

The *FADN/RICA* data set, in its final form, is composed of 10 record types or sections. Each record type records information upon different aspects and attributes of each farm. The information in each record is coordinated using a unique farm identifier code (since confidentiality is preserved). Data is present upon general descriptor variables such as Farm Size (area and economic), geographic region, farm type, etc. in section A. These then allow the investigator to target his or her sample of farms to the policy question in hand.

On the output side of the account, previous and current crops are recorded separately in sections C1 and C2. Only current crops are of interest and a full ledger is presented in revenue and quantity terms. This then allows the derivation of implied crop prices for each farm, only revenues are recorded for intermediate fodder crops. For livestock outputs, section E, again quantity and revenue data allow the implied farm specific prices to be retrieved. Section D records miscellaneous outputs.

On the variable input side of the account, section F, much less detail is presented. All farm specific price and quantity information is lost within expenditure data. Both stocks and imputed flows (financial terms) of fixed capital items are also recorded in section F. A much more satisfactory situation is found for labour, where time and expenditure data are recorded in section B. However, care should be exercised here, there measurement error may be considerable on the side of family labour.

Section G contains a farm balance sheet. Section H records taxation (VAT) subsidies on livestock and the derived variables for use in comparative analysis. Section K supplements the return with off farm income data. The last section, section Z contains derived policy variables.

These data can be acquired by the researcher in a variety of computer readable media, the most common form is via magnetic tape or over the internet.

19.3 Economic modelling data requirements

From the point of view of economic modelling, sections A, B, C2, E and F are of interest. The remaining sections are only of interest if we require to pre condition the sample or to construct dummy variables for qualitative attributes.

Netting of inputs and outputs

The reconstruction of the data, from a purely accounting return, into a production data set requires a vast amount of effort. Intermediate inputs, those outputs produced on the farm, using land, labour and capital, for use as inputs in the production of 'final products' on that farm, must be netted out of both sides of the account. This is similar to the practice involved in the construction of aggregate production data set but here the farm 'ring fence', not the region, forms the boundary. Intermediate products are potentially a major source of double counting in most data sets, however, the *FADN/RICA* data contains more than its fair share. This is especially so for the livestock record because the data treats each age category of animal as a separate enterprise. Thus some or all of the annual output of one animal enterprise enters as an input into another animal enterprise. The resulting data should record only sales plus farmhouse consumption and valuation change, less revaluation increment, as a 'reconciled' net output.

Input prices and quantities

One of the important omissions in the *FADN/RICA* data set, from the researchers point of view, is that relating to input prices and quantities. This is because it requires the researcher to make certain assumptions regarding the distribution of input prices across the cross section of farms. From economic theory, all firms in a competitive industry, at any one time, face the same prices. This clearly does not include transport costs.

Output prices

Even though implied output prices are available at the level of the individual farm, we must decide the best treatment of these with resort to theory. In much the same manner as the case presented above for input prices, the economic theory of perfect competition assumes that output prices are determined outside the firm. This means that the firm cannot dictate the price of its output. The researcher must make an assumption about what factors effect the variation in the prices of like products across the cross section. Again, this variation may be due to the distance of individual farms from market centres reflecting in transport costs. As with input prices, some adjustment may be made to the data with resort to section A of the return.

Input and output prices, their treatment in previous studies

The question then is whether or not to remove cross section output price variation. Surely, transport costs may be included within the data. For 'local' geographic regions this may pose little problem, however, the larger the region, there is a greater possibility of price variation. Other sources of cross section price variation, for example discounts, will violate the assumptions of competitive markets. However, other non-competitive price variation caused by market power should be excluded. Empirical workers (Higins, 1986, Guyomard and Vermersch, 1989 and Tiffin and Moxey, 1992) have reported poor results, wrong signs on elasticity's, and insignificant parameters, and the rejection of theoretical restrictions when cross section price variation is preserved in the data. Thijssen (1992) and Bailey (unpublished) both utilise panel data, both eliminate cross section price variation for both inputs and outputs. In both of these studies stable results were obtained. This position it not totally surprising since the persistence of exogenous cross section price variation invalidates the assumptions of competitive markets assumed by the model of production. The treatment of output prices used in Bailey was to produce a cross section weighted average price for each product. This price is then applied to each farm for the year.

Pooling year on year: the FADN/RICA panel

In pooling cross sections of data we are attempting to meet three objectives. Firstly, we reduce the importance of atypical years and thus limit the effect of weather and market swings. Secondly, we drastically increase the number of observations over which inference is drawn. This has the additional advantage for econometric estimation of increasing the estimators degrees of freedom which both allows increased confidence, and permits less parsimonious functional forms to be utilised. Thirdly, we can employ estimation procedures which recognise the panel features of the data to reduce the detrimental effects of cross section heterogeneity. In addition, given the treatment of prices over each cross section, the addition of observations through time provides the only source of price variation. See Mundlak (1978).

Nature of the panel

In terms of the logistics of pooling annual samples of *FADN*/RICA data the most versatile method, in terms of the use of estimation techniques, is to arrange each annual observation on each farm in ascending order together. Thus our data would, reading down the set, contain all years for farm 1 then all years for farm 2 and onward. Simple computer algorithms can be written to perform this task, first combining all common farm records from each year, discarding non-matched observations, and sorting the resultant file by farm first and then by year. Clearly, the main limitation to work of this kind is computational space. Even when the researcher is working with a relatively small number of farms, the size of the data set will quickly become very large.

The above procedure would produce a 'balanced panel' of data. The balanced panel contains the same number of annual observations on each farm and is of dimension N*T where N are cross section units and T are time periods. This presentation, as noted above, is the most tractable to estimation. Econometric methods have been developed to handle unbalanced panels of data, see Hausman and Taylor (1981), and Hsiao (1986), but with the exception of the ubiquitous 'within' estimator, all require complex computation. Clearly, as computational considerations are limiting, we would prefer to keep things simple where ever possible.

However, with the *FADN/RICA* data set in mind, the requirement to balance the panel often limits the size of T. This is because the voluntary participation in the survey by farmers is not compatible with the needs of the model builder. Through basic attrition farms fall from the sample. In addition, some member states enforce the 'rolling' of the sample, stipulating that no one farm may remain in the sample for more than 15 consecutive years, in order to increase its statistical properties.

Furthermore, for the UK at least, the MAFF instruct the collection centres to stratify their sample by 'farm type' to reflect the assumed product mix of the region. This then applies a precondition on the sample based upon product choice. However, we might expect producers to base their choice of output combination on price relatives, risk and resource endowment. Our sample then can only reflect an historic picture of product choice for the region as we do not allow the evolution of our sample to persist through the medium term.

19.4 What is possible?

The question to answer now is given this basic level of data availability afforded by the *FADN/RICA*, what, if anything, can the model builder achieve? The answer, in truth, is very little. However, with the addition of input price information from other sources, the researcher might specify a production function. Here output quantity would be specified as endogenously determined by the quantity of each input. Moreover, without information upon the allocation of each input to each enterprise, output must be measured by one aggregate output. This factor causes some concern to researchers who are often asked by political agents to assess the impact of a change in some commodity specific policy measure.

A further problem with this approach, whether single or multiple output, is that input quantities must be assumed to be exogenously determined. Since input levels are, at least in part, determined by the farmer we would expect to encounter problems of inconsistency in estimation. Potentially more damaging though is that the production function, retrospectively classified as 'primal', contains no economic information. As a function it is expressed purely in technical terms and so no economic optima can be found without resort to further analysis given prices.

Recent developments in production economics

From the late 1960s a new orthodoxy began to emerge in the field of applied production economics, the so called 'dual' approach, developed from the thinking of Shepherd, see Shepherd (1970), Diewert (1974) and McFadden (1978). As with most 'new orthodoxy's' this new approach has gained a growing band of followers. Although this is never a guarantee of the value of a new method, the dual approach does possess several advantages over the primal. The dual analysis of production would involve the specification of a Cost, Profit, Revenue or Distance function instead of the primal Production or Transformation functions. The first advantage of these dual relationships are that they are functions of both quantities and prices, thus the economic behavioural model is embedded into the objective function. In addition, the use of prices as regressors allows the quantities to be endogenously determined. This last point is valid for the profit function, the cost and revenue functions vary from this in which variables are considered as exogenous. The cost function assumes that output is determined outside of the function, whereas the revenue function assumes inputs to be exogenous. The result, however, is that, especially for the profit function, the switch to the dual analysis of production results in a more intuitive representation of profit maximising behaviour, under certainty, and more consistent estimation.

Taking the profit function as our example, estimation might follow directly from the profit function itself. Here, though, we may experience estimation problems such as multicollinearity due to the large number of parameters to be estimated. We can improve our results by resorting to Hotellings lemma, the partial derivatives of the profit function with respect to each input price and the output price, which yields the J, profit maximising Marshallian, input demand functions and a single, K, output supply function. This system of supply and demand equations, j = 1,2,..J. input categories and K is aggregate output, can then be estimated as a full system. The common practice is to use Zellners (1962) Iterative Seemingly Unrelated Regressions estimator which utilises prior information about the variance covariance matrix of the residuals, from the first iteration, to aid subsequent iterations of the model.

Perhaps the most attractive advantage of the dual approach to production analysis is the possibility of specifying a Multi-output function. In empirical studies the profit function has been commonly used for this. The advantage is that, through input and output prices, we can estimate the full system of J input demand and K output supply functions together (where k = 1,2,..K. output categories) using the same procedures as described above.

The implication of this result is that, even in the case of data which does not record input allocations to each output, we can recover this information from the estimated system (see Chambers and Just (1989), Just, Zilberman and Hochman (1983) and Leathers (1991), for a full explanation). However, there is, as one might expect, a price to pay for this power. The disadvantage of this approach is encountered when we require estimates of supply parameters for disaggregated outputs. In the presence of predominantly commodity specific EU agricultural policy measures, policy analysis, must to some extent, also be

commodity specific. If we do not possess input allocations then to gain this information from the model some level of product aggregation will become necessary. Typically, empirical workers have aggregated products into the output aggregates such that Dairy, Other Livestock, Cereal Crops and Other Field Crops, which, taken together are the total net product of the farm. This level of aggregation is fine when the study is attempting to investigate the effects of changes in cereal support upon farm profits and the supply of farm commodities. However, if the question posed to the researcher is to assess the impact of say changes to the 'Suckler Cow Premium' then the resultant disaggregation will result in estimation problems. It is unlikely that degrees of freedom will become a restricting factor, but that the supply and demand equations will loose all parsimony, resulting in multicollinearity problems as the prices of similar products vary together.

If farm level input allocations were recorded within *FADN/RICA*, then the researcher could utilise this information to impose structure upon the model. This would also reduce the number of free parameters to be estimated and so reduce the computational requirements of the exercise.

Choice of functional form

As an aside to the main subject of this paper, it is worth mentioning that the choice of functional form will have a major effect upon estimation and interpretation. The now called 'flexible functional forms' (Diewert (1971) and Christensen, Jorgenson and Lau (1971 and 1973)) were introduced specifically in order to allow the data to determine input substitution. They are termed 'flexible' because they place no *apriori* restrictions upon substitution.

However, a certain amount of 'structure' must be imposed, such as convexity and homogeneity, in order to gain meaningful results. As a point of interest, it is worth noting here that these forms, and specifically the 'translog' (second degree approximations to the true function or a Taylor Series expansion) were first employed by Heady and Dillon (1961) to model agricultural production in Iowa, USA. Heady and Dillon referred to these forms as 'second degree polynomials'. These functional forms have, to some greater extent, replaced other, more restrictive forms, which assumed that substitution is unimportant (the Leontief) or is constant and all factor or product substitution elasticity's sum to unity (the Cobb Douglas). The flexible forms are generalisations upon these themes. For example, the Cobb Douglas is nested within the translog, and the Leontief is nested in the Diewert (sometimes imaginatively called the Generalised Leontief). As such estimation of these forms will degenerate to the restrictive form if the data rejects the generalisation.

The implication for the econometric analysis of *FADN/RICA* using a flexible functional form is twofold. Firstly, the more general the functional form, the less parsimonious the specification which may result in computational complications. In the case of the translog, each product price and each input price enters the profit function twice, the scope for multicollinearity is vast. This point is of importance especially when a high degree of product disaggregation is both possible and is desired. Secondly, the general specifica-

tion of these flexible functional forms allows the researcher to test empirically the assumptions of profit maximising competition. However, the utilisation of panel data does allow differing levels of firm efficiency and heteroscedasticity to be taken account of.

19.5 Aggregation of production variables

Clearly, the use of a cross-section of firms as data for econometric analysis forces the necessity to aggregate data. As with all econometric analysis some level of aggregation is needed for both inputs and outputs in order to ensure the parsimony of estimated models and to avoid multicollinearity problems. For a multi-product industry such as agriculture, the diversity of products produced and the factors used in their production increases the importance of aggregation to avoid estimation problems caused by 'non-missing' zero observations in variables. These considerations are also valid for the input side of the account.

As the dominant dimension of the current data set is the cross-section then consideration of cross-section aspects in aggregating variables is seen as important here. The method of aggregation of variables in a cross-section data set should be regarded as distinct from that of variable aggregation through time.

Time series aggregation

The theory of aggregation of time series is distinctly different to that of the cross section. Time series aggregation techniques employ the theory of index numbers, such as the 'divisia' index approach. These employ a conditional dependence upon values of the variable in time t of values in time t-1. For the time series case the divisia quantity index, expressed in logs, which aggregates several, *i*, underlying quantity series is

$$\log Q_t - \log Q_{t1} = \sum_i w_{it} (\log Q_{it} - \log Q_{it\text{-}1} \qquad \text{Equation 1}$$

This aggregator has a number of desirable properties for time series analysis, firstly, it is a chain-linked Laspeyres indices, and estimates the rate of growth in a series. Secondly, it is also a chained Paasche and Fisher Ideal index and it is symmetric in prices and quantities. The procedure uses a cumulated weighted sum of the rates of change in each component (in this case quantity).

Cross section aggregation

For the cross-section case there is no theoretical basis for assuming conditional dependence between unrelated observations on a single variable from one isolated firm to another. We must, therefore, consider alternative non-

chained tools for the construction of both quantity and price aggregates which will place little or no restrictions upon our estimation procedures. The procedure adopted here was to apply a non-chained revenue weighted average aggregate of quantities and of prices for the components of both inputs and outputs. This procedure followed a two stage process.

Stage one

Aggregation for each observation for each year. This is necessary because of the physical size of the data files. In the case of annual input files, in excess of 1.2 megabytes. The resulting observations on farm *m* could then be condensed onto a single line in ASCII format.

$$Q^{*} = \sum_{j} [Q_j \times S_j \qquad for_j = 1,.....,J \qquad \text{Equation 2}$$

Where Q^{*} = firm level aggregate of $Q_{i=1,....,I}$

$$S_j = \frac{R_j}{[\sum_i R_i]}$$

and $_j$ index's components of each output or input aggregate. In the case of prices, substitute P for Q.

Stage Two

Aggregation across the cross-section.

$$Q^{c} = \sum_{j}[Q_{im} \times S_{im}' \qquad for_i = 1,.....,I \qquad \text{Equation 3}$$

where Q^{c} = cross-section aggregate of $Q_{i=1,....,I}$

$$S_{im} = \frac{R_{jm}}{\sum_j R_i}$$

Due to the storage considerations noted above, the 'raw data' return for each record contains a different number of lines for each observation because each observation will not all produce the same number of products. This requires that special aggregation programmes must be written, utilising the above aggregation calculation, to allow exact looping over each individual.

Once the variables of each annual cross-section of farms were aggregated then the panel was assembled by stacking annual observations for each farm consecutively.

19.6 Limitations upon model specification

In its simplest form an economic model can be specified such that, in the case of the profit function, profit is a function of current or lagged input and output prices. The use of current prices (P_t) seems theoretically flawed in that these prices are not fully known at the point decisions are made. Thus there may be some advantage in employing a 'rational expectations' approach and using past prices (P_{t-1}) or some function of past prices

$$(\overset{e}{P}_t = \beta(P_{t\,1},.....P_{t\,n}))$$

where $\overset{e}{P}$ is expected price. With the latter case, we will encounter problems if we also require prices (especially of outputs) to be conditional upon the sample. Here we will quickly run our of observations through time. The same argument can be made for other more complex dynamic models. This is because the time dimension of our panel data sets are limited by the rules of data collection and of attrition. However, if we rely more heavily on external sources of price data then we will reduce the effect of this limitation.

The treatment of fixed or quasi fixed factors as either stocks or flows, allows the estimation of the long-run or short-run relationship respectively. The *FADN/RICA* supports data to form either treatment of these items. These short-run models, the 'restricted' or 'variable' functions are preferred in most cases for agricultural panels because it is unlikely that a static equilibrium will be found in these data.

19.7 In conclusion

This paper has discussed many of the problems which the researcher must address when he or she decides to make secondary use of the *FADN/RICA* as a data source for econometric study of agricultural production. The main area of deficiency lies in the non-availability of input allocation information. Without this information the researcher will find that his results become increasingly unstable as the level of product disaggregation is increased. This is clearly a severe limitation to the utilisation of such a data set in the analysis of the EU commodity specific agricultural policies.

Other data deficiencies are of somewhat less significance to the research econometrician. Prices for inputs can be found from outside the sample, and as has been discussed, these prices may be more consistent with the theory than would farm specific prices.

The limitation upon the time dimension of our panel data sets is dictated by two factors. Firstly, the *FADN/RICA* (as distinct from the national surveys, e.g. FBS for the UK) is still relatively young. The earliest consistent data for the EC 12 is available from the early 1980s onward. Clearly, much less data from 'later' entrants is available. Secondly, the sample within each members survey will experience year on year change. Some countries actively enforce this process but the voluntary basis of contribution adds to the general turn over rate. This will continue to limit the time dimension of our panel data sets for years to come and therefore the econometric methods and models we can employ.

Given these limitations much can be done to gain economic estimates from this data. The advantages gained from taking account of both the cross section and time series aspects of production add to the power of our models. The biggest limiting factor to future advances in the use of this data is the lack of allocation information, without which little can be done to analysis EU policy effects at the farm and aggregate level.

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WORKING GROUP SESSION: FADN STAKEHOLDERS AND INNOVATION

FADN stakeholders

In this working group session FADN stakeholders were discussed (section 4 of the global descriptions). The objective was to gain insight in who the most important stakeholders are in each country.

Group division: by country

In order to compare between the countries which stakeholders are important, four tables were made on four different subjects:

1. *Provision of data*
2. *Finance*
3. *Determination of contents*
4. *Users of the data*

The first three subjects deal with the input of the FADN, the fourth subject deals with the output of the FADN.

The participants were asked to allocate five points between the stakeholders in each diagram: the highest point for the most important stakeholder, the lowest point (or no points) for the unrelevant stakeholders.

Table 1 Ranking of stakeholders with respect to their contribution to provision of data

country	Ministry of Agriculture	Other Statistical Offices (outside FADN)	Research	Agri-cultural Accountants	Farmers	Farmers organizations	Others ? .....
RICA	1			1	3		
FI			2		2	1	
FR	3			2			
IT		1				3	1
NL		1			4		
SP	2		1	1		1	
SW	0.2	1		1.8	2		
UK	0.1			0.4	4.5		

Table 2 Ranking of stakeholders with respect to provision of finance

country	Ministry of Agriculture	Other Statistical Offices (outside FADN)	Research	Agricultural Accountants	Farmers	Farmers organizations	Others ? .....
RICA							Commission 5
FI	2		1			1	EU 1
FR	3	0.5	0.5				EU 1
IT	5						
NL	5						
SP	2			1		1	regional govern. 1
SW	5						
UK	5						

Table 3 Ranking of stakeholders with respect to their interest in determination of contents

country	Ministry of Agriculture	Other Statistical Offices (outside FADN)	Research	Agricultural Accountants	Farmers	Farmers organizations	Others ? .....
RICA	2					1	Commission 2
FI	1		2		1	1	
FR	2					1	Europ. Commission 2
IT		1	4				
NL	1		LEI-DLO 3				ATC, CBS, RICA 1
SP	1.5		2	1		0.5	
SW	3.5	1	0.4			0.1	
UK	5						

Table 4 Ranking of stakeholders with respect to their importance as users of the data

country	Ministry of Agriculture	Other Statistical Offices (outside FADN)	Research	Agricultural Accountants	Farmers	Farmers organizations	Others ? .....
RICA	1		1				Commission 3
FI	1		2		1	1	
FR	2	1	1			1	
IT	1	1	2				1
NL	1		2		1	1	
SP	1.5	0.5	1.5			1	0.5
SW	3.5		1			0.2	education, journalists 0.3
UK	3	0.5	0.25		0.25	1	

Table 5 Overview of tables 1 to 4

DATA FINANCE / CONTENT USERS	Ministry of Agriculture	Other Statistical Offices (outside FADN)	Research	Agricultural Accountants	Farmers	Farmers organizations	Others ? .....
RICA	1 2 1		1	1	3	1	5 2 3
FI	2 1 1		2 1 2 2		2 1 1	1 1 1 1	1
FR	3 3 2 2	0.5 1	0.5 1	2		1 1 1	1 2
IT	5 1	1 1 1	4 2			3	1 1
NL	5 1 1	1	3 2		4 1	1	1
SP	2 2 1.5 1.5	0.5	1 2 1.5	1 1 1		1 1 1	1 0.5
SW	0.2 5 3.5 3.5	1 1	0.4 1	1.8	2	0.25	0.3
UK	0.1 5 5 3	0.5	0.25	0.4	4.5 0.25	1	

Discussion on provision of data

France: Farmers give data, but FADN has to buy it from Ministry and accounting offices (no consensus within France)

Finland: Researchers make the final data

RICA: Worried about farmers to give data

Spain: Farmers do not get feedback, so they do not have the incentive to lobby to get data registrated. The feeling exists that farmers and farmer organisations must be taken together

Conclusion: Farmers provide data, some countries get it from intermediaries

Discussion on provision of finance

Spain: Accounting offices are public; they take part in the network. Technicians are payed by all four. Most money comes from Ministry. Agricultural accounting offices and farmers organisations help with lobbying, because they make money on data

Finland: The researchers and farmer organisations influence the Ministry

Remark: Only two countries mention the EU!

Discussion on content determination

United Kingdom: Ministry five points: if there are problems, the Ministry blames the European Commission

Finland: Importants of content, therefore farmers mentioned. Farmers have a large influence on what is NOT in the data

Sweden: Statistical office is very important!

Spain: Accountants make software, so we are dependent of them

Discussion on users

In Sweden and the United Kingdom FADN is used for education purposes.

Accounting offices do NOT use FADN data, even in Spain.

In Finland and the Netherlands the researchers work for the Ministry (therefore more points than the Ministry). Both countries also see farmers as users, because they want to keep them happy to make sure they will give data.

Sweden: The Ministry includes the joint councils etc.; therefore so much points

United Kingdom: Ministry employs their own researchers. MATH data set is inaccessible, so researchers must make own data from FADN. Points for researchers low because data are inaccessible

France: Two statistical secrets: households (really secret) and RICA (used by researchers)

Discussion on overview

Italy and the Netherlands: Ministry pays a lot, is getting nothing. Explanation from the Netherlands: Ministry pays researchers for time, not for data gathering so it gets data free through researchers. Perhaps change is needed.

Farmers providing data and getting nothing!

Stakeholders and innovation

The objective of the working group session on FADN innovation was to clarify the role of the stakeholders in innovation processes.

Group division: by country

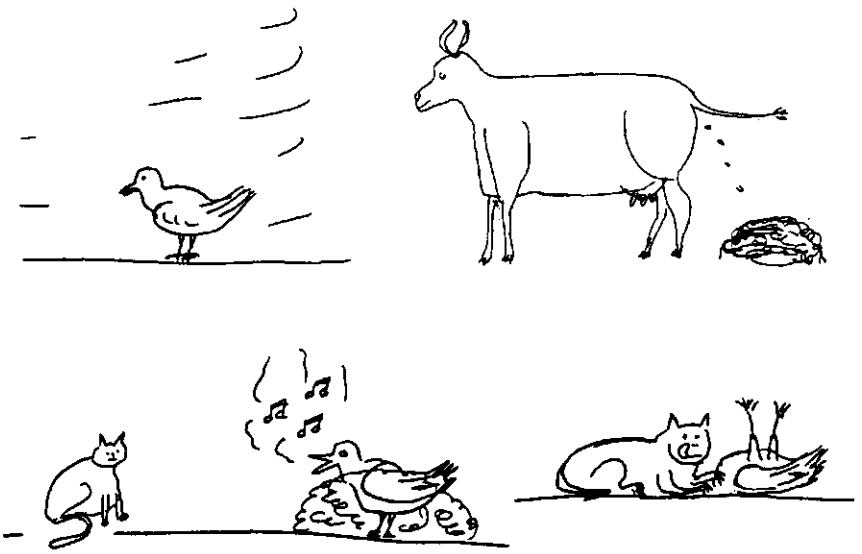
The participants were asked to look at the following diagram. From this diagram they had to classify the stakeholders of their country for the imaginary innovation in the FADN of

- *gathering data on pesticides*
- *gross margin per crop*

	common trust	**no common trust**
same vision / expectation	FRIENDS	POTENTIAL ALLIES
contrary point of view / expectation	OPPONENTS	ENEMIES

In the discussion it became clear that if you speak about new, very useful data which will be gathered in the FADN, there are a lot of friends. But if you start talking about money - who has to pay for the gathering of this new data - there are a lot of enemies.

An anecdote which was told in this context was about a bird in the winter which was very cold. A cow came by and shitted on the bird. You would say that that is not nice, but the bird started singing because it was warm again, so it was actually very happy with the shit. Then a cat saw the bird, pulled it out of the shit and started eating it.



(designed by Nigel Robson)

The moral of this story is:
1. The person who shits on you is not necessarily your enemy
2. The person who pulls you out of the shit is not necessarily your friend
3. If you are up to your neck in shit, do not 'sing' about it!

20. INSTITUTIONAL QUESTIONS AND ENVIRONMENTAL ASSETS IN EUROPEAN AGRICULTURE: HOW AND WHY RICA/FADN WILL GO GREEN

Dr. Miguel Merino-Pacheco 1)

20.1 Introduction

In the present contribution the most important environmental and resource management alternatives related to agriculture will be analyzed. The hypotheses are that agriculture is well on the way to get her own environmental policy, that this policy will consolidate important assets for agriculture, susceptible to be treated under an accountancy framework and that the creation and management of those assets will happen - is already happening - within the frame of the Common Agricultural Policy. Due to the fact that the CAP is the driving force behind the RICA-FADN, and that the operation of the CAP requires 'objective and relevant information on incomes' 2), it is easy to imagine that the RICA will be one of the most important instruments in charge of collecting, organizing and distributing this information.

20.2 Brief consideration of environmental consequences of economic activity

20.2.1 The externality problem

All economic activity has consequences on third parties who neither participate in the production process nor profit from it taking place. These consequences could be beneficial or damaging for these third parties, but the effects on others do not have to be taken into account by the individual or firm which originates it, because they are not valued by the market. These effects can arise from a producer, a supplier or a consumer. As a consequence of this phenomenon, a difference originates between the optimal level of activity of profit maximizing individuals and the optimal level of activity for the society as a whole. As we all know, this is called the 'externality problem'.

This externality problem is represented very simply in figure 20.1. As the level of activity rises, the use of the environment (pollution) increases according to the Marginal External Cost function (MEC). This function originates at A_n

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1) Agricultural Economist- Consultant. He works in Spain and the F.R. Germany.
2) Williams, N., A. Bailey and S. Dedman. 1995.

because the emissions appearing at a lower activity level are within the assimilative capacity of the ecosystem. The Marginal Net Private Benefit Curve (MNPB) is constructed assuming price-taking behaviour on the part of the producers, as usual in agriculture. As the level of activity increases, output will also increase but with a decreasing marginal rate, due to diminishing returns. Ceteris paribus, the MNPB diminishes as the activity level increases. The market inefficiency occurs as producers choose A_p as they optimal private (profit maximizing) production level (MNPB = 0), whilst society would prefer the activity level A_s which maximizes net social benefits, given that conditions for allocative efficiency hold. At the origin of this problem we find that choice and scarcity fall outside the realm of price and market. That means, our rational producer, using environment as a free production factor, perceives his optimum at Ap; adequately pricing that production factor will drive back the level of activity to As.

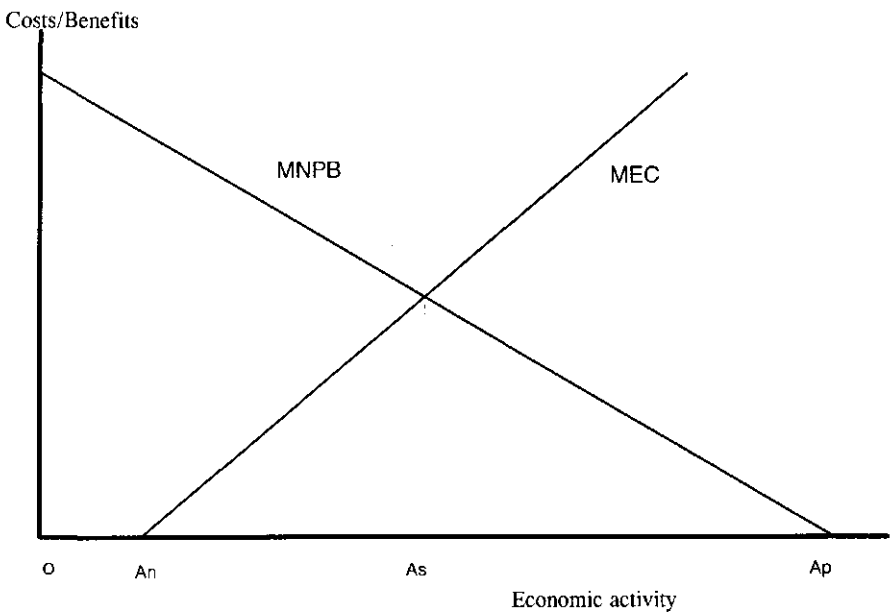

Figure 20.1 The externality problem

Environment is then a resource, both a productive resource and a consumption good, whose valuation falls outside the market and which is available, in principle, to everybody without restrictions. In order to bring private and social optima of environmental use to coincide, it is necessary to obtain and operationalise a measure of environmental quality. It boils down to maximizing the social optimum under a monetary expression. This monetary expression for products without a real market has to be found.

20.2.2 Environmental evaluation

There are several methodologies available to estimate monetary values for the environment. Their use depends on the characteristics of the problem to be tackled. They can be classified in direct and indirect methodologies (figure 20.2).

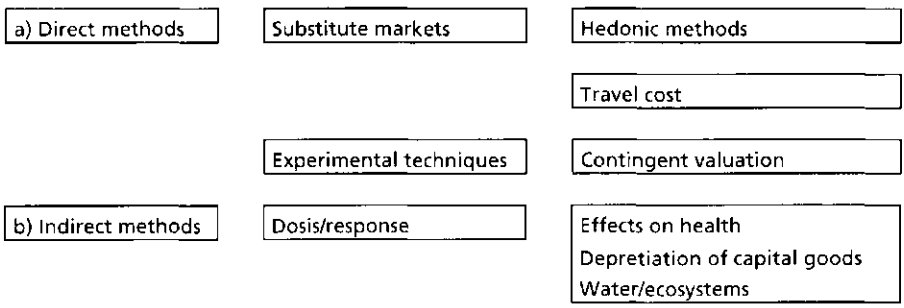

Figure 20.2 Environmental evaluation methodologies

The direct methods of environmental evaluation try to establish directly a monetary value for the environmental assets studying existing parallel markets or creating experimental ones. The *hedonic 1) method* can be used to evaluate the environmental quality at a definite location, where market valuation of real state or other kind of property is available. It is assumed that the value of a piece of real state is related to the satisfaction (utility) obtained from its use. Here are included obvious advantages, like the possibility of obtaining income from agricultural activity or the habitational use. But other benefits (or inconvenients) also accrue to the value, like easy communications, existence of commercial facilities in the vicinity, local criminality, and of course environmental values like air quality, noise, temperature, etc. Due to the fact that different locations differ on all these characteristics, it is possible to identify through multivariate regression techniques the share of property value which is due to environmental variables.

The *travel cost method* is based also in the value of time. Assuming that the visit to certain environmental amenities (parks, natural reserves) imply travelling, it is possible to establish the costs incurred in visiting those places (including the opportunity cost of time) and derive a demand function for the environmental benefits provided by those amenities.

The *contingent valuation method* relies in the creation of an experimental market for the environmental assets being investigated. Standardized surveys other laboratory measures establish the maximal willingness to pay for the

1) From the Greek 'hedone': pleasure.

acquisition/conservation of non-marketable environmental goods or the minimal indemnification to be accepted for the lost of those values. The main advantage of this method is the possibility to use it in almost all contexts of environmental policy. Very often is the only research method available, as in the case of establishing existence values 1). Some assimetries in the valuation of assets to be acquired and assets to be lost had been observed - the compensations for the lost of a value must be larger than the payments for obtaining the same asset - which throw some doubts about the validity of these method. But it has also been shown that a good 'experimental design' can minimize those discrepancies.

The indirect procedures to estimate environmental values estimate a *relationship dose/response* between a pollutant and some known effect. Only afterwards there is a preference for the measured effects established. The estimations of the most important environmental effects of agriculture (nitrate and phosphate pollution) follow this procedure, as it will be seen later.

The methods commented up to now undertake environmental evaluation in an unidimensional way: the environmental effects are reduced somehow to a monetary common denominator and then it is possible to add and substract them in a straightforward way. Of course, the concept behind all this methods is that somebody is willing - or can be obliged - to pay for an environmental service or resource.

Nevertheless, sometimes it is necessary to carry out evaluation of projects with heavy social and environmental impact, where the trade offs between economic objectives and social and environmental goals, which are more difficult to measure, can be better considered with a *multicriterial approach*. This can be the case when the evaluation of environmental aspects done in different social groups collide blatantly, for instance the evaluation of a wild animal reserve in a Third World country done among potential European tourists and also among poor local farmers.

In figure 20.3 it is possible to visualize the process of combining objectives in a multidimensional space. An initial situation of low economic, social and environmental yield (ABC) can be improved simultaneously in all three dimensions to DEF ('win-win' situation). Further progress in the social and environmental axes lead to a loss of efficiency (GIH). A goal conflict is present, and to establish the social preferences very difficult. But at least it is possible to measure the cost of reaching certain objectives, measured against the loss on the others. This kind of problems can be solved through multicriterial optimisation, assuming that the information needed to solve the algorithm is available.

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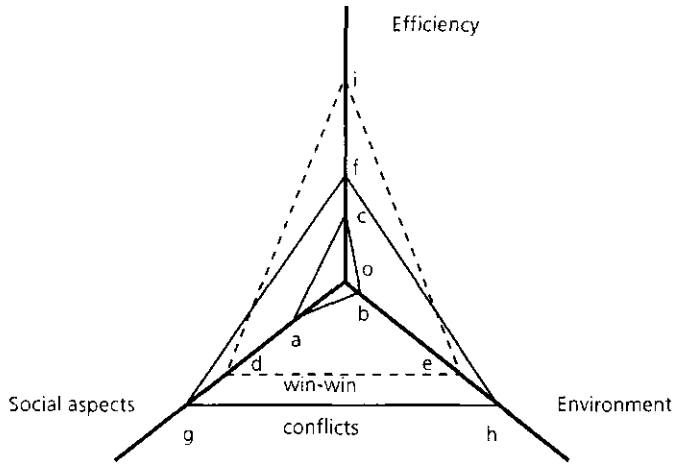
1) Existence values are the values assigned to the satisfaction which the surveyed person obtains from the 'existence' from elements which he/she most likely will not ever directly experiment. Biodiversity is the most clear example.



abc= starting position
def= equilibrated change ("win-win")
ghi= further social/environmental gains at cost of efficiency

*Figure 20.3 Multicriterial analysis (adapted from Munasinghe, 1993) *)*
*) Rectification: i = f and f = i.

20.2.3 Environmental assets and property rights

20.2.3.1 Rationing environment

From the discussion developed up to now, it should be clear that the environment can be defined as an asset. If the environment is an unavoidable component for creating a stream of income through economic activity, it is possible to attribute a value to it either through evaluating changes in that income stream, through effects on third parties or in related markets, or through subjective evaluation methods. The availability of the environment is also limited; environment is a scarce good. That leads directly to the problems of the rationing of that important asset and to the question of who is entitled to the profits that will accrue once a rationing system is put in place.

The rationing of the environmental assets can be achieved through many instruments which are being tried presently, mostly across the industrialized Western World. They can be considered within two great categories: regulatory instruments and economic instruments.

The *regulatory instruments* are applied to products, production processes or consumption through licensing, setting of standards or other administrative constraints. Once the regulation is in place, the polluter is not left in a position to negotiate a polluting level or other similar choice. Their main characteristic is their inflexibility and that they are source of economic inefficiency (higher

costs to achieve predetermined pollution reduction objectives). Nevertheless, there are situations in which regulation sees to be a convenient choice (the industry to be regulated has a small number of big polluters, for instance).On the other hand, in regulation there are not financial streams involved, which make it more popular among those who will be most likely charged if other pollution control systems are introduced.

The *economic instruments* leave the polluters free to respond to economic incentives, in a way that adjust their contaminating activities towards a social optimum (point A_s in figure 20.1).

It is possible to differentiate four main kinds of economic instruments of pollution control -subsidies, charges, deposit refunds and market creation.

Subsidies appear under the form of grants, soft loans or tax allowances. Though sometimes it is understood that such concessions are only temporary and directed to help the polluter to change his/her ways, in the case of agriculture that kind of support looks to be among us to stay.

Charges are a price to be paid for pollution. They have to be large enough to have an impact. There is evidence that the demand for environment is mostly price inelastic. Moreover, charges (taxes) invite bargaining from pressure groups, which normally leads the tax level away from economic optimum. They are more effective when they are applied as directly as possible to the environmental damage itself.

Pigouvian taxes had been extensively commented in the economic literature since first mentioned in 1920. Though elegant and attractive in the economic reasoning -to internalise external costs in order to make private and social production optimum coincide, the practical estimation of the tax level presents serious problems. Even then, the problem of 'double counting' charges on environmental damage stays. More about that with the discussion of property rights.

Deposit - refund systems are a particular case of the just mentioned pollution charges, with provisions to recirculate the obtained funds among potential polluters who avoid polluting.

Market creation happens allowing potential polluters to acquire (through purchase or free allocated) 'rights' to pollute. The total amount of these rights (permitted pollution) is decided from a central authority according to technical considerations. Making this rights tradeable assures that each potential polluter could choose their optimum level of pollution. Each market participant will have an interest in keeping contamination low, but everybody will have an option to work at higher contamination levels buying permits from more 'pollution-efficient' producers. The creation of such a market is a practical application of the Coase theorem, which explains the problem of externalitites as the absence of markets and property rights.

20.2.3.2 Who owns the environment? The question of property rights

The question of the property rights regarding the environment has been up to now purposefully avoided in the discussion. The environment has been identified as an asset (20.2.3.1), but no systematic discussion has been at-

tempted about the way in which the different actors get to enjoy the benefits originating with such asset.

On the other hand, property rights are related with the right to use a certain asset. Law and custom establish the limits within the use of property are allowed. The right to crop a plot of land or to dwell in a house are straightforward examples. But what about the environment? A new glimpse to both curves in figure 20.1 will help to clear the positions.

We can consider that behind both curves hide two actors: a producer/-polluter and a polluted suffering the effects (costs) of the contamination. It has been said, that without some kind of intervention or interaction, the production level will be increased until the point where the Marginal Net Private Benefit equals zero. The benefits of the producer reach there a maximum, due to the fact that all external costs (MEC) are to be suffered by the polluted. It can be considered that this situation occurs because the environment can be used without charge by the producer (free good).

If property rights over the environment are established and they are alloted to the polluted, he/she will be, in principle, interested in suffering no pollution at all. That means, the polluter will be shut down and production will be zero (or stay within the limits that the environment can manage without been clogged). But through starting and increasing production, the polluter can acquire enough benefits to compensate the polluted/owner and keep a profit for himself. Until production level A_s, where the value of the marginal produced unit equals the compensation to be paid to the polluted, is reached. The social optimum has been achieved through negotiation. It is easy to see that the same optimum can be reached through negotiation if the rights to use the environment lie by the polluter, when the polluted pays in order to avoid being annoyed. This rather simple theoretical construction can be stated as follows: independently of who holds the property rights over the environment, once they are allocated, free negotiations will drive the environmental equilibrium towards the social optimum. This is what is conceptually stated in the already mentioned Coase's theorem. The conclusion that optimal results - from the point of view of 'socially acceptable' pollution - are achieved independently from the initial distribution of property rights has been bitterly criticized and it is not the intention of this paper to take sides in that strident discussion. Something much more pedestrian will be pointed out: Even when the ecological-economical equilibrium (optimal or not) could remain unaffected by the initial distribution of property rights, that distribution of property rights surely determine the direction of the payment flows in any kind of transaction involving the environment. Not surprisingly, because it has been already agreed that the environment was and could be treated as an asset. *The property rights matter since they define who is going to pay and who is going to collect the money.*

The institutional order (legislation, custom, or otherwise) plays a central role in determining who will be allowed to benefit from the use of the environment and who will carry the costs. The European legislation is committed to protect the environment and has also stated general principles regarding

the way to approach this problem. The Article 130r, par 2, of the Single European Act states that the Polluter Pays Priciple (PPP) should apply:

> 'Action by the Community relating to the environment shall be based on the principles that preventive action should be taken, that environmental damage should as a priority be rectified at source, and that the polluter should pay. Environmental protection requirements shall be a component of the Community's other policies.' 1)

This seems rather straightforward. But in practice it is not. For instance, excess application of nitrogen in agriculture, which contaminates drinking and coastal waters, are widely regarded as a problem. The existence of such surpluses affects negatively the utility function of the society. Farmers are responsible for an important fraction of that surplus nitrogen, but they are nowhere required to compensate other individuals for that welfare loss. Under UK law 2), for instance, so long as farmers abide by 'good agricultural practice' - which doses not preclude use of nitrate fertiliser or animal wastes - then any nitrate emissions from agricultural land are exempt from state control in most circumstances 3).

Existing extensification programs of the European Union and their implementation at national and regional level foresee payments to the farmers whose yields are negatively affected by reduced input of fertilizer and pesticides. Those programs are then recognizing the land-owners (or land-tenants) a 'de facto' right to pollute, unless up to a certain point.

This point can be visualized through the functioning of a Pigouvian tax. Pigouvian taxes - or corrector, as I prefer to call them 4) - are defined as charges raised on polluters based on the estimation of the environmental damage caused by that polluter. Damage done must be interpreted in this context as a negative externality imposed on the whole of society by the producers.

Figure 20.4 shows how a Pigouvian corrector for a negative externality works. The pigouvian charge 't*' is to be paid at each level of economic activity, in such a way that the Marginal External Cost (MEC) is reduced on the amount of the tax. The polluter will try to maximize his private benefits, and that happens in As. The tax equals the MEC at the social optimum; that means, equals the Marginal External Cost - the damage caused by an extra unit of contamination - at the social optimum. The solution is very elegant but raises two questions.

The first one is the need to establish a damage function (at least some points of MCE), the second one (the focus of interest here) is the treatment of the alternatives raised by the application of the tax and the property rights.

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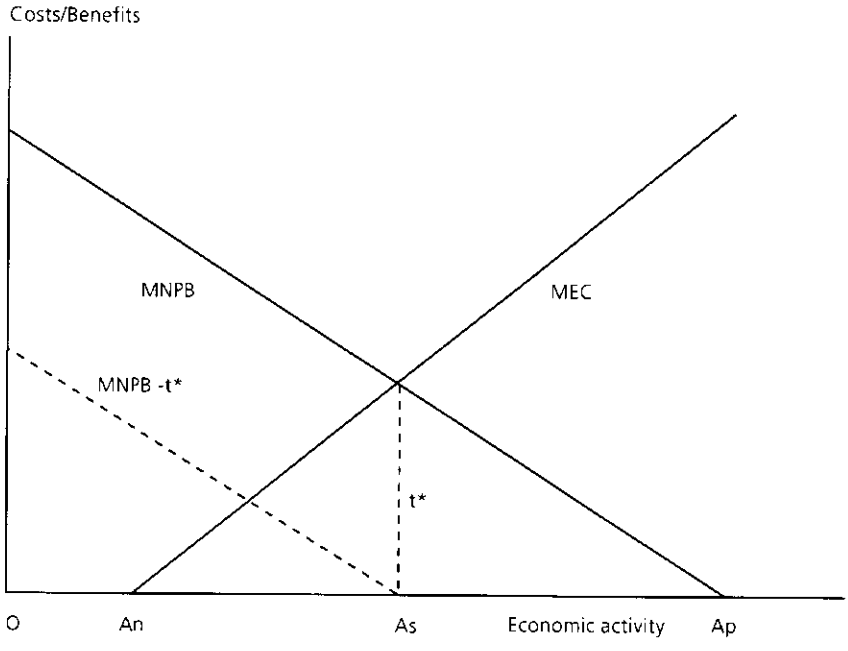
1) Quoted from Conway, 1991.
2) Control Pollution Act of 1974. Quoted from Hanley.
3) Hanley, N.: The economics of nitrate pollution. 1990.
4) Merino-Pacheco, M.: Possibilities of improving the basic knowledge needed for the estimation of pigouvian correctors....1995.



The difficulty arises when a polluter maximizing his private benefit (producing at A_p) starts paying the tax and falls back to A_s to avoid paying tax in excess of his/her net private benefits. Up to now, no surprises. But happens that the polluter is still paying the tax for the production up to point A_s, in spite that now he/she is producing at the social optimum. As a matter of fact, the polluter is being penalized twice: first through diminished output; second when operating at A_s.

Is that justified? The answer depends on the distribution of property rights. If the firm does not have the right to use the environment, then the tax up to the optimum (A_s) is a payment for using property belonging to the community. If, on the contrary, the polluter has complete property rights on the environment, the whole concept of a corrector is wrong. Last, it is possible to think of a situation where the producer does not have the right to pollute from the social optimum onwards, but has all the right to use the environment up to that point. In that case, the taxes paid from A_p to A_s will be handed back by the State.

The design of a charge or a subsidy for the correction of externalities will depend on the assumptions about property rights on the environment. The Single European Act quoted above, with its underwriting of the Polluter Pays Principle surely justifies taxes to avoid production behind the social optimum, and probably also up to the social optimum. It looks more likely, however, that if future developments lead to the introduction of Pigouvian taxes for the control of surplus agricultural inputs, the measure will be complemented with

some kind of direct payments working as tax restitutions. The present programs of extensification of the production compensate the farmers for lost production caused by restrictions in the application of chemical inputs.

20.3 Focusing on Agriculture and Environment

20.3.1 *Agricultural activity affecting environment*

As a matter of fact, almost all the externalities originated from agricultural production are negative. With the exception of the maintenance of landscape and cultural heritage, and the trapping of green house gases - if forestry is counted among the agricultural activities -, all other external effects of intensive agriculture can be considered damaging for something or for someone. With a strict application of the PPP, it is most likely that agriculture could be in the future make responsible for important environmental damage and being charged accordingly. Only recognizing the farmers some kind of property rights over the environment can change this situation.

Loading the environment with excess inputs, specially phosphates, nitrogen and different pesticides is one of the most common ways in which agriculture abuses the environment. Soil erosion destroys the basis of a sustained production and can ruin either future generations of farmers or even the present one. It can be internalized, at least up to a point. The action of pesticides and monoculture reduces biodiversity, both animal and botanical. The problem of nitrate pollution and its treatment under different environmental protection measures will be considered now with certain attention.

20.3.2 The Problem of Nitrogen

20.3.2.1 Type of damage and measurement methods

Excess nitrogen contents in underground, continental and coastal water is perceived as a problem. The problems originated by high nitrogen presence in water concentrate mainly in two areas: health problems caused by contaminated drinking water and eutrophication of marine waters.

The relationship between health problems and high nitrate concentration in drinking water (more than 50 ppm according to EU-regulations) are not clear, but in public perception excessive nitrates in water are undesirable. Nitrogen is also found at the beginning of the causal relationships of the biological phenomenon known as eutrophication, which lead to important loses and eventually to the destruction of fisheries in coastal marine waters.

The damage done on commercial fishing can be established indirectly through response estimations of the availability of fish as response to changes in the nitrate contents in water. The same methodology can be used to establish the costs of the effects of nitrogen concentration in drinking water on human health. The avoided or reduced expenditure on human health care due to smaller nitrogen concentration in water can be established. An alternative

way - probably more effective due to the difficulties in establishing clear relationships between nitrogen pollution and health effects - is to measure directly the willingness to pay for an improvement of the water quality through contingency valuation. The value of the damage done to recreational fishing can be estimated either through contingent valuation or the travel cost method.

On the other hand, the first step in order to establish this damage functions is to determinate the amount of pollution produced; which is the level of economic activity related to this amount of pollution and which are the alternatives to reduce the contamination, how can they be implemented and which are the costs involved. It is here where the RICA-FADN information can, in its present form, offer a good basis for the estimation of the level of pollution produced by agriculture related to the present level and structure of production. In order to estimate changes in the production structure due to the action of economic instruments to abate pollution, the RICA-information, as it is presently presented cannot be used directly.

20.3.2.2 Nitrogen balances based on RICA-data. A concrete possibility for ecological accountancy

Some of the factors influencing nitrogen loses from the upper soil are do to external factors like weather conditions; some others are the consequence of too high fertilizer applications, incorrect managing of animal wastes or incorrect agricultural practice. The basis to improve the management of fertilizer is to obtain an accurate measure of the polluting potential of the agricultural activity.

This measure can be effectively obtained based on already existing farm balances like the ones offered by RICA-FADN. A clear advantage of that is that the data is organized on a comparable basis and covers the complete range of farms across Europe.

The nitrogen exchanges over the market are registered in the bookkeeping and are easy to reconstruct. Much more difficult to establish are the nitrogen movements due to biochemical and physical phenomena, like rain, symbiotic and asimbiotic fixation, etc.

In the RICA registers are the financial transactions of farms recorded. It is possible to establish the physical exchanges of nitrogen due to this commercial exchanges. Following points must be considered:

a) Input side
   * Acquisition of nitrogen fertilizer
   * Acquisition of proteic feed
   * Acquisition of animals
   * Acquisition of seeds

b) Output side
   * sale of plant products
   * sale of animal products
   * sale of animals

It is possible to estimate the nitrogen export through crops with the data of Table K of the RICA-FADN farm return, where the areas, the total productions, the sales and in-farm consumption are registered. The exported production is to be multiplied with keys expressing the nitrogen contents of the different crops to arrive to a final number.

Table D registers the animal movements of the farm across the year. An estimation of the nitrogen outflow by way of animal bodies is possible. As a complement, table E registers the money movement from acquired and sold animals. Liquid milk and milk products are registered both in value and quantities under codes 162 and 163. The animal productions are in quantities expressed, and also wood sales (code 174).

The estimation of the nitrogen input in the farm through feed and fertilizer needs some help from outside. Extra information relative to prices of this inputs regionally differentiated is needed. The RICA-FADN is very spare with information about inputs, but for the total prices paid. The only possibility, so long no other complementary information is available, is to use averages and complementary information regarding prices and types of fertilizers and concentrates. The use of auxiliary data from nutritional tables and other sources is unavoidable. The same can be said for seeds.

A first analysis of environmental consequences of nitrogen exchanges over the market in and out of the farm is possible with the available information and little more. It is of course also possible to stratify the information using all the variations that RICA offers, like regionalization, farm size, farm type, etc. Some non-market movements of nitrogen (manure) can also be estimated according to the number of animals kept in the registers. The symbiotic nitrogen fixation is to be estimated through the area of nitrogen-fixing crops.

On the suggestions page, we could note that the introduction of the physical quantities of inputs acquired by the farm will improve the possibilities of the RICA-data for this kind of analysis considerably. If that information could be discriminated according to production activities, at least in a general way, a great step would have been taken in the direction of the use of optimization models to establish the relationships between economic activity and their environmental consequences, and also between the development of measures to protect the environment and their cost economic and financial consequences.

20.4 Why RICA will go green. Reaching consensus for environmental accountancy through RICA

In the discussions of the first meeting of PACIOLI some months ago, the possibility of extending RICA-data was discussed. Among the problems standing in way of a reorganization and enlargement of the RICA-records, costs and lack of willingness of the farmers to collaborate were mentioned.

In a contribution by POPPEe which reached our hands recently 1), the author underlines the importance of market and institutional factors influencing the adoption by farmers of a technological innovation in the field of administrative and organizative activities: the use of personal computers in the farm. POPPE states - referring to the use of the tool, the computer -: 'The central issue is the usefulness of the accounting data: keeping the records on the farm is more interesting if they have a direct and clear meaning for the day to day decisions that the farmer has to make'.

Looking at the problem of introducing environmental relevant data in the RICA from the point of view of the involved actors and institutions, it is possible to find the basis for a coalition of interests which could have a positive attitude towards such innovation.

From the point of view of the administrative instances of the Commission (DGVI-A3), there are two points which appear relevant to the decision to extend the coverage of the information it collects and provides: a) the administrative interest of the information and b) the costs of collecting it.

In section 20.2.3 of this paper it was established how and why the environment is considered an asset. Once property rights over assets are defined - a point which is already being tackled seriously by the European Union -, income streams start to flow. Citing again WILLIAMS, BAILEY and DEDMAN (1995), the operation of the CAP requires 'objective and relevant information on incomes'.

A mineral recording system like the one presented as an example under section 20.3.2 is relevant for regulatory and property definition purposes. The discussed system can be established with little more than the already available information, which addresses then above mentioned point b); the low additional cost of broadening the information basis.

The willing participation of the farmers in this schema is to be expected due to several reasons. As POPPE points out in his contribution (1993), the farmers ought to see a benefit in order to make voluntary participation a fact. This advantages for the farmers can be summarized in the following points:

a) faced with the possibility of some kind of contribution due on mineral surpluses, the farmers will be interested in a uniform and just measure of their tax basis.

b) the examples discussed here point to negative externalities of agriculture. No wonder: they are relatively easy to measure. But there are also some positive externalities like landscape improvement, improvement of general tourist attraction of determined regions and trapping of greenhouse gases through expanded forest. Even when a little bit more complex, some parameters on the value of these externalitites can be obtained through contingency valuation and included into the accounting balances of the farms (see section 20.2.2).

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1) Poppe, K.J.: On the adoption of farm accounting software (1993).

c) the improvement of the input accountancy by RICA; especially physical quantification of inputs and their assignment to production activities is not only interesting for scientists. Also the farmers can get their effort ploughed back to them under the form of improved reports for their farm management -including environmental management.

d) the spirit of the CAP is drifting away from income support over the administrated product prices and changing to direct income support. But that income support must somehow be justified, specially in the long run. Selling environmental services will be surely one possibility of keeping income support for agriculture going. But in order to sell something, that something has to be quantified and property rights firmly established. Clear registers of environmental assets and services are indispensable for that.

There are also some other stakeholders in this process who are not so directly involved, but could nevertheless influence it in a direction or the other. Consumers have a stake at the conservation of the countryside and cultural aspects in general and will react generally positive to measures who could improve the life quality. And of course they care a lot about the quality of drinking water, which can transform the possibility of penalizing taxes due to surplus fertilizer into subsidies for not fertilizing. Again the property rights and the possibility to improve sales there.

Foreigners will also have an interest in knowing what is going on in the relationships between our environment and our agriculture. International negotiations on global environmental protection are taking place and this kind of information will beneeded more and more in the future. And of course scientists will be grateful to have a dependable and well ordered source of information in this sensitive area.

20.5 Conclusions

Through the present contribution some points in support of the thesis that RICA will go green had been driven home:

a) there is a real possibility and a real need to use RICA-data for environmental accountancy;
b) the costs of improving the available data to that end should not be impossible high;
c) there is no reason to expect resistance from farmers to provide additional data; rather an interest to comply with some extra requirements;
d) demand for that information can be taken for granted;
e) some other stakeholders, though not directly involved, will not interfere with such proposals.

The elements for building a positive consensus should then be found there.

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21. CONTROL OF AGRICULTURAL POLLUTION THROUGH MINERAL BALANCES

Researcher, Reijo Pirttijärvi, M.Sc. (Agric. Econ.) 1)

21.1 Introduction

Agriculture has both positive and negative impacts on environment. Environmental degradation from agricultural sources has been noted both in practice and in research. Practice shows eutrophication in our lakes, and research results show that agriculture can also be blamed for that.

Various recent Finnish researches, e.g. Rekolainen et al. (1992), indicate agriculture to be the most important single sector affecting environmental degradation. Presently, agriculture accounts for over 1/2 of the total nitrogen and phosphorous load to watercourses in Finland. That fact is also due to the reason that point source pollution of industries or dwellings is much more easily controlled than the nonpoint source pollution of agriculture.

Choosing and setting up a policy measure is based on biological and economic information (figure 21.1). Policy makers first focus on information on the present status of the environment. This information is presented to them by biological scientists (soil and water scientists). They can also present the level of desirable environment to the policy makers, although there is seldom enough information to assess it precisely. Changes in mineral balance work as an indicator of the state of the environment.

The next step is to judge what is 'the best', i.e. the optimal, way to achieve the aforementioned desirable environmental status. The economic and environmental consequences of using different environmental policy measures can be assessed on farm and on aggregate level. The term optimal can be split into four policy goals: cost efficiency, equity, informationality, and feasibility. The main focus is usually on assessing the cost efficiency of the measures. In practice, also the transaction costs play an important role.

21.2 Theoretical background

Policies to control environmental pollution from agriculture are usually implemented in the forms of standards or regulations. For example, the nitrate directive of EU sets fertilizing upper limits to nitrogen in order to assure the desired drinking water quality. Also, regulations of having certain manure stor-

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1) Agricultural Economics Research Institute Paper presented at PACIOLI meeting in P.O. Box 3, FIN-00411 HELSINKI, Finland Maastricht, The Netherlands, 18-20.9.1995; reijo.pirttijarvi@mmm.agrifin.mailnet.fi

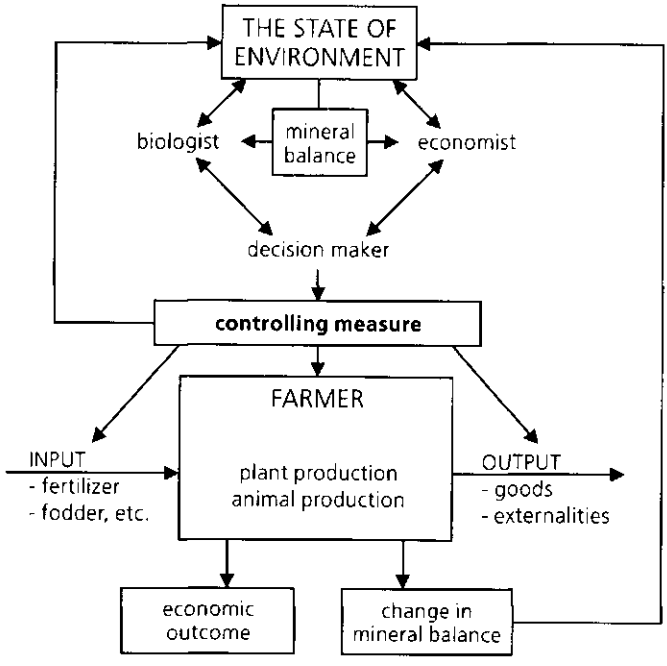

Figure 21.1 Methodological approach

age capacity or guidelines of proper manure spreading are often used in control policy.

One way (OECD, 1994) to categorize different controlling measures is to split them into three groups, i.e.;

1.	Information policy
2.	Direct economic instruments, sometimes referred to market based instruments; and
3.	Direct regulations, also known as the 'command and control' or legislative approach

In information policy the goal is to reduce pollution by producing and sharing relevant information on the impact of agriculture to the environment. Most often the information is produced by research workers, and their results are delivered to farmers by agricultural advisory services.

With direct economic instruments or regulations e.g. the state sets either norms or levies to production (to inputs or to outputs). Farmer adapts his production according to the regulation or the financial incentive he encounters.

A controlling measure based solely on information policy does not work very well, if there is no tangible or evident entrepreneurial or environmental benefit for farmer to be realized. Hence, if farmer does not see any effects related to the change in his behaviour or in the farm practice, the information does not mature into knowledge and into environmentally friendly behaviour.

The controlling measures based on direct economic instruments or regulations are often blind in taking into account the farm characteristics. For example, a tax on fertilizers treats all farmers the same way, even though the efficiency of using the input varies across the farms. Therefore, a farmer who produces more with the same amount of inputs than another farmer, has to pay the same amount of a tax than a farmer cultivating more sluggishly. Also, the least polluting crops are penalized more heavily than the crops from which the leaching is proportionally greater.

However, we could try to combine the perspective of information with the economic-legislative perspective. We need a controlling measure, which gives farmer feedback on the impact of the measure to the farm economic and environmental circumstances. In addition, the controlling measure needs to fulfill the equity requirements, i.e. the polluter should be identified and be charged for the amount of his pollution.

A fundamental problem with the agricultural pollution is that it is non-point source pollution, i.e. it can not be traced back to only one particular source, and the quantity of which can not be easily measured. Controlling measures such as pollution tax can not, and are therefore not used with agricultural pollution. But, there is a way to avert this problem.

We need to approach the problem of non-point source pollution of agriculture from a different perspective, and the answer lies in mineral balance calculations. The environmental load of an individual farm can be measured by balance calculation of minerals. Thus, in measuring the incoming and outgoing minerals (e.g. N, P and K), and deriving the balance, the problem of non-point source pollution is avoided. In this way, we get a farm specific environmental load of different nutrients.

21.3 Mineral balance formula

The nutrient flows of a farm can be examined in two following ways (see also figure 21.2):

A) Farm gate balance

The idea behind the farm gate balance is to measure how much the farm uses purchased mineral inputs in its production, and to compare these figures to the mineral contents of the outputs sold from the farm. In other words, the nitrogen and phosphorous contents of the inputs are compared to the corresponding figures in the outputs. Also, the nitrogen deposition form the air can be taken into account, but as farmer can not affect it (and it is sometimes postulated to equal the denitrification in soil), it is neglected in this model.

+ Mineral contents of the purchased inputs (fertilizers, manure, fodder and animals)
- Mineral contents of the sold products (milk, meat, manure, grains etc.)

Farm gate balance

B) Surface balance

The surface balance is calculated with respect to the minerals entering vs. exiting from the soil surface. Within the inputs, the calculation takes into account the use of chemical fertilizers, and manure. For the part of the outputs, the mineral contents of the harvested crops are calculated. Subtracting the latter from the former we get a gross surface balance. If we take into account also the evaporation of the nitrogen in the manure and a fact that all nitrogen in the manure is not in a feasible form for plants to be utilized, we get a net surface balance.

+ Mineral content of the purchased fertilizers
+ Mineral content of manure used on farm
- Mineral content of the harvested crops
- Evaporation and non-feasible nitrogen

Surface balance (gross) Surface balance (net)

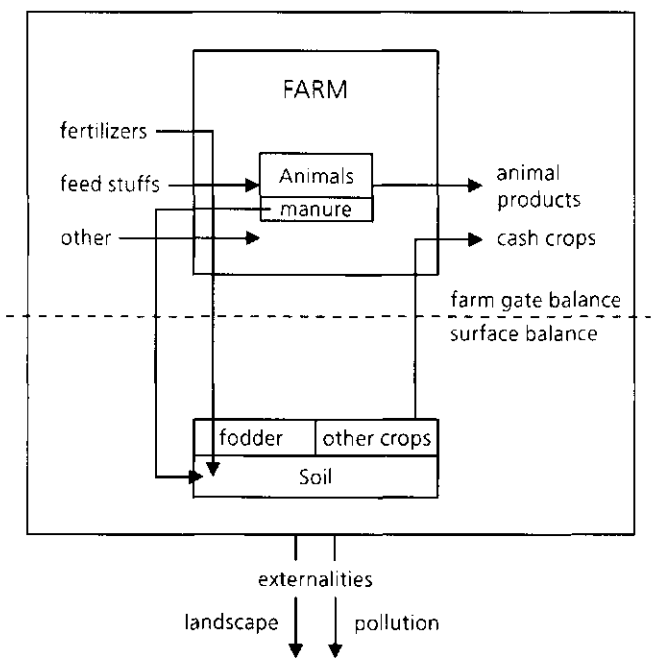

Figure 21.2 Mineral balances on farm level

In both cases the subtracted figure indicates a farm specific mineral balance. Most likely the balance is positive, which means that some of the nutrients have accumulated in the soil, evaporated to the air or leached to the watersystems. The both ways of calculating the balance have their benefits, but also their difficulties, as will be discussed later.

The farm gate balance indicates in the short run the potential of polluting charges. In the long run, the averages of mineral balances approximate average farm environmental load.

Calculating the net surface balance evens the differences of nutrient usage efficiency between cereal farms and animal husbandry farms. In some earlier studies (Brouwer et al. 1994 and Schleef & Kleinhanß 1994) 65% of the nitrogen in manure is subtracted in net surface balance calculation. This net balance is more closely related to the problem of nutrient losses to watersystems. However, this approach biases the real problem of agricultural nutrient losses, as losses to the air and partly to the ground are neglected.

One major question concerning the feasibility of mineral balances is the problem of external factors, such as weather and soil type, affecting the build up of the surplus. Because of the weather, yield levels from year to year vary quite much in Finland. Finland locates in a cultivational border area for different crops. Wheat and rye can be grown in southern Finland but not in the north. Also, barley growing border is met in Lapland area. The question of how important role the external factors (especially the weather) have to mineral balance must be studied in detail. If external factors very much dictate the level of the mineral balance, setting a levy on the surplus loses some of its justification.

21.4 Mineral balances in practice and in research

Mineral balance calculations are recently performed in many European countries. According to some EU studies (Brouwer et al., 1994 and Schleef & Kleinhanß, 1994) the nitrogen losses from cereal farms are about one fourth of the losses compared to dairy farms. The mineral balances from poultry and pig farms show the highest nutrient losses.

The magnitude of nutrient losses to environment varies between countries and within countries. For example in the Netherlands the nitrogen losses per hectare of arable land are on average almost three times higher than in Germany and close to ten times higher than in Finland. In EU-12 mineral balances show regional variation as can be seen in figure 21.3. The main reason for high nutrient losses stems from intensive animal husbandry, and thus from the use of manure. Large scale livestock farms, which rely on imported feed stuffs, like many pig farms in the Netherlands, produce huge amounts of manure. Instead of being a valuable production input, manure has turned out to be a mere waste in many cases (Dietz, 1992).

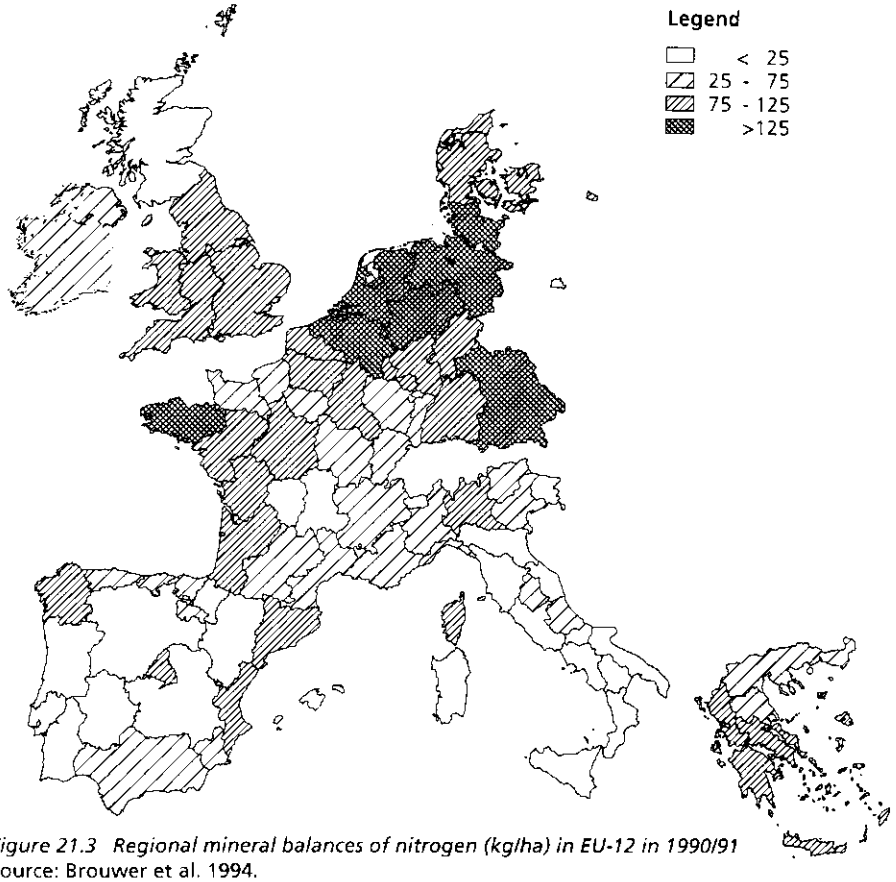

Figure 21.3 Regional mineral balances of nitrogen (kg/ha) in EU-12 in 1990/91
Source: Brouwer et al. 1994.

Finnish mineral balance calculations indicate also that nutrient losses from animal husbandry farms surpass those of cereal farms. Regional variation in nutrient losses relates to animal density. In intensive milk production areas the nitrogen losses are the highest (figure 21.4).

Also exceptional weather conditions, such as the drought in 1992, lower the usage efficiency of nutrients. Phosphorous balances are fairly similar in all parts of the country, and have decreased in the past few years to the level of some 12 kg of P per hectare (Pirttijärvi 1995).

When measuring absolute mineral balances Finnish net surface balances of nitrogen are on average about 10 times lower than in the Netherlands and some 3 times lower than in Germany, for example. But, in measuring output/input ratio, the situation evens to some extent. The (efficiency) ratio of nitrogen shows 43% utilization in the Netherlands, 46% in Germany, and 56% in Finland, correspondingly.

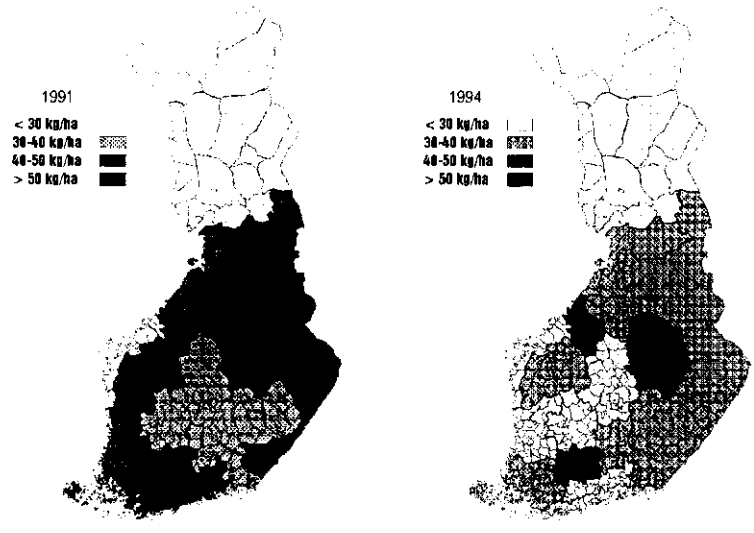

Figure 21.4 Finnish mineral balances of nitrogen (kg/ha) in 1991 and 1994
Source: Pirttijärvi 1995.

21.5 Mineral balances in bookkeeping

The present FADN of EU records mostly farm's monetary flows. The data contains some information on the output quantities, but it lacks the information on input quantities (and their prices). Therefore it does not suit for the purpose of calculating mineral balances. However, some countries, e.g. the Netherlands, collect the data needed for calculating mineral balances on farm level.

Calculating mineral balances on farm level is a rather straightforward procedure, but it can be a tedious one. Keeping account of all nutrients entering the farm is difficult in animal husbandry farms. Especially difficult it is to keep track on the nutrients in the feed stuffs, e.g. in Finland information on the N and P content of concentrates often lacks in the feed stuff packages. Thus, the approach of farm gate balance is not an easy one, and may require too much extra work to be feasible in practice.

But, the approach of surface balance suits fairly well for present bookkeeping. At the moment, all other information needed for surface balance is collected from Finnish bookkeeping farms except for the amount of nutrients in the fertilizers.

Coefficients must be used in calculating the mineral contents in the harvested crops and in the manure. These are averages, and may vary to some extent from year to year. However, the fresh Finnish agri-environmental protection scheme, according to EU Regulation 2078/92, requires farmer to carry

out a nutrient analysis of manure once in every five years. That measure makes it easier for farmer to better assess also farm's mineral flows. An example of mineral contents in crops and manure is given in table 21.1.

In order for farmer to better realize the importance of mineral bookkeeping as a good management tool, a monetarization of mineral surplus is needed. An assessment of the benefits and costs should be carried out in reporting the results of mineral balance calculations.

In Finland, mineral balance calculations work as a tool retrieving information on farm nutrient flows. Mineral balance provides valuable information to farming and production planning. But, we have to note that mineral balances do not precisely tell where the nutrient losses emerge from and to what extent the losses leach to the watercourses or discharge to the air. Substantial mineral losses tell farmer that there is an efficiency problem in using the inputs in his disposal; and that there is also an environmental problem.

When having a bookkeeping of nutrients farmer can try to pinpoint whether the gap between the nutrient inputs and outputs is either in the cultivating process or in the animal husbandry practices. If the gap results from the latter and an analysis of the nutrient content of the manure is carried out, it is possible to determine whether the mineral leakages are due to the inefficient manure handling or in the improper structure in the feeding of the animals.

Table 21.1 Coefficients for calculating mineral balances in Finland

Crop	Nutrient content in crops, %		Animal	Amount of nutrient in manure, kg/year (see Note)	
	N	P		N	P
Winter wheat	2,0	0,34	Bovine animal, cow	80	12
Spring wheat	2,1	0,34	Heifer	40	7
Rye	1,8	0,34	Calf (<1 year)	20	3
Barley	1,7	0,35	Sow	20	4
Oats	1,8	0,35	Pig	8	2
Mixed crops	2,0	0,35	Horse	65	10
Pea	3,4	0,38	Pony	45	7
Potato	0,35	0,05	Sheep	5	1
Sugar beet	0,20	0,035	Laying hen	0,6	0,2
Dry hay	1,9	0,24	Poultry	0,3	0,03
Silage	0,55	0,06			
Clover seed	1,5	0,22			
Timothy seed	1,5	0,22			
Winter rape	3,7	0,86			
Spring rape	3,7	0,90			

Note: The figures of nutrient contents in manure are from Finnish water protection directive from the year 1992. At the moment, a new directive is being formulated and in it the corresponding figures are in parts to some extent higher.

Therefore, farmer faces many farm specific options to choose from how to reduce the mineral losses. In addressing measures to the elements where mineral surplus builds up, the farmer can better utilize the potential of his inputs. Thus, mineral balances induce farmer to choose environmentally sound management practices.

On farm level mineral balances work as an indicator of the efficiency of input usage. Mineral balances can also be useful in the implementation and monitoring of environmental policy measures. Mineral balances help to identify the polluter, and after that an incentive to reduce the level of nutrient leakages can be formulated for the polluter. Changes in nutrient flows after a tax or subsidy system (such as EU's environmental subsidy programme) is established, indicate how well the environmental goals of the applied policy have been met.

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22. FORESTRY ACCOUNTING IN THE CONTEXT OF THE FARM ACCOUNTANCY DATA NETWORK (FADN) 1)

Dr. Pentti Hyttinen 2)

22.1 Justification

Privately owned forests account for more than half of the total forest area in Europe. The ownership structure, and particularly the distribution of size of forests, varies from country to country. Typically, however, a significant proportion of the total area of a country is divided between a very large number of private individuals or families, so called non-industrial private forest (NIPF) owners.

Another common phenomenon is that private forests are often combined with agricultural areas as farm forests. These mainly small-scale forests are concentrated in rural and mountainous areas which are at a disadvantage compared with industrialized areas. The danger of socio-economical erosion and depopulation is substantial in these rural regions. Income from forests can play an important role in maintaining a proper social structure, and forestry can contribute to the overall economy of rural areas. It should be emphasized that the areas of concern include not only traditional questions such as the continuing viability of individual farms, to which the production of timber and other products can contribute, but also more recent questions such as the contribution that the landscape value of attractive woodlands can make to the rural economy through tourism.

The issue of monitoring forestry costs and revenues is of importance in connection with EU policies concerning, e.g., afforestation, farm viability, multifunctional forest management and rural development. Regarding agricultural overproduction and the reform of the EU's Common Agricultural Policy, a major concern has been the extent to which agricultural land could and

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1) This paper has been written as supplementary to the following reports agreeing with the main lines proposed in them:
   - Treatment of forestry in the classification of farms and in the Farm Accountancy Data Network. 123rd meeting of the Community Committee for the Farm Accountancy Data Network. 16 March 1994.
   - Treatment of forestry and other non-agricultural income in the EU-FADN. Community Committee for the Farm Accountancy Data Network. Special working group meeting on 10 January 1995.

2) Address: University of Joensuu, Faculty of Forestry, P.O.Box 111, FIN-80101 Joensuu, Finland, Tel: +358-73-1514092, Fax: +358-73-1514444, E-mail: HYTTINEN@METSA1.JOENSUU.FI

should be converted to woodland, and the policy measures to achieve this. In almost all European countries, there are national policies to support farmers who convert their agricultural land to forestland. As a result, a large-scale afforestation of agricultural lands is expected to take place. However, information to determine the relative profitability of different land uses as well as the relevant level of public support is insufficient in most cases.

In addition, the contribution that forests can make to the environment in such diverse areas as water catchment protection, habitat creation and conservation, and recreation (to name but a few) is now widely recognised. Increasingly, forest owners are either required by statute or influenced by financial incentives to alter their management practices with the objective of increasing these environmental benefits, and in some cases decreasing environmental disbenefits.

Here, while profitability in the usual sense may be of less importance than the concept of non-market benefits to society in general, the financial implications for owners cannot be ignored. The treatment of forestry needs examining due to its importance in the economy of agricultural or mixed holdings, and the different treatment in the Member States of EU.

22.2 The need for profitability information on farm forests

Naturally, different people and organisations need different types of information on forestry. For example, an individual owner, faced with a decision on whether or not to sell a parcel of timber, will be interested in likely prices in his or her particular region over a relatively restricted time period. A national government, however, may be interested in average prices in a whole country over a much longer period. Before any decisions are made on the parameters to be monitored, or stratification of type of holding (by ownership type, size, region and so on), or the way in which information is to be collected, it is necessary to identify different potential users of the information, the type and quality of information that they will require, and potential sources of information.

Forest owners participating in the survey receive detailed information on the transactions concerning their woodlot. Other forest owners receive comparable information on woodlots similar to their own to support the management decisions related to their own woodlots. Information on the results achieved by others helps in defining a realistic picture on the potentialities of their property. *Forest owners' associations* receive information that is valuable in promoting the common benefits of all forest owners.

Policy-makers and governments can utilize the data in planning forest policy means directed to farm forestry. For example, indicative information on the expected long term costs and revenues helps a lot in determining the regional levels of support for field afforestation. *Forestry advisory and extension organisations* need the data when they assist forest owners in making decisions on forestry practices. Benefit-cost calculations can be based on real life examples.

Research dealing with economic issues in forestry gains a lot by having up-to-date empirical data on costs and revenues. *Banks and other financial institutions* can use the data in determining their clients' solvency, respectability and the schedule for repayments. For example, the value of a forest area as security or pledge for a loan can be estimated based on the results achieved in corresponding circumstances on surveyed woodlots.

22.3 Problems to be addressed

The objective should be a monitoring system able to produce information that can be generalized without reservations concerning the representativeness of the results. In general, therefore, monitoring the costs and revenues in forestry comprises three different types of problem areas as presented in figure 22.1.

First, there is a problem of accounting in the field of business economics. Receipts and expenditure must be recorded in a way or another. Questions to be solved can be, for example: What is the data that a forest owner should enter in bookkeeping? What are the calculation procedures that lead to the desired parameters describing profitability?

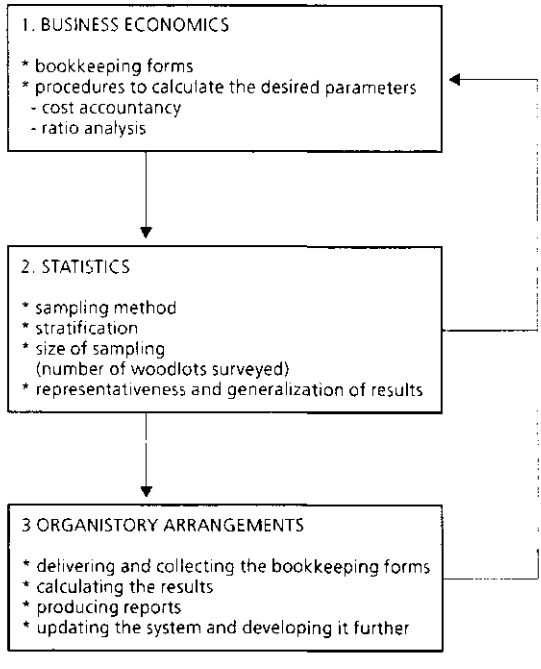

Figure 22.1 Problem areas to be addressed in establishing an accountancy data network for monitoring costs and revenues in forestry

These questions can be addressed by applying the methods of cost accountancy and ratio analyses in the theory of firm to forestry enterprises. From this viewpoint, harmonizing the calculation procedures for the costs and revenues is one of the most challenging problems in order to make the results from different countries comparable. For example, there are large differences between regions and countries in the procedures applied in timber trade, in the productive capacity of woodlands and in the structure of forest ownership. Taking the different national taxation and subsidy policies into account makes the interpretation of the calculations even more complicated. Moreover, currency rates complicate comparisons further.

Secondly, because of the huge number of individual forest owners, there is a problem of statistics. Practically, it is not possible to collect comprehensive information on all the forest owners, but the parameter values for the whole population must be defined by collecting a limited amount of empirical data that can be analysed and generalized. The basic question includes the choice of the sampling method, sampling size and grounds for stratification (e.g. size of the farm, type of forest owner, location, etc.).

The main problems in establishing a bookkeeping network of forest owners to be able to produce statistically valid information on the costs and revenues are

(1) the difficulties in obtaining both a real-time and a comprehensive list of forest owners to design the sample, (not a problem if the network is the same as that for agriculture)
(2) the relatively high probability of having a large number of non-cooperative owners as well as owners who, after starting the bookkeeping, give it up later,
(3) the validity of the data, i.e. whether the forest owners are giving correct information, and
(4) the selectiveness of the repliers, as only active forest owners have the sufficient motivation to continue the bookkeeping from year to year.

These problems also interact with each other.

Thirdly, after finding the solutions to both of the above mentioned problem areas, several practical problems related to the arrangements of the work still have to be solved before statistically valid profitability information can be produced.

Some activities regarding the development of a pan-European forestry accountancy network have already taken place. Since 1986, the IUFRO Project Group P 3.04-00 'Small-scale Forestry' has had several meetings in which studies on the profitability of small scale private forestry have been presented and discussed. An important milestone so far has been the preparation of the 'Guidelines for the presentation of data about the profitability of private forestry'.

The European Confederation of Agriculture (CEA) published a report on the development of the costs and returns in European forestry 1980-1990

(Wurz 1993). Olischläger (1993) conducted a comparative study including Austria, Baden-Württemberg, Finland and Japan.

In addition, at the University of Wales in Bangor, U.K., there is an ongoing pilot study on analysing the costs and revenues of private forestry in the European Union as a precursor to the systematic modelling of the same on a regular basis (Anon. 1992a). At the moment, a proposal for a concerted action on monitoring the costs and revenues of European forestry (Monifor) is under evaluation within the EU/FAIR programme. The proposal coordinated by the European Forest Institute (EFI) includes 17 partner institutions from 15 countries.

22.4 Illustrative example of an accounting model for forestry ratio analysis and cost accounting

In Finland, a research project was started in 1992 aiming at developing an accountancy model for an individual woodlot and submitting a proposal for the arrangement of a forestry accountancy data network in Finland (Hyttinen et al. 1994). An accountancy model has now been tested and might provide proper profitability figures when a national forestry accountancy data network is established.

In the proposed system, accounting is based on general principles and rules applied in business economics to guarantee a solid theoretical basis (see Appendix 1). Two approaches have been adopted: (i) a deductive one that focuses on differences in the state of wealth between two points of time and (ii) an inductive one that pays attention to the realized values during the accounting period and the profit and loss account.

22.5 Conclusive remark

To summarize, the recent economic and political developments call for a more comprehensive analysis on the profitability of farm and other small-scale forestry. Forest policy issues imply a rising demand for information on costs and revenues of forestry at regional and national, and increasingly, also at international levels. Along with the ongoing attempts to modernize the existing forest accountancy networks or establish new ones in some European countries, there is an urgent need for a synoptical analysis which could be achieved by co-operation between agriculture and forestry.

Literature

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APPENDIX 1

ADJUSTED INCOME STATEMENT

7000 stumpage sales
7001 sales at delivered price
7002 other timber sales
7003 timber for own use
7004 adjustments to timber sales
7005 NET TIMBER SALES
7006 other gross sales
7007 adjustments to other gross sales
7008 NET SALES

VARIABLE COST
7009 costs of harvesting
7010 increase or decrease in timber reserves
7011 PROFIT I
7012 cost of timber selling (selling expenses)
7013 costs of silviculture
7014 change of afforestation reserve
7015 costs of maintenance (of forestroads)
7016 change of other current assets
7017 other variable costs
7018 variable costs together
7019 GROSS PROFIT

FIXED COSTS AND EXPENSES
7020 office expenses
7021 expert expenses
7022 insurance expenses
7023 other fixed costs
7024 fixed costs and expenses together
7025 PROFIT FROM OPERATIONS BEFORE DEPRECIATION

7026 interest expence
7027 interest income
7028 dividends received and share incomes
7029 subsidies
7030 indemnities
7031 direct taxes
7032 silvicultural fee
7033 ordinary other expenses
7034 ordinary other revenues
7035 PROFIT/LOSS BEFORE DEPRECIATIONS

DEPRECIATION AND AMORTIZATION
7036 depreciation allowances
7037 over- or underdepreciation
7038 NET PROFIT

7039 extraordinary expenses
7040 extraordinary revenues
7041 PROFIT (LOSS) FOR THE PERIOD
7042 change in value of growing stock (timber balance) and forestland
7043 ADJUSTED PROFIT FOR THE PERIOD
ADJUSTED BALANCE SHEET AT 19...

1 ASSETS

10 - 11 FINANCIAL ASSETS

10 Cash on hand and in banks
- 1000 cash on hand
- 1010 bank giro account 1
- 1020 bank giro account 2

11 Other financial assets
- 1100 stumpage sale receivable
- 1110 sales at delivered price receivable
- 1120 other timber sales receivable
- 1130 other trade receivable
- 1140 advances paid
- 1150 loans receivable
- 1160 prepaid expenses and accrued income
- 1190 other financial assets

12 Current assets
- 1200 timber reserves
- 1210 growing stock
- 1290 other current assets

13 Fixed assets and other capitalized expenditure
- 1300 timber-growing land and water areas
- 1310 buildings and constructions
- 1320 machinery and equipment
- 1330 bonds and shares
- 1340 silvicultural improvements
- 1350 other tangible assets
- 1360 other capitalized expenditure
- 1370 differs from standard reserves

14 1400 other long term investments

15 1500 valuations items

2 LIABILITIES AND CAPITAL

20 Short term liabilities
- 2000 trade payables
- 2010 advances received of stumpage sales
- 2020 advances received of sales at delivered price
- 2030 advances received of other timber sales
- 2040 other advances received
- 2050 accrued liabilities and prepaid income
- 2090 other short term liabilities

21 Long term
- 2100 interest subsidy loans
- 2110 other loans from banking establishments
- 2190 other long term debts

22 2200 valuations items

23 Reserves
- 2300 afforestation reserve

24 Capital
- 2400 capital at the beginning of the accounting period
- 2410 capital investment
- 2420 value of own work
- 2430 profit (loss) for the period
- 2440 capital return
- 2450 private return
- 2460 differs from standard reserves

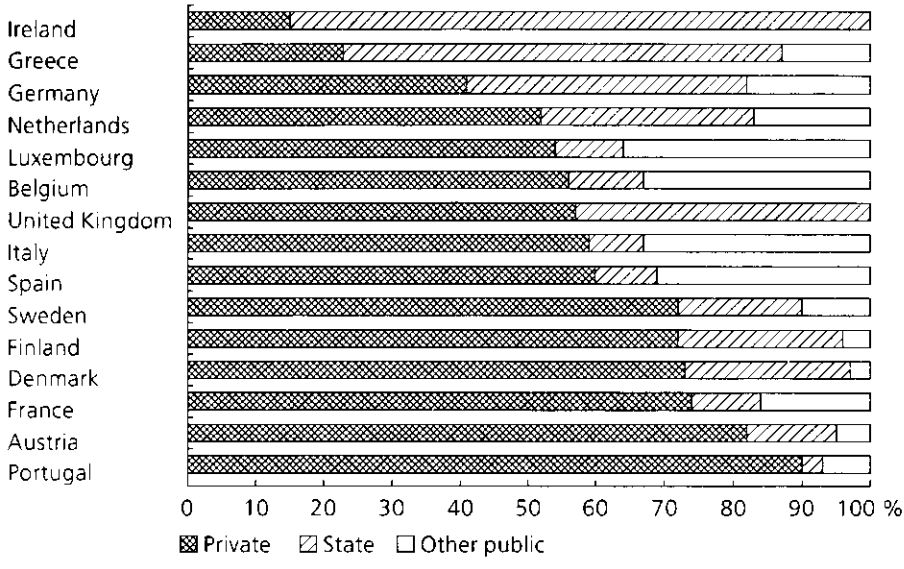
FOREST AREA PER CAPITA IN EU COUNTRIES (1990)

Country	Forest area ha/capita
Finland	3,91
Sweden	2,58
Austria	0,43
Greece	0,23
France	0,22
Portugal	0,22
Spain	0,17
Germany	0,12
Ireland	0,11
Denmark	0,09
Italy	0,08
Belgium-Luxembourg	0,06
United Kingdom	0,04
Netherlands	0,02

FOREST AREA IN EU COUNTRIES (mill. ha, 1990)

Country	Forest area, mill. ha
Sweden	27,8
Finland	23,2
France	15,1
Spain	10,8
Italy	8,1
Germany	7,2
Greece	5,8
Austria	3,8
Portugal	3,0
United Kingdom	2,2
Belgium-Luxembourg	0,8
Denmark	0,5
Ireland	0,4
Netherlands	0,4

FOREST OWNERSHIP STRUCTURES IN EU COUNTRIES



WORKING GROUP SESSION: A STEP UP TO THE NEXT WORKSHOP

Group division: by country

In the third workshop we will discuss 'the need for change'. In the time between the second and the third workshop we have to generate suggestions for innovation. It is important that the ideas and needs for change are generated within the FADN community. The stakeholder analysis shows to which stakeholders we should listen and the reason why.

In getting ideas about the needs and wishes of our 'clients' and those who supply the FADN resources, it is important to involve the most important stakeholders in the process in which ideas and directions for change are gathered. In this way we can give some 'weight' to ideas that will be discussed and analysed in the third workshop.

Therefore we asked each country to give suggestions on how the most important stakeholders can be involved in the process of inventorying ideas for change. The three questions that were answered are:

1. which stakeholders should be involved?
2. how to organise their involvement?
3. what will be the result of this interaction?

Summarized the following agreements were made:

PACIOLI 3

* gathering ideas for innovation: - *specific*
  - strategic
* first assessment
* choice what ideas should be worked out in PACIOLI 4

Towards PACIOLI 3

1) brainstorm on potential innovations: - farm accounting
   - accounting offices
   - national FADN
   - RICA
2) order these topics: a) importance for your country
   b) your preference to work it out in a paper

this will bring up TWO LISTS !! Send in before December 20, 1995.

3) design workshop 3 (around Christmas)
   ➜ request for papers!

4) papers on 'innovation idea' containing:
   a) description problem and change needed
   b) effects of the change in the information model
   c) stakeholder analysis of this change
   d) proposal how to deal with the stakeholders

The Netherlands

Which stakeholders should be involved
Accounting 2000: * Ministry of Agriculture (renew software) and DLO
* farmers and accounting offices
* LEI-DLO management (performance, quality)

How to organise their involvement
Interviews and/or workshop

What will be the result of this interaction
Preference: paper with * performance/quality indicators
* methods for flexible data management

Finland

Which stakeholders should be involved
* Ministry of Agriculture and Forestry
* Farmers organisations
* representant of the Ministry to the third PACIOLI workshop

How to organise their involvement
* new national FADN committee in Finland. Wide range of stakeholders
* well organised meeting on high level with stakeholders (including financing)
* information: e.g. articles in professional magazines

What will be the result of this interaction
* common understanding of the goals of FADN on national and EU level
* commitment to the development of the system on agreed basis

RICA

Which stakeholders should be involved
a) DG VI hierarchy and policy makers
b) RICA liaison agencies - especially for *other* country's data
c) users, clients, public and publications

How to organise their involvement

at a) meeting *in Brussels* with PACIOLI leaders
Consultation on the basis of suggested subjects relating to RICA: priorities /new proposals, define data needs

at b) working groups:
* costs of production
* forecasting
* Farm Return
* data treatment in EDP

missions to memberstates / more frequent meetings

at c) obtain opinion/advice of M.S. which have a strong interest in publishing. Set up efficient document exchange system. Data access conventions, or software solutions to greater access

What will be the result of this interaction

Hopefully, a great improvement all round.

United Kingdom

Which stakeholders should be involved

1) everybody!! Farmers, accountants, survey offices, researchers
2) everybody
3) policy makers, finance offices, national institutions

How to organise their involvement

at 1) PACIOLI 3: present a paper on the accountancy issues to be considered (go to New Zealand!)
at 2) PACIOLI 3 - paper - to coordinate requests for further data
at 3) interviews, seminars, working papers, lobbying

What will be the result of this interaction

at 1) the development of 'the conceptual framework for accountancy for FADN' to be available for guidance when required
at 2) harmonised framework of requests - to minimize cost and disruption
at 3) new FADN

Italy

Which stakeholders should be involved

* U.E.
* Ministry
* statistical institutes
* other suppliers of information

How to organise their involvement

* feasibility study
* pilot project

What will be the result of this interaction

* integrate RICA with other sources of information
* set up a system to distribute RICA information (i.e. internet)

Spain

Which stakeholders should be involved

* RECAN (Spanish FADN)
* Ministry of Agriculture - SGT (budget)
  - SDGSAV (health: livestock, crops)
* Accounting offices
* Agricultural extension services + Rural department Services
* Farmer organisations (unions and cooperatives)
* Research teams (interdisciplinary)
* Agro-chemical Industry's Associations

How to organise their involvement

* Seminar - explain PACIOLI's targets
* Article - RICA's output innovation
  - software exchange and innovation; info distribution
  - feasibility
* Translation PACIOLI's main goals

What will be the result of this interaction

* Spread information
* Try to get their cooperation towards the innovation of RICA
* Increase their willingness to invest in the project

France

Which stakeholders should be involved

* Farmers
* Advisory centres
* Ministries of Agriculture and Environment (political and administrative)

How to organise their involvement

* Collect and gather their need (actual and future)
* Improve the use of FADN / RICA (awareness and usefulness)

What will be the result of this interaction

* RICA considered as French FADN
* Harmonisation - references
* PACIOLI 5.... (on national level)
* New FAN / RICA

Sweden

Which stakeholders should be involved

1) Farmers, farmers organisations
2) Farmers, accounting offices, software suppliers
3) Farmers, accounting offices, statistical office
4) Responsible for Information Systems development in different countries

How to organise their involvement

at 1) Participating in national FADN committee
at 2) Farmers organisations, Swedish standard committee
at 3) Workshop, Swedish standard committee
at 4) Workshop

What will be the result of this interaction

at 1) Improve comparability between different legal forms
at 2) Integration of accounting systems
at 3) Expanded account structure
at 4) More efficient accounting on farm level (better Information System)

EPILOGUE

In the final session of the workshop the following concluding remarks were made:

Description of the FADNs

In line with the methodolgy of Information Modelling discussed in PACIOLI 1, each country gave a good impression of their FADN by writing the global description. By 'cross presentations' the differences between the countries were made very clear and especially the process-models gave good insight in the various ways to organise accounting networks.

Farm Accounting

It is important that we are aware of the developments which take place in accounting. In the workshop some recent developments in accounting like current cost accounting and trends in farm accounting software have been discussed. It was concluded that it is important to be aware of new developments in aacounting outside agricultural context. For this it was mentioned that it is interesting to be part of the IASC network; the International Accounting Standard Committee.

FADN issues

There were two presentations on environmental data. Integration of environmental data will be an important topic for the innovation of the FADN. Another issue will be the integration of forestry in the FADN, since this is required by new member states like Finland and Sweden. The use of the FADN data and the differences between the countries were brought up and discussed. We spoke about the backgrounds of these differences and tried to find an explanation. For effective innovation of FADNs it is important to have at least some understanding of these differences.

There was a demonstration of LEI-DLO software on a special Dutch dairy farm; special attention was given to the data processing of crop protection chemicals as used on the farm.

In the innovation process it might be helpfull to think in two different 'lines'; a strategic or conceptual line versus practical descriptive.

Stakeholders

In the epilogue of the workshop report of PACIOLI 1, the potential threat was discovered that too much consensus between the PACIOLI participants would make us forget the actors within our environment that are not so enthusiastic as the participants in the workshops. Therefore each country brought a list of the most important stakeholders. In the discussion the role and importance of the various stakeholders was compared between the countries. For the follow-up the relevant stakeholders were identified, a classification was made and the question of how to deal with them in PACIOLI was brought up. The importance of listening to them was explicitly stressed.

Issues for the third workshop

Between the second and third workshop the countries are going to think about how to involve their relevant stakeholders in PACIOLI. Will they come to the third workshop? Or is a 'national' workshop a better way to make sure the stakeholders take interest in the projects that might result from PACIOLI?

In PACIOLI 3 proposals for innovation will be gathered and preliminarily ranked. Each country will bring up their own subjects with their own preferences. Together we will discuss which subjects have to be dealt with in our international (PACIOLI) environment.

Overall

The need for innovation is beyond dispute, but it asks for a structural approach. With PACIOLI 1 we made a succesful step in creating the platform that will prepare necessary and feasible proposals for the FADN environment. After PACIOLI 2 this platform has become stronger. Now we have an impression of the FADNs and their 'environment' (their possibilities and their restrictions). We know about the current developments in the FADNs. We have put forward our 'own' ideas for innovation and communicate about them with our stakeholders as best as we can. All this will help to put forward innovative ideas in PACIOLI 3.

ANNEXES

Annex 1 Curricula vitae participants PACIOLI 2

RICA

Nigel Robson

Head of Division of the European Commission. He graduated in agricultural economics at the University of Durham and pursued graduate studies at the University of Aberdeen where he worked as agricultural economist and lecturer. Moved to the European Commission where he worked for the units of poultry and egg production (VI/D3), statistical information quantitative analysis and forecasts (VI/A2), and analysis of the situation of the agricultural holdings (VI/A3). His main areas of work are FADN Committee, budget, personnel, archives and filing.

Luis Florez

Business economist working as administrator/analyst for the European Commission-RICA Europe. Graduated at the Polytechnic University of Madrid. Started his career as lecturer of agro-economics at the University of Leon, where he became head of academic affairs of the School of Technical Agricultural Engineering. Moved to the Polytechnic University of Madrid to do research and teaching work on several topics of agribusiness economics and microeconomics. Also worked as general manager of the Spanish National Association of the Brown Swiss Cattle Producers and as a private consultant before joining the European Commission. His main areas of work are economic analysis, costs of production for crops, forecasts of the farm income and European projects for producing, gathering and disseminating agro-economic information.

Jacques De Dooy

Technical specialist of the European Commission. He worked for the private sector before joining the European Commission for which he has been working in the RICA unit for the last 25 years. He is responsible for data input, control and correction of data and the farm return.

Belgium

Nicole Taragola

Current function: researcher in the Agricultural Economics Research Institute (LEI-IEA), Brussels. She is responsible for the Belgian FADN of horticulture holdings; sample plan, coordination of the collection and analysis of FADN data. She makes the calculation of the Standard Gross Margins and is also busy with microeconomic research in horticulture.

Germany

Peter Kreins

Studied agriculture at the University of Bonn from 1984 till 1989. After finishing, he worked for four years at the Institut for Agricultural Policy in Bonn, by Profes-

sor Henrichsmeyer. Together with other researchers, he developed an regional differentiated agricultural and enviromental informationsystem for Germany (RAUMIS). After finishing this project, the informationsystem (RAUMIS) was installed in the Ministry of Agriculture in Bonn. Now his assignment in the Ministry is the application of information systems and the coordination of model- activities between the Federal Agricultural Research Centre in Braunschweig-Völkerode (FAL), the University of Bonn and the Ministry of Agriculture.

Finland

Jouko Sirén,
member of the Management Board:
Long term experience in agricultural economic research especially in farm management and accountancy. 15 years experience in agricultural policy planning and administration in the ministry of agriculture and forestry and national board of agriculture. Vice chairman of the agricultural research consultative national committee. Head of the Agricultural Economics Research Insititute since 1992. MTTL as the 'section Finland' is tuning the Finish FADN to the RICA network.

Simo Tiainen,
researcher in the Agricultural Economics Research Institute (MTTL).
Mr. Tiainen is a specialist in agricultural statistics and especially FADN-network. He has worked for some months in DG VI in Brussels with FADN in European Union. At the moment he is working with problems concerning EU farm typology on Finnish bookkeeping farms and Standard Gross Margins (SGM) for different products.

Rijo Pirttijärvi
M.Sc. (Agric. Econ.) Researcher in Agricultural Economics Research Institute (MTTL) Helsinki, Finland. Presently working on a PhD project on 'Controlling agricultural pollution through mineral balances'. The task is to compare different controlling measures and their efficiency on farm and on national level with respect to economic and environmental changes that take place in using restrictive measures to control agricultural pollution.

Pentti Hyttinen
works at the University of Joensuu, Faculty of Forestry. His current position is professor in forest management and economics. His research interests and areas of expertise (with ongoing research activities) are forestry in the context of rural development, managerial economics of farm forestry and accounting schemes for forestry.

France

Emmannuel Chantry
Agricultural agronomist, works in the statistical office of the Ministry of Agriculture. Now head of the division of conceptual studies, he is to take the direction of the FADN unit in September 1995.

Bernard Del'Homme
Teacher-researcher in agricultural management at ENITA.

Jerôme Steffe
Researcher on information systems in agriculture at ENITA.

Italy

Guido Bonati
graduated in Agricultural Sciences (Piacenza Catholic University). MBA degree at Boston university. Senior researcher at INEA. Responsible for information technologies at INEA.
Main research activities in:
- information technologies for agriculture;
- adoption of IT by farmers;
- utilization of IT for extension services;
- development of DSS for agriculture.

Carla Ciaramelli
graduated in Mathematics (Naples University). Project manager and customer consultancy and support in Finsiel (private company for information systems development) Territory and environment business unit. Involved in projects for management of:
- Italian RICA data base;
- National Agricultural Information System;
- Forestry National System;
- information system for research institutes.

The Netherlands

Krijn Poppe
Business economist with many years experience in research to support the agricultural policy making in the Netherlands. Dutch representative in the RICA committee. Expertise in accountancy and information modelling in agricultural bookkeeping. Project leader of projects to implement mineral bookkeeping in Dutch agriculture. Intensively involved in the management and innovation of the Dutch FADN.

George Beers
Management scientist, expertise in ISD-methodology, experience in development of farm information systems, development of agricultural information models, manager/senior scientist in research programme on fundamentals of information modelling, project leader of innovation of computer system for Dutch Farm Accountancy Data Network.

Connie Graumans
works with the ATC. This organisation develops and maintains information models for Dutch agriculture. The aim of the Agro Telematics Centre (ATC) is to optimize the use of informatics in agriculture. It is a non-profit organisation, fi-

nanced by the government and the farmers organisations. The ATC has been active in international projects before.

Gijs van Leeuwen
is working at the Ministry of Agriculture.

Carlien Pruis
is the organisor of research events at LEI-DLO. She supports the project leader in organising the PACIOLI workshops.

Spain

Inmaculada Astorquiza
Research experience in Spain and United States on natural resources and environmental economics related with agricultural production. Publications on agricultural production, supply and policy, as well as resource and environmental economics. Familiar with data sources in the agricultural context. At the UPNA there are research groups working on decision making, accountancy, information systems, policy etc, as well as on environmental issues.

Miguel Merino-Pacheco
Agricultural economist and researcher with extensive work done on different aspects of Spanish agriculture integration in the EU, regional economics, set aside programs, marketing of agricultural products). Based in Germany, he makes long and frequents research stays in Spain. His work has been carried out, up to the present, through the Universities of Madrid, Hohenheim (Stuttgart, GFR) and Humboldt (Berlin (GFR), with private and public funding.

Carlos San Juan
has a Ph.D. in Economics from the Complutense University of Madrid, and has a postgraduate degree in "Time Series Analysis and Macroeconomic Dynamic Models" from the Central Bank of Spain.
He is presently a Professor at the Carlos III University of Madrid in the Economics Department, teaching Applied Economics (Spanish Economics, Environmental Economics and E.U. Economics).
His research is in the field of Agricultural and Environmental Economics and the Labour Market, and has published several books and articles.

Sweden

Bo Öhlmér
Professor in farm management, Swedish University of Agricultural Sciences. He has carried out research in farmers' need and use of information, the managerial processes and use of information technology.

Per Persson
Head of the Joint Council for Economic Studies in the Food Sector (LES). LES has the responsibility for the cultural statistics in Sweden, i.e., which agricultural

statistics should be produced and by whom. LES is responsible for the Swedish accounting suvey linked to FADN.

Arne Bolin and Lars-Eric Gustafson work at Statistics Sweden.

Arne Bolin

is specialized in financial accounting and has experience from different sectors of industry. He has been in charge of the Swedish Farm Economic Survey since the administration of the survey was transferred from the National Board of Agriculture to Statistics Sweden in 1976. Bolin is responsible for the adaptation and implementation of economic methodology according to the principles of the Farm Accountancy Data Network (FADN) in the Swedish system.

Lars-Eric Gustafson

is a computer scientist with university diploma and several years of professional experience of agricultural systems. In 1994 he worked in Eurostat with issues concerning development of a metadata and catalogue system for European statistics (CANDIDE). In the adaptation of the Swedish Farm Economic Survey to the principles of FADN, he is responsible for the system analysis and the programming.

United Kingdom

Nigel Williams

Current function:
Senior lecturer in agricultural business management
Wye College, University of London
Relation to FADN:
Chairman, UK Ministry of Agriculture Farm Business Survey Methodology Working Party.
Member, UK Ministry of Agriculture Farm Business Survey Sub-committee.
Actively involved in the collection and analysis of FBS/FADN data at Manchester University and London University (Wye College) from 1970 to 1978. Manager, Wye College FBS/FADN operation from 1977 to 1984. Author of numerous reports on FBS/FADN data. Author of several computer software packages in use at Wye College and other universities for dealing with current cost accounting procedures.
Expertise in information science:
An extensive experience of linear and other programming techniques and their data requirements for economic and behavioural modelling.
Relation to agricultural policy makers:
Carried out a number of policy evaluations for UK Ministry of Agriculture.

Alastair Bailey

Current function:
Research Officer in Agricultural Management and Economics.
Wye College, University of London
Relation to FADN:
Have extensive knowledge of building secondary data sets, using UK s national FBS and the FADN, for economic modelling purposes. Much of this work has involved the pooling of successive FBS cross sections to form Panel Data sets. This

work was carried out for my PhD study and for a project funded by the EC The FADN Gross Margin Project with Andrew Errington and Peter Midmore (Reading and Aberystwyth).
Data collection role. Have acted as a research assistant on MAFF Occasional Survey of Hardy Nursery Stock enterprise in England and Wales 1993.
Expertise in information science:
The above data sets have been used in conjunction to econometric techniques to obtain production parameters from duality based models. In the long term it is hoped that these models will be combined with GIS and Meteorological data to improve estimation performance.
Relation to agricultural policy makers:
No direct involvement as yet. However, most of my work does have policy implication.

Sandra Dedman

Current function:
Lecturer in Accountancy
Wye College, University of London
Relation to FADN:
Utilises FBS FADN derived agricultural business statistics for teaching and practising comparative statistics .
Expertise in information science:
A fully qualified chartered accountant trained by a top 8 UK firm which specialises in agriculture. As such she is well versed in the problems of extracting data on complex agricultural businesses and their analysis.
Relation to agricultural policy makers:
Strictly firm level business analysis.

Annex 2 Addresses participants PACIOLI 2

Participants PACIOLI 2.

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