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IMPROVEMENT OF AGRICULTURAL STATISTICS
IN ASIA AND PACIFIC COUNTRIES
(GCP/RAS/171/JPN)

**PROCEEDINGS OF THE NATIONAL SEMINAR
ON THE SYSTEM OF FOOD AND AGRICULTURE STATISTICS
IN THAILAND**

Bangkok, 19 December 2001

**FOOD AND AGRICULTURE ORGANIZATION OF THE UNITED NATIONS
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I. INTRODUCTION

This document was prepared by the FAO regional project “Improvement of agricultural statistics in Asia and Pacific countries” (GCP/RAS/171/JPN) and the Office of Agricultural Economics of the Ministry of Agriculture and Cooperatives of Thailand, for identification of the status, system, issues and improvement of agricultural statistics in Thailand.

To achieve this purpose, the project and the Office of Agricultural Economics jointly organized a national seminar on the improvement of food and agriculture statistics in Thailand on 19 December 2001 in Bangkok.

The seminar aimed to:

- assess the state of national food and agriculture statistics service;
- review the existing food and agriculture statistical activities;
- identify demands and expectations of data users;
- discuss problems and issues faced in the collection, analysis, use and dissemination of food and agriculture statistics; and
- contribute to the generation of a programme of improvement of national food and agriculture statistics.

The seminar would serve as a forum for identifying data gaps, deficiencies in methodology, duplication of efforts and activities, and measures to improve or streamline agricultural statistics.

Fifty-seven officers attended the seminar, from the relevant departments of the agriculture ministry, the National Statistics Office, the Ministry of Commerce, the National Economic and Social Development Board, the Embassy of Japan, JICA and the FAO. The officers and their organizations are listed in Appendix B.

Eight resource papers were presented and were the basis of discussions on particular aspects of agriculture statistics, such as organizations involved, compilation, data items, publications and analysis. Adequacy of data to users’ needs, and future developments, were also considered.

In general, the statistical system of Thailand is well set-up among the developing countries of Asia and the Pacific. However, many problems remain. The Office of Agricultural Economics is considering setting up a strong coordination mechanism on agricultural statistics among the relevant departments of the agriculture ministry and other concerned organizations. The seminar and this document are expected to contribute to the future development of agricultural statistics in Thailand.

II. GENERAL STATUS OF THE SYSTEM OF FOOD AND AGRICULTURE STATISTICS IN THAILAND

1. Background

Thailand is a tropical country located in Southeast Asia. It extends from 6° to 20° N latitudes and from 97° to 106° E longitudes and has a total area of 514 000 square kilometres or about 51 million hectares. The total population is of about 60 million. Thailand shares borders with Myanmar and Lao PDR to the north, Cambodia and Lao PDR to the east, Myanmar to the west and Malaysia to the south. Its western coast opens onto the Indian Ocean and its eastern and south-eastern coast girdles the Gulf of Thailand. The kingdom is divided into 76 administrative units called *changwat* or provinces. For agricultural development planning purposes, these provinces have been grouped by the Office of Agricultural Economics into 24 agro-economic zones. Each zone is considered homogeneous in terms of climatic and agronomic conditions as well as agricultural activities. Each province is further divided into several *amphoe* or districts, themselves subdivided into *tambon* or subdistricts. Each *tambon* consists of five to ten *moo ban* or villages (literally, 'groups of houses'). In 2001, there were 926 *amphoe*, 7 409 *tambon* and 72 591 *moo ban* in the country. The community area is also divided into three types of municipalities: *nakhon* or city, *muang* or town and *tambon* or commune, depending on the population density. The area of a province not covered by its various municipalities is called the non-municipal area and is considered a rural area. Non-municipal areas are further divided into sanitary and non-sanitary areas.

Most of the civil service officers in each province are appointed by their respective departments from the central offices and work under the control and supervision of the governor, who is appointed by the Ministry of Interior. The officer in charge of each district is also appointed from the staff within the Ministry of Interior. However, the subdistrict chief (*kamnan*) and the village head (*phoo yai ban*) are selected by and from the local people. For certain departments, although the officers are assigned by their respective departments to work regularly in the province, they are officially beyond the governor's control.

Thailand is predominantly an agricultural country. Approximately two thirds of the population engage in agriculture. About 10 percent of the gross domestic product is derived from the agricultural sector. Although the share of agricultural produce in total exports has decreased in recent years, its value is increasing every year and agricultural exports are still a major source of foreign-currency earning. Currently they represent about a quarter of the total export value. For many years, the agricultural economy of Thailand was dominated by only one crop, rice. After World War II, crop diversification occurred in almost all regions of the country. At present, Thailand's main crops are rice, maize, cassava, kenaf, sugarcane, beans, para rubber, oil palm, and fruit. Recently, fishery products have become increasingly important as a source of foreign currency. However, other sectors such as manufacturing, wholesale and retail trade have seen their importance for the national economy grow year on year.

The agricultural sector has long been important for the Thai economy as a source of both income and labour and as a contribution to world food production. But agricultural production can no longer be easily expanded due to constraints linked to the limitation of land, labour and water. In addition, production inputs for fertilizers, pesticides and other chemicals are increasingly costly. The focus has therefore shifted to using appropriate technology for value-

added production, thus helping the farmers to increase their income. The structure of production too has improved by focusing on market demand and area suitability.

Agro-industry has significantly increased, especially for animal feed, canned pineapple, sugar and frozen shrimp. These industries will encourage agricultural production and stimulate new industries.

Agricultural management should focus more on demand, because the greater the demand the stronger the production. Agricultural organizations should be developed in terms of technical know-how, knowledge perception capability and production adjustment in accordance with market demand and area suitability.

Livestock production is anticipated to increase only slightly, due to constraints and price restrictions regarding animal feed.

Fishery production, on the other hand, is likely to prosper, despite some constraints, especially regarding natural resources and unfertile cultivation areas. Production still lags behind foreign demand.

The policy of farmer's self-production should focus on a suitable balance between demand and supply. Rehabilitation efforts should be undertaken by motivating farmers to adjust their production scheme to be in line with world market demand.

The agricultural sector plays a very important role in national development, as it is the basis for food stability and security. Farmers need to have money to invest in production. Agricultural produce promotion is also one of the urgent needs to be considered to support the development of agricultural production. During 1990-2001, agricultural production grew by an average of 2.56 percent per year. In the long run, trading will expand, which will contribute to the growth of the sector, resulting in increased food security.

At present, the international transfer of production and investment inputs is done somewhat haphazardly within the frameworks of WTO and other international agreements. At the same time, some countries turn increasingly to imposing non-tariff trade barriers. In the next decade there will be changes in both the domestic socioeconomic structure and the international economic environment. The agricultural sector will still play an important role and will need to adjust to be in line with the country's social and economic development, which focuses on sustainability to improve the quality of life of the majority of the population. Development in the past has resulted in unsustainable growth and in unfairness in various economic and social aspects countrywide. The focus is now on solving the problems of income distribution, poverty and environmental degradation. Agricultural development can help solve these problems. It is an important challenge to the sector in the current decade. Much work therefore needs to be undertaken. Brainstorming and public hearings about the adjustment of Thai farmers, from experts from the public and private sectors, educational institutions and farmers are also needed. Their comments and suggestions will be submitted to the relevant organizations to use as supplementary information for policy formulation and appropriate concept determination. This will improve farmers' quality of life, increase their job security and help sustain and balance the country's growth.

2. Review of activities on food and agriculture statistics in Thailand

The system of food and agriculture statistics and information in Thailand is decentralized. Many government agencies are responsible for collecting, compiling and disseminating the data. Each ministry has its own statistical unit, albeit different in size and status. The agencies involved in food and agriculture statistics and information in Thailand are as follows:

2.1 The National Statistical Office

The National Statistical Office (NSO) is a government agency with departmental status under the Prime Minister's Office. Its main functions and authority are to plan, coordinate and direct the technical aspects of all statistical projects and activities of the government, to supervise statistical agencies in the technical aspects of planning sample surveys and in collecting and analysing statistics. The NSO also conducts all censuses relating to population, industry, agriculture, fishery, etc, as well as large-scale statistical surveys such as the labour force survey, the socioeconomic survey and the intercensal survey of agriculture. In 1998, it undertook an intercensal survey of agriculture in order to collect data on changes in the structure of agriculture since the last agricultural census, which had been held in 1993. The results obtained from this survey are useful for policymaking on the agricultural development projects of the country. The NSO has branch offices in every province.

The first agricultural census of Thailand was conducted in 1950, the second in 1963, the third in 1978 and the fourth in 1993. In accordance with the recommendations of FAO, the fifth agricultural census is scheduled for 2003.

The NSO, in collaboration with the Department of Fisheries, conducted marine fishery censuses in 1967, 1985 and 1995. Thailand's fishery has developed rapidly in recent years and it is essential to obtain timely statistics for policy formulating and development planning of marine fishery.

From 1966 to 1975, the NSO conducted annual countrywide crop surveys for rice, kenaf and maize. However, after the establishment of the Centre for Agricultural Statistics in 1973, agricultural statistics were transferred to that centre, now known as the Centre for Agricultural Information.

2.2 The Office of Agricultural Economics

The Office of Agricultural Economics (OAE), a department agency of the Ministry of Agriculture and Cooperatives, is the prime office responsible for collection, compilation and dissemination of all current agricultural statistics. Since it is the most important department as far as agricultural statistics are concerned, the development of this office will be discussed here.

OAE consists of 5 bureaus or centres and 24 agro-economic zones as follows:

1. Office of the Secretary
2. Centre for Agricultural Information
3. Bureau of Agricultural Economics Research
4. Bureau of Policy and Agricultural Development Plan

5. Centre of Economic Project and Programme Evaluation
6. Agro-economic zones 1-24

The other main functions of the OAE besides agricultural data collection are conducting agricultural economic research, formulating and recommending appropriate agricultural policies and development plans, and monitoring and evaluating certain projects of the ministry.

Currently, there are about 1 000 permanent employees and officials in the OAE, with some 300 of them attached to agro-economic zone offices. The Centre for Agricultural Information (CAI) has about 200 permanent staff members, all of whom are stationed at the central office in Bangkok.

As for agricultural surveys, survey design, questionnaire design, survey manual preparation, data processing, and training of involved survey personnel are all under the responsibility of the CAI while fieldwork is managed by the staff in the various zones. In every survey conducted by the CAI, data collection is done by the staff of the agro-economic zone offices. A zone is a group of two to four provinces that is homogenous in terms of climate, economy and agricultural activities. The data collected are reported to the CAI, which tabulates them by computer. After processing and analysis, the results are compared with previous statistics, references and information and then formatted for wide and easy use.

To service data users, the CAI also compiles agricultural statistics from other agencies and publishes them in the *Agricultural Statistics Yearbook* besides storing them in its database.

The data collection activities of the OAE have increased every year, especially since it was given department status in 1979. The main surveys of the OAE include crop and livestock surveys, the socioeconomics of agricultural household survey and the cost of production survey.

2.2.1 Production surveys

(1) Crop surveys

The OAE annually conducts specific surveys for the following crops: rice, maize, cassava, sugarcane, soybean, mung bean, groundnut, sorghum, kenaf, cotton, pineapple, garlic, shallot, onion, potato, coffee, oil palm, pepper, para rubber, and fruit crops such as rambutan, durian, guava, lime, mangosteen, longan and lychee.

The data collected in the specific crop surveys are:

- 1) planted and harvested areas and production;
- 2) dates of planting and harvesting;
- 3) amount of fertilizer applied;
- 4) amount of varieties planted;
- 5) monthly product sale; and
- 6) number of total tree crops and productive trees (for tree and fruit crops only).

The survey design employed in the crop surveys is mostly the stratified two-stage sampling. For each crop, all villages under survey are stratified into three or four strata according to the reported crop acreage. The sample villages are randomly drawn from each stratum. About ten crop growers in each sample village are selected randomly for interview. The estimate of the total and mean of characteristics under study are then obtained from this sample.

(2) Livestock and poultry surveys

The livestock and poultry surveys are currently divided into two types of farms: commercial farms (big operators) and non-commercial farms (backyard farms). The types of livestock are cattle, buffalo, swine, chicken, duck and dairy cow.

The sample farms in each stratum are randomly selected. The sampling rate is higher in the big-farm group than in the small-farm group.

For non-commercial farms, the stratified two-stage sampling design is used as in the crop survey. The surveys take place on 1 January and 1 July.

2.2.2 The socioeconomic survey

The survey is a multipurpose survey conducted every two years. However, the type of information gathered each year may change. The detailed information collected from the socioeconomic questionnaire changes from time to time but usually covers the following:

1. Landholding and land use
2. Socioeconomic information
 - characteristics of farm family members
 - farm and off-farm income and expenditure
 - credit and indebtedness situation of farm household
 - marketing and utilization of farm products
 - farm assets

The survey design is stratified two-stage sampling. The sampling units are the villages which are stratified according to the number of households. The second-stage sampling units are the farm households which are listed in the sample villages. The sample households are randomly selected from the list.

2.2.3 The cost of production survey

The cost of agricultural production survey is carried out annually by the OAE. The information collected is divided into two main items: variable cost and fixed cost. Each item is further broken down into actual cost and imputed cost. The commodities covered in this survey vary from year to year depending on the need to update the physical coefficients when computing the cost.

The survey is conducted independently for each crop and covers the main crops, fruit crops and livestock.

2.2.4 Agricultural commodity registration

For the government, the main aim of the registration of agricultural commodities is to be able to regulate their production and eventually reduce the fluctuation in prices due to the imbalance of supply and demand. The decision whether to register a commodity is taken by the Committee on Agriculture and Cooperative Development Policy and Planning of the agriculture ministry. The OAE is responsible for preparing all necessary documents, data processing and monitoring of the registration. Crop registration in each province is carried out by the field staff of the Department of Agricultural Extension, whereas the field staff of the Department of Livestock Development are responsible for livestock registration. The results are not yet satisfactory, as the registration does not cover all farmers – mainly because many farmers are afraid to be taxed and are not aware of any direct benefit for them.

2.2.5 Farm-gate price

Every week the farm-gate price of agricultural commodities is collected and reported to the CAI by the agro-economic zones (local staff) using telex and online computer systems. The weekly report of farm-gate prices is published and distributed to the public every Friday.

2.2.6 Crop forecasting

Thailand is an agricultural exporting country whose export policy has to be formulated, if possible, well in advance of the harvest of each crop. Crop forecasting offers the possibility to get this information at an early stage. At present, the quarterly forecast for each province covers 20 crops and 3 kinds of livestock and is included in the mid-year outlook of 65 commodities and then in the national aggregate model.

There are two types of model used for crop forecasting, the acreage model and the yield model. In the acreage model, the planted area of a crop is specified as a function of the previous year's price, the lagged price of competing crops and its own lagged area; the amount and distribution of rainfall during the growing period are also considered as important variables in the planted-area forecasting model. In the yield model, the average of historic yield over three to five years, excluding abnormal years due to drought, flood, disease or pest, is used. In later months, the rainfall and inputs such as fertilizer applied are used in the forecasting yield model. The production forecast is obtained by multiplying the acreage model with the yield model.

2.2.7 Remote sensing and GIS

Satellite data are used for producing food agricultural statistics and agricultural resource maps. Agricultural development planning will be more efficient if it uses the geographic information system (GIS).

2.2.8 Dissemination and service

- (1) Database
 - (2) The OAE has compiled and published:
 - Agricultural statistics of Thailand in each crop year
 - Annual Thailand foreign agricultural trade statistics
 - Agricultural survey reports such as *Crop survey*, *Cost survey* and *Livestock survey*
 - Seasonal forecasts of agricultural production
 - Farm registration data
 - Geographical information by remote sensing
 - (3) Secondary data compiled from other agencies:
 - Data on commerce and wholesale and retail prices as published by the Ministry of Commerce
 - Data on agricultural industry: by the Ministry of Industry
 - Data on total area: by the Ministry of Interior
 - Import and export of agricultural production: by the Department of Customs
 - Data on credit and agricultural projects: by the Bank for Agriculture and Agricultural Cooperatives
 - Data on rain, temperature and humidity: by the Meteorology Department
 - Data on production of other countries: by international organizations
- Farm information is disseminated via local radio and market news leaflets
- (4) Websites
 - www.oae.go.th
 - <http://thaifarmer.oae.go.th>

2.3 Other agencies

In addition to the above two agencies, the following agencies of the agriculture ministry also compile and publish food and agricultural statistics.

2.3.1 The Department of Agricultural Extension

The Department of Agricultural Extension of the agriculture ministry also compiles the statistics on area and production of various crops from the reports of its local officers. Because this agency has its own agricultural extension officers in every *tambon*, the reports are passed on to the extension worker at

tambon or *amphoe* level and eventually to the province level. These statistics are then compiled by the department in Bangkok and published annually.

2.3.2 The Department of Livestock Development

The Department of Livestock Development is responsible for the collection and publication of figures on the number of animals slaughtered, the number of animals dying from epidemic diseases, the number of animals vaccinated and the number of beasts of burden. These figures are compiled from the reports of its local officers stationed in every province.

2.3.3 The Department of Fisheries

The Department of Fisheries publishes statistics on annual catches of both marine and freshwater fish by province and the amount of fish landed at the Bangkok fish markets by species. The department also keeps records on the number of fishing boats registered, value of fishery products and quantities exported and imported.

2.3.4 The Cooperative Promotion Department

The Cooperative Promotion Department is responsible for promoting all cooperatives in the country, as well as implementing activities according to the Cooperative Act BE 2511 (1968) and the Land Allocation for Livelihood Act BE 2511 (1968) on matters relevant to land settlement cooperative promotion and related laws. Agricultural cooperatives are established to enable farmer members to engage in business together, thus helping one another in times of crisis as well as gaining for themselves a better livelihood and quality of life.

2.3.5 The Department of Internal Trade of the Ministry of Commerce

The Department of Internal Trade, one of the departments in the Ministry of Commerce, issues monthly and annual reports on retail and wholesale prices and price indices of various commodities, including food and agriculture products.

III. PAPERS PRESENTED AT THE SEMINAR

METHODOLOGICAL REVIEW OF DATA COLLECTION, ANALYSIS, USE AND DISSEMINATION OF THE CENSUS OF AGRICULTURE AND FISHERY BY THE NATIONAL STATISTICAL OFFICE

1. NSO responsibilities

The National Statistical Office (NSO), under Section 5 of the Statistical Act of 1965, is authorized to perform the following statistical activities:

1. To compile statistics from all statistical agencies;
2. To plan and conduct all censuses;
3. To promote and develop public and private statistical activities;
4. To plan, coordinate and direct the technical aspects of all statistical projects and activities of the government;
5. To collaborate with and participate in the coordination of the work of statistical agencies in the assembling, compilation and analysis of statistics;
6. To make recommendations or advise other statistical agencies on plans, methodology, forms, questionnaires, as well as other documents such as handbooks and instructions to be used for statistical purposes;
7. To conduct or direct sample surveys or to collect, abstract, compile and analyse statistics relating to the basic conditions of the country obtained from censuses and surveys;
8. To supervise statistical agencies in the technical aspects of planning sample surveys or in collecting analysed statistics;
9. To conduct or direct research on statistical techniques;
10. To issue periodicals and to publish statistical data;
11. To maintain a library of books and documents relating to statistics and to exchange the said books and documents;
12. To direct and promote the study of and training in statistics; and
13. To cooperate with and participate in the coordination of the work of foreign states or international organizations.

2. NSO organization chart

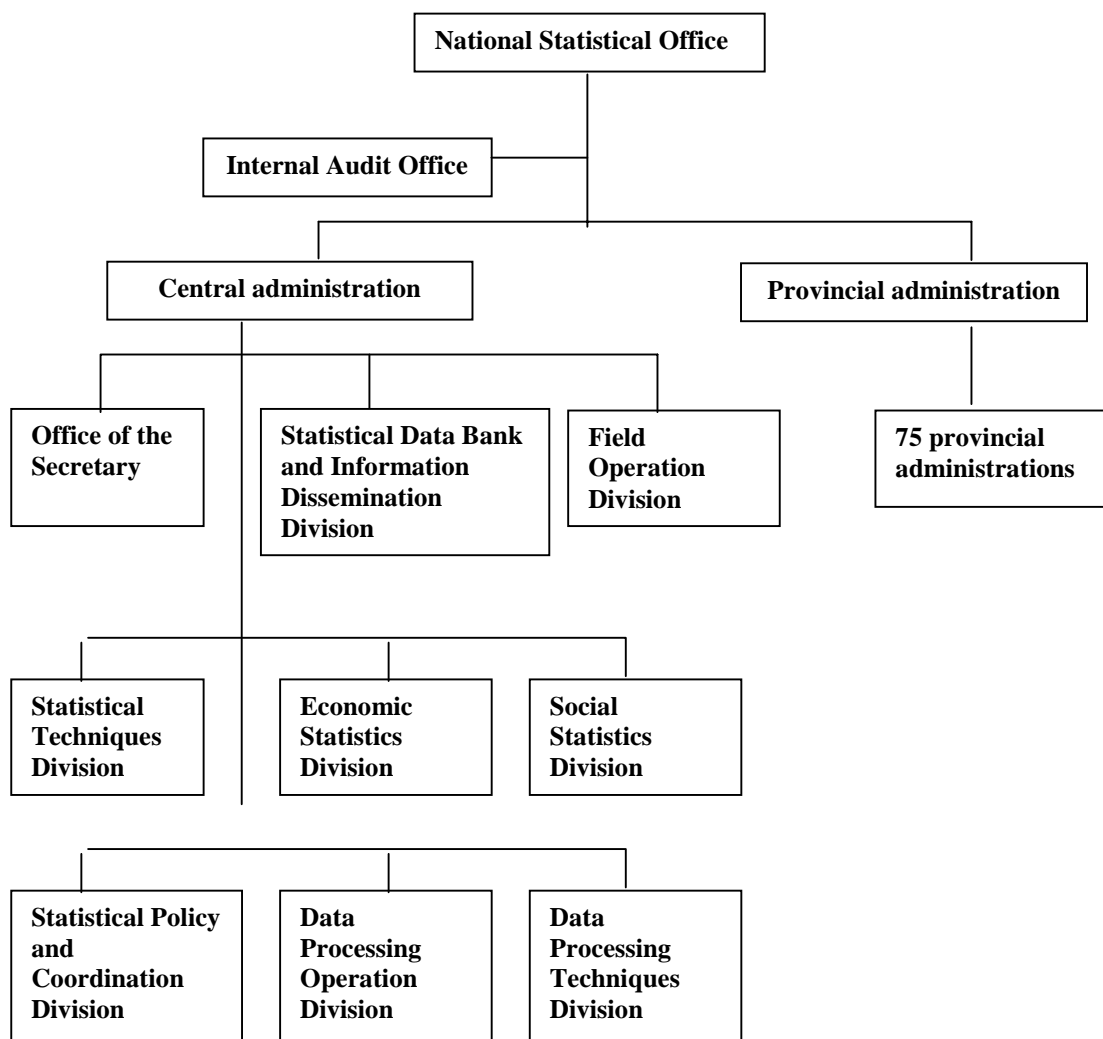
2.1 The organization

In August 1993, the present organization of the NSO was approved by the cabinet. The administration of the NSO is separated into two parts, central administration and provincial administration. The head of the office is called the Secretary General and has two deputies, who assist in directing technical and administration work.

The central administration is divided into nine divisions. The administration in each division is subdivided into branches, according to the type of work performed. The provincial administration consists of 75 provincial offices, which are now expected to

conduct not just field operations as used to be the case in the past but the entire cycle of statistical work. Each provincial office is also expected to perform supporting and supervising roles for the statistical system in the provinces.

The functions of the nine divisions of the central administration at headquarters are significant components of the statistical system of Thailand. The plans of all the surveys and censuses, including other procedures of statistical work (except field operations), are completed at headquarters by any of the nine divisions. In order to figure out how the statistical and administrative work of the NSO is performed, it is important to understand the functions of all the nine divisions. Following are the organization chart and the main duties of each division under the central administration.



2.2 The central administration

- Office of the Secretary
- Statistical Data Bank and Information Dissemination Division
- Field Operation Division

- Statistical Policy and Coordination Division
- Data Processing Operation Division
- Data Processing Techniques Division
- Statistical Techniques Division
- Economic Statistics Division
- Social Statistics Division

(1) Office of the Secretary

- administration of official documents for local and inter-department correspondence
- administrative coordination and public relations
- responsible for document and report printing
- personnel administration and development, and social welfare for the staff
- responsible for annual budget, accounting and finance
- supply and maintenance of facilities, vehicles and building, and responsible for security work

(2) Statistical Data Bank and Information Dissemination Division

- compiling statistical data produced by other government agencies and enterprises
- setting up databanks for social and economic statistics
- preparing manuscripts of periodical publications
- servicing local and international clients regarding statistical data and information
- exchanging (disseminating) statistical data and publications with local agencies and international institutions

(3) Field Operation Division

- collecting statistical data for all projects in metropolitan Bangkok
- collaborating with other government agencies in metropolitan Bangkok in conducting survey projects and other statistical activities

(4) Statistical Policy and Coordination Division

- setting up the master plan for statistical works and programmes of the country
- monitoring and evaluating the progress and achievements of statistical projects of the NSO and other government agencies
- organizing meetings for the National Statistical Committee and its subcommittees
- organizing meetings for the directors of the nine divisions regarding plans and projects of the NSO
- supervising other government agencies and enterprises in conducting statistical projects
- conducting ad hoc surveys for the government and other government agencies and enterprises, as requested
- setting up standard concepts and definitions for statistical work
- coordinating with local and international institutions regarding statistical work and international seminars and conferences

- coordinating between the central and provincial administration

(5) Data Processing Operation Division-+

- processing censuses and survey data
- servicing other government agencies and enterprises including international institutions in computer data processing
- supporting and assisting the NSO and other government agencies over computer data processing procedures
- controlling the computer operation systems

(6) Data Processing Techniques Division

- conducting research projects in order to develop the computer system and to prepare technical documents in computer data processing
- analysing, designing and developing computer data processing procedures
- developing computer systems
- creating and maintaining the statistical information system
- advising users about computer data processing

(7) Statistical Techniques Division

- being responsible for sampling plans of statistical projects including plans for evaluating the quality of the statistics
- preparing sampling frames
- conducting village surveys to set up a database for the basic structure of all the villages in Thailand
- evaluating and performing statistical analysis on data obtained from the censuses and surveys conducted by the NSO
- advising other government agencies and enterprises on statistical techniques and methodologies
- conducting in-service training courses on statistics and computer data processing
- studying and developing statistical methodologies for the censuses and surveys of the NSO
- cooperating with international institutions in conducting training courses and study tours for the staff of those institutions
- cooperating with local educational institutions in job training programmes for their students
- maintaining the office library
- being responsible for the cartography of the country for use in both sampling procedures and field operations

(8) Economic Statistics Division

- conducting censuses and surveys on economic issues as well as preparing manuscripts for the census and survey reports
- performing statistical analysis of economic data obtained from those censuses and surveys and preparing manuscripts for these research reports
- producing economic indicators

- cooperating with local and international organizations on economic statistics (to obtain advice and suggestions which allow for the improvement of all procedures in producing economic statistics, and to share knowledge and experience in conducting censuses and surveys)

(9) Social Statistics Division

- conducting censuses and surveys on social issues as well as preparing manuscripts for the census and survey reports
- performing statistical analysis of social data obtained from censuses and surveys, and preparing manuscripts for these research reports
- producing social indicators
- cooperating with local and international organizations on social statistics (to obtain advice and suggestions which allow for the improvement of all procedures in producing social statistics, and to share knowledge and experience in conducting censuses and surveys)

2.3 Provincial administration

The provincial administration consists of 75 provincial offices, whose main responsibility has been expanded from merely field operations to the complete cycle of statistics work.

3. NSO mission

3.1 Policy

1. Produce basic statistical information with high quality and timeliness, and in accordance with users' needs.
2. Timely, widely and continuously distribute statistical data and information to users by using up-to-date and linkable technology.
3. Contribute and promote the decentralization of statistical work to provincial offices.
4. Set up statistical databanks for every field so that the NSO can be both a national and a provincial statistical centre.
5. Increase coordination among data producers, informants and users.

3.2 Main functions

The NSO is one of the departments of the Prime Minister's Office. Its main functions, by the 1965 royal decree on statistics, are:

1. Statistical data production
2. Statistical data dissemination
3. Statistics coordination
4. Statistics consultancy
5. Training

(1) Statistical data production

The NSO, the national core agency in statistical data production, produces basic statistics, which illustrate the socioeconomic characteristics and structure of the country and are used for policy formulation and structural planning, especially for socioeconomic development projects. They are also used for project monitoring and assessment at various levels, national, regional and small-scale. The NSO produces two main types of statistics:

- Economic statistics comprised of statistics on agriculture, fishery, industry, commercial businesses, service businesses, household expenses, communication and transportation, etc.
- Social statistics comprised of statistics of population, labour, immigration, education, public health, sanitation and welfare, culture, habitation, etc.

Two main methods are applied for data collection, namely census and survey. Most data are obtained from interviewing or through questionnaires. Data analysis is conducted by the NSO computer system and the results of every census and survey are published and disseminated to public users. The data at village or subdistrict level are not publicized, although they can be requested from the NSO. Generally, the NSO conducts 12-15 projects for data collection. The census/survey projects conducted between 1992 and 2001 are as follows:

Census projects

1. Population and housing census (2000)
2. Industry census (1997)
3. Marine fishery census (1995)
4. Agricultural census (1993)

Survey projects

1. Intercensal survey of agriculture (1998)
2. Intercensal survey of fishery (2000)
3. Household socioeconomic survey (1992, 1994, 1996, 1998, 2000)
4. Household energy consumption survey (1992, 1994, 1996, 1998, 2000)
5. Industrial survey (1992-1995, 1999-2001)
6. Commercial and service business survey (1992, 1994, 1995, 1999, 2000, 2001)
7. Household industry survey (1993, 1995, 1999, 2001)
8. Dormitory survey (1994, 1996, 2001)
9. Private hospital and health care centre survey (1992, 1997, 2001)
10. Hotel and guest house business survey (1992, 1991, 1996, 1998, 2000)
11. Non-governmental organization survey
12. Civil servant living survey (1993, 1995, 1997, 1999, 2001)
13. Bus transportation business survey (1999)
14. Construction survey (1999, 2001)
15. Intercensal survey of population (1996)
16. Housing survey (1996)
17. Reproduction period survey (1996)

18. Labour survey (1992-2001)
19. Immigration survey (1992, 1994, 1997)
20. Elderly population survey (1994)
21. Home worker survey (1999)
22. Survey of population characteristics and society of slums in Bangkok vicinity and provinces (1998)
23. Survey of working status during non-cultivation periods (1999)
24. Survey of employment and unemployment of middle and high levels (1992-2001)
25. Survey of knowledge, attitude and practice of family planning in the South (1994)
26. Child and youth survey (1992, 1997)
27. Sanitation and welfare survey (1996, 2001)
28. Population's smoking behaviour survey (1993, 1999, 2001)
29. Social attitude survey (1993, 1998)
30. Report of education and teachers (1992, 1993, 1994, 1996, 1998, 2000)
31. Press survey (radio and television – 1995)
32. Press survey (newspapers – 1995)
33. Cultural participation and time consumption survey (1995)
34. Time consumption survey (2001)
35. Household basic information survey (1992-2001)
36. Village information survey (1992, 1994-1996, 1998-1999, 2001)
37. Private honorarium survey (1996, 1998, 2000)
38. Current statistical data collection (1992-2001)
39. Construction statistics
40. Local government office real income and expense statistics
41. State enterprise capital expense statistics
42. Local government office budget statement statistics
43. Southern region statistics project on measures to increase government-sector payments for economic stimulation (Miyazawa)

In 1999, the NSO was allocated the budget for the southern region static project on measures to increase government-sector payments for economic stimulation. The objective was to prepare statistics of urgent need. The village census project was therefore established to collect statistical data and it is usually conducted every year. The data collected include:

- Number of population and household countrywide
- Number of births and deaths
 - Main careers of the village, number of households by main career
 - Number of agricultural households and agricultural areas
 - Number of households by group of income
 - Number of livestock-raising households and number of livestock
 - Number of water bodies and number of households using those water bodies
 - Number of households with electricity available
 - Number of households with telephone available

- Number of rice mills and industrial factories
- Transportation conveniences to province/district offices
- Number of household industries
- Assistance requirement from the government

Implementation period: from May 1999 to May 2000

Presentation of results: the results were reported at village, subdistrict, district, province, region and country levels.

(2) Statistical data dissemination

The NSO provides statistical information for the public and private sectors, both domestic and foreign. The statistics provided include information produced by the NSO and other agencies. As the NSO is the statistical core, every field of statistics is compiled for wide and continuous dissemination.

The NSO disseminates statistical information in various formats: reports on censuses and surveys, statistics journals, annual statistics books, provincial statistics reports and regional statistics reports. Other media are also available, such as tape, diskette and CD-ROM.

(3) Statistical coordination

Besides statistical data production, at present the NSO is in charge of coordination among statistics-producing agencies to avoid overlapping and to standardize the data. In addition, the NSO coordinates with users to find out their needs and with foreign agencies, organizations and educational institutions. The NSO cooperates with other government organizations in special survey projects as requested. This helps those agencies obtain high-quality data which can be effectively used for policy formulation and development planning.

(4) Statistical consultancy

The NSO provides consultancy on statistical techniques and computer processing for both public and private organizations. The contents of consultancy are statistical planning, statistical methodology, sampling design, questionnaire design, data collection, tabulation, processing, data analysis, data presentation, statistics calculation and report preparation. The consultancy on computer processing is focused on data preparation for processing, processing software use, statistical data system design and computer use development for data processing. The service on processing data by computer is also available to various agencies.

(5) Training on statistics and computer data processing techniques

The NSO has organized in-service training courses on statistical methods since the early 1960s and on computer data processing for the personnel of government agencies and state enterprises since 1970. The main objectives of the training are:

1. to improve the statistical system of the country in order to meet current development plans;
2. to develop experience and skills among statistical personnel so that statistical operation problems are found out and solved properly; and
3. to improve the coordination of the activities of the statistical personnel in various government agencies.

Training programmes

- a) **Statistical training programme:** the programme lasts four and a half months and is usually attended by about 45 trainees for each course.
- b) **In-service training in computer data processing:** this course is organized annually for those who obtain a bachelor degree or equivalent and those who are responsible for data processing in the public and private sectors. Several subjects are included in each year training, such as use of software packages (SAS, SPSS, FOXPRO, Microsoft Excel for Windows, etc). There are about 400-500 participants each year.
- c) **Computer training programme for government officials:** the NSO is one of the agencies selected by the National Electronic and Computer Technology Centre to be a computer training institute. The training is organized for the officials to be promoted including staff of the NSO and of other government agencies. Each year, two or three courses are conducted with about 100-150 participants altogether.
- d) **Training programme for foreign officers:** the NSO usually organizes study visits and training programmes for officers from various countries. Some 30-40 foreigners participate in this programme.
- e) **Special training programme:** this programme conducts two or three courses a year for NSO officials to develop their capability. This special course focuses on statistics and computer technology.

4. NSO manpower

At present, the NSO has 1 196 officials and permanent employees – 679 at headquarters and 517 in regional offices. In addition, there are temporary employees working for data collection and processing in various projects. In FY2000, there were 1 114 temporary employees – 456 at headquarters and 658 in regional offices. Six thousand and five persons were temporarily employed under the statistical project on public payment for economic stimulation – 430 at headquarters and the others in regional offices.

5. Methodological review of data collection, analysis, use and dissemination of the agricultural census

5.1 Definition

Agricultural census means the collection of agricultural statistical data by interviewing every agricultural holding in the country within a specific period. The latest agricultural census was conducted in 1993 by interviewing every agricultural holding under assigned coverage conditions. The First of April 1993 was determined as Census Day.

5.2 Background

The first agricultural census of Thailand was conducted in 1950, the second in 1963 and the third in 1978. To obtain statistics on the agricultural structure in accordance with FAO recommendations, the agricultural census should be conducted at least every ten years. As Thailand is an agricultural country, agricultural basic structure information obtained from an agricultural census is necessary. Such information comprises details at below-province levels of every area of the country which are important for national food and agriculture development policy formulation. The fourth agricultural census was conducted in 1993, and the fifth is scheduled for 2003.

5.3 Utilization of the results

1. To collect data on agricultural structures such as number and area of holdings, land use, land tenure, planted area of crops, number of livestock, use of fertilizer and pesticide, machinery and equipment, etc;
2. To provide a frame for other agricultural surveys on holdings;
3. The results obtained from the census are essential for both national and local policymaking and monitoring and evaluation of agricultural development projects; and
4. To alter the agricultural basic structure for a period of 15 years.

5.4 Coverage

The 1993 agricultural census covered all holdings whose agricultural operations were as follows:

1. the area operated was 2 *rai* and over; or
2. the number of livestock raised on 1 April 1993 was two or more head of cattle or buffalo, separately or together; or five or more swine; or 100 or more ducks or chickens, separately or together; or
3. income earned from selling crops or animals or animal products during the last 12 months amounted to Baht 6 500 or more.

Census Day was 1 April 1993 and was used as reference time for:

- legal status of household holder and number of household members
- area of holding
- planted area and number of permanent trees
- planted area of para rubber
- number of livestock
- number of machinery and equipment
- indebtedness for agriculture of holder's household

The Last 12 Months referred to the period between 1 April 1992 and 31 March 1993 and was used as reference period for:

- irrigation
- planted area of rice, field crop, vegetable crop, flower and ornamental plant
- use of fertilizer and pesticide
- use of machinery and equipment

- employment on the holding
- activity status of members in the holder's household
- income of holder's household

5.5 Census items

The data collected in the agricultural census were as follows:

- 1) legal status of holder
- 2) land tenure, land use and irrigation
- 3) rice
- 4) field crop
- 5) vegetable crop, flower, ornamental plant
- 6) permanent crop and para rubber
- 7) livestock
- 8) fertilizer and pesticide
- 9) machinery and equipment, animal use and transport equipment for agriculture
- 10) employment on the holding
- 11) members of the holder's household and activity status
- 12) income and indebtedness of holder's household

5.6 Census methodology

A combination of complete and sample enumeration was applied for the agricultural census. In this method, the questionnaire was divided into two parts. The first part was used for collecting data on the agricultural basic structure for all holdings; the second part was used for collecting other agricultural structure data from a 25-percent sample of holdings.

5.7 Data collection

The interviewing method was applied. Field work was carried out by some 30 800 local school teachers (25 800 enumerators and 5 000 supervisors). The enumerators were sent out to interview all head of households using listing form SK1 to find out agricultural holders. Approximately six million agricultural holders were interviewed subsequently for detailed information using enumeration form SK2.

5.8 Data processing

All filled questionnaires already edited during the field operation were sent to the central office. Manual editing for completeness and consistency of all items in the questionnaires were again examined, including the coding process for some items. Then, all information was entered onto magnetic tape. Before tabulation, all raw data were edited by computer for final review and correction to ensure that they were all clean for further tabulation.

Publication of the census results was done in three series: province, region and country. However, detailed data not presented in the reports were stored on magnetic tape.

Complete enumeration

Data processing for each province was undertaken by summation of every household in each village, every village in each *tambon*, every *tambon* in each district and every district in each province. Every level of data was therefore obtained for household, village, *tambon* and district in each province.

$$Y = \sum_{i=1}^m y_i$$

in which

Y = total value of each province

Y_i = character under study of 1th household

M = total number of agricultural household in each province
= 1, 2, 3 ... m (every household)

5.9 Post-enumeration survey

After the conclusion of census field work in April, a post-enumeration survey was carried out in June in order to evaluate the quality of the data by selecting four percent of the total enumeration areas. All enumerators were field staff officers of the National Statistical Office.

5.10 Summary findings

- (1) Number and area of holdings
 - by region
 - by legal holder
 - by cropland
- (2) Size of total area of holding
- (3) Land tenure
 - operated under one tenure farm
 - owned
 - rented
 - other
 - operated under two or more tenures
- (4) Land use
 - rice
 - field/vegetable crops
 - permanent crops/para rubber
 - forest/pasture
 - other
- (5) Use of fertilizer, pesticide, machinery and equipment; employment
 - use of fertilizer
 - use of pesticide
 - tractor, 4 wheels
 - tractor, 2 wheels
 - water pump
 - sprayer
 - manual

- engine
 - rice thresher
 - rice miller
 - employment of agricultural workers
 - does not employ agricultural workers
 - employs agricultural workers
 - permanent
 - occasional
 - permanent and occasional
- (6) Demographic characteristics and activity status
- sex
 - age group
- (7) Household income and debt
- by source of household income
 - agriculture only
 - agriculture and other sources
- mainly from agriculture
 mainly from being agricultural worker
 mainly from other sources
 equally from agriculture and other sources
- by indebtedness for agriculture
 - not being in debt
 - being in debt
- cash
 non-cash
 cash and non cash

6. Methodological review of data collection, analysis, use and dissemination of the intercensal survey of agriculture

The NSO undertook the intercensal survey of agriculture in order to collect the data on changes in agricultural structure over the five-year period since the last agricultural survey. The results obtained from the latest survey are useful for policymaking on the agriculture development projects of the country.

The survey reports were published in two series: the provincial reports in which the primary data of the province were presented, and the final reports which were published for each region and the whole country.

6.1 Background

The NSO conducted the first agricultural census of Thailand in 1950, the second in 1963, the third in 1978 and the fourth in 1993. However, the interval between censuses was so long that some data on the agricultural structure might have changed fundamentally. In order to study the changes and to obtain data on the agricultural structure for each of the five years, the NSO decided to conduct an intercensal survey of agriculture in 1998; the first such survey had been carried out in 1983 and the second in 1988.

6.2 Objective

The main objective of the survey was to collect data on the basic structure of agriculture used in the census of agriculture, such as number and area of holdings, land use, land tenure, planted area and number of livestock. Such data would be used as a tool for studying changes of the agricultural structure from 1978, 1983, 1988 and 1993 to 1998, influencing policymaking, monitoring and evaluation of agricultural development projects.

6.3 Coverage

The intercensal survey of agriculture covered the same holdings as did the agricultural census.

Enumeration Day was 1 April 1998 and the date was used as reference time for:

- legal status of holder and number of members in the holder's household
- area of holding
- planted area and number of permanent trees
- planted area of para rubber
- number of livestock
- number of machinery and equipment
- indebtedness for agriculture of the holder's household

The Last 12 Months referred to the period between 1 April 1997 and 31 March 1998 and was used as reference time for:

- irrigation
- planted area of rice, field crops, vegetable crops, flowers and ornamental plants
- the use of fertilizer and pesticide
- the use of machinery and equipment
- employment on the holding
- activity status of members in the holder's household
- income of the holder's household

6.4 Survey items

The data collected in the 1998 intercensal survey of agriculture were as follows:

- 1) legal status of holder
- 2) land tenure, land use and irrigation
- 3) rice
- 4) field crops
- 5) vegetable crops, flowers and ornamental plants
- 6) permanent crops
- 7) para rubber
- 8) livestock
- 9) fertilizer and pesticide
- 10) machinery and equipment, animal use and transport equipment for agriculture
- 11) employment on the holding

- 12) members of the holder's household and activity status
- 13) education and main activity status of holder
- 14) income and indebtedness of the holder's household

6.5 Survey methodology

6.5.1 Sample design

Stratified two-stage unequal probability sampling was adopted for the survey. Regions were stratified into four primary strata. Provinces were stratified into 76 substrata. Each substratum was divided into nine groups of villages or blocks according to the data obtained from the agricultural census, i.e. planted area of field crops, vegetable crops, flowers and ornamental plants, para rubber or number of permanent tree crops of two main economic crops for each province. Villages were the first-stage sampling unit and holders were the second-stage sampling unit.

The enumerators were assigned to visit all household heads in 3 550 sample villages or blocks and the listing form was filled in. About 43 000 sample holdings throughout the country were then selected, interviewed and recorded in the enumeration form.

6.5.2 Method of estimation

The estimate of the total number of each characteristic of holdings from the enumeration form was based on the formula

** Provincial level*

$$\hat{Y}_{hi} = \sum_{j=1}^9 \frac{1}{m_{hi jk=1}} \sum_{k=1}^{m_{hi j}} \frac{1}{P_{hi jk=1}} \sum_{p=1}^4 \frac{N_{hi jkp}}{n_{hi jkp}} \sum_{r=1}^{n_{hi jkp}} Y_{hi jkp}$$

- in which
- $Y_{hi jkp}$ = the number of characteristic Y of the r^{th} holder in the p^{th} group of holders, k^{th} sample village/ block, j^{th} group of villages/blocks, i^{th} province, h^{th} region
 - $N_{hi jk}$ = the total number of holders in the p^{th} group of holders, k^{th} sample village/ block, j^{th} group of villages/blocks, i^{th} province, h^{th} region
 - $n_{hi jk}$ = the total number of sample holders in the p^{th} group of holders, k^{th} sample village/ block, j^{th} group of villages/blocks, i^{th} province, h^{th} region
 - $P_{hi j}$ = the probability of selection of the k^{th} sample village/block, j^{th} group of villages/blocks, i^{th} province, h^{th} region

m_{hij} = the total number of sample villages/
blocks in the j^{th} group of villages/blocks, i^{th}
province, h^{th} region

***Regional level**

$$\hat{Y}_h = \sum_{i=1}^{N_h} \hat{Y}_{hi}$$

in which N_h = the total number of provinces in the h^{th} region

***Whole country**

$$\hat{Y} = \sum_{h=1}^4 \hat{Y}_h$$

7. Methodological review of data collection, analysis, use and dissemination of the marine fishery census

7.1 Background

The National Statistical Office in collaboration with the Department of Fisheries conducted the marine fishery census three times, in 1967, 1985 and 1995. Thai fishery has developed rapidly during the past decades and it is essential to obtain timely statistics for policy formulating and development planning of marine fishery.

7.2 Objectives

The objectives of the marine fishery census are:

1. to collect data on basic economic structure of marine capture fishery and coastal aquaculture and socioeconomic characteristics of fishery households, fishery employees' household, fishermen and aquaculture workers and
2. to provide data to be used as sampling frame for other related surveys.

7.3 Coverage

The census covered all marine capture fishery and coastal aquaculture households/ establishments and fishery employees' households (excluding foreign fishery employees' households) in the municipal and non-municipal areas of 24 coastal provinces in the central and the southern regions of the country. The 24 provinces were divided into five coastal zones as follows:

Coastal Zone 1 (eastern part of the Gulf of Thailand) consisting of three provinces: Trat, Chantaburi and Rayong

Coastal Zone 2 (inner part of the Gulf of Thailand) consisting of seven provinces: Chon Buri, Chachoengsao, Samut Prakan, Bangkok Metropolis, Samut Sakhon, Samut Songkhram and Phetchaburi

Coastal Zone 3 (central part of the Gulf of Thailand) consisting of three provinces: Prachuap Khiri Khan, Chumphon and Surat Thani

Coastal Zone 4 (southern part of the Gulf of Thailand) consisting of five provinces: Nakhon Si Thammarat, Phatthalung, Songkhla, Pattani and Narathiwat

Coastal Zone 5 (Andaman Sea) consisting of six provinces: Ranong, Phang-nga, Phuket, Krabi, Trang and Satun

7.4 Census items

The data collected from marine fishery households/establishments and fishery employees' households were as follows:

1. Marine capture fishery/coastal aquaculture management
 - (1) type of management
 - (2) type of fishery
 - (3) number of persons engaged
2. Marine capture fishery
 - (1) fishing boat; type of boat, length of boat, gross tonnage, type of equipment installed, ownership of boat, etc
 - (2) main fishing gear
 - (3) main fishing areas, etc
3. Coastal aquaculture
 - (1) type of aquaculture
 - (2) area under culture and tenant status, method of culture, etc
4. Socioeconomic characteristics of fishery household
5. Fishery household members
6. Socioeconomic characteristics of fishery employees' household
7. Fishery employees' household members

7.5 Census methodology

Complete enumeration by the interviewing method was applied. The enumerators including permanent and temporary staff of the National Statistical Office and of the Department of Fisheries and local teachers of Pattani and Narathiwat provinces were assigned to list all households/establishments in the coverage area using listing form SM1 in order to identify the fishery households/establishments and the fishery employees' households. Subsequently, the detailed information was recorded in enumerator forms SM2 for fishery households/ establishments and SM2/1 for fishery employees' households.

The field enumeration was carried out simultaneously for the 24 coastal provinces in 3 500 enumeration districts from April to May.

The post-enumeration survey was carried out one month after the completion of the field work. About 120 enumeration districts were selected and field enumeration was carried out to evaluate the content and coverage error of the census.

7.6 Data processing

All filled questionnaires were edited at the field office then sent to the central office. Manual editing for completeness and consistency of detailed information was

performed before recording the data onto magnetic tape. Before tabulation took place, all raw data were edited by computer for final review and correction to ensure that they were clean for tabulation.

7.7 Time references (for the 1995 marine fishery census)

- (1) Census Date was 1 April 1995 and it was used as reference time for data collection on:
 - type of management
 - type of fishery
 - fishing boat
 - source of fishery loan
 - area under culture
 - possession of consumer durable goods
 - number of fisherfolk
- (2) The Last 12 Months referred to the period from 1 April 1994 to 31 March 1995 and was used as time reference for all data collected except those mentioned in (1).

7.8 Summary findings

The report of the marine fishery census was presented at two levels:

- Five reports of coastal zones, i.e. zones 1 to 5
- A national report, including the 24 coastal provinces whose statistical tables of marine fishery and coastal aquaculture are divided into two, national level and provincial level, as follows:
 1. Marine capture fishery/coastal aquaculture
 - 1.1 Number of fishery establishments by type of fishery and coastal zone (including coastal aquaculture)
 - 1.2 Number of fishery employees' households
 2. Marine capture fishery
 - 2.1 Type of management
 - 2.2 Size of management
 3. Fishing boats
 - 3.1 Type of boat
 - 3.2 Number of inboard-powered boats by size of boat
 - 3.3 Number of inboard-powered boats by type of main fishing gear
 4. Coastal aquaculture
 - 4.1 Number of coastal aquaculture establishments and area under culture
 - 4.2 Type of main culture
 - (1) shrimp culture
 - (2) fish culture
 - (3) mollusc culture
 - (4) crab culture
 5. Fisherfolk and persons engaged in coastal aquaculture

6. Socioeconomic structure of fishery households and fishery employees' households (excluding company and juristic partnership)

8. Methodological review of data collection, analysis, use and dissemination of the intercensal survey of marine fishery

8.1 Background

The National Statistical Office and the Department of Fisheries jointly conducted three fishery censuses, in 1967, 1985 and 1995. The main objective was to collect statistical information of the basic structure of marine fishery and coastal aquaculture. As a census is usually undertaken every ten years and marine fishery is developing and changing somewhat rapidly, an intercensal census is conducted every five years. The first of its kind was undertaken in 1990 and the second in 2000. The information obtained from the intercensal was used for planning, policy formulation and assessment of national marine fishery and coastal aquaculture. It was also useful for setting up assistance measures for fisherfolk.

8.2 Objectives

1. To collect the data on the basic structure of marine capture fishery and coastal aquaculture; characteristics of fishery households, fishery employees' households, fisherfolk and aquaculture workers.
2. To collect the data on income and expenditure of small-scale marine capture fishery.
3. To analyse the collected data and compare them with those of the previous marine fishery census.

8.3 Coverage

The coverage was the same as that of the previous marine fishery census.

8.4 Survey items

The data collected under the intercensal survey of marine fishery were as follows:

Data on the basic structure of marine fishery and coastal aquaculture

(1) Marine capture fishery/coastal aquaculture management

- type of management
- type of fishery
- number of persons engaged

(2) Marine capture fishery

- fishing boats: type of boat, length of boat, gross tonnage, type of equipment installed, ownership of boat, etc
- main fishing gear

- main fishing areas, etc
- (3) Coastal aquaculture:
 - type of aquaculture
 - area under culture and tenant status, method of culture, etc
 - basic information and environmental management of intensive black tiger shrimp culture
- (4) Fishery household members and fishery employees' household members

Data on income and expenditure of small-scale marine capture fishery (native fishery)

- income obtained from marine capture fishery and expenditure for small-scale marine capture fishery
- capital assets for small-scale marine capture fishery

8.5 Time references (for the 2000 intercensal survey of marine fishery)

- (1) Census Date was 1 July 2000
- (2) The Last 12 Months referred to the period from 1 July 1999 to 30 June 2000

8.6 Survey methodology

8.6.1 Sample design

A stratified two-stage sampling was adopted for the survey. Each province was stratified with village or block as the first-stage sampling unit and marine fishery households/establishments and fishery employees' households/establishments as the second-stage sampling unit.

8.6.1.1 Stratification

In the 1995 marine fishery census covering 24 coastal provinces, each province was defined as one stratum. The number of strata was therefore 24. Each stratum, village/block was divided into 11 substrata. The stratification of the village or block is determined by the number of marine fishery households, coastal aquaculture households and employees' households of marine fishery and coastal aquaculture, except Group 11, which is comprised of additional villages obtained from the sampling frame update as follows:

No. of marine fishery households	0	few	plenty
No. of coastal aquaculture households			
0	Group 1	2	3
few	4	5	6
plenty	7	8	9
		Group 10	

in which

- Group 1 comprises villages of marine fishery/coastal aquaculture employees' households only
- Group 10 comprises villages of marine fishery households having an at least 20 gross tonnage inboard-powered boat
- The rest of the villages are determined to be in groups 2 to 9.

8.6.1.2 The first-stage sampling unit

In this stage, sampling villages/blocks were selected from each group of villages in each province. The probability of selection depends upon the number of marine fishery households, coastal aquaculture households and marine fishery/coastal aquaculture employees' households of those villages or blocks, except Group 11. Sample villages/blocks were then randomly selected in the 24 coastal provinces. The total number of sample villages/blocks was 1 829, selected from 3 797 villages/blocks.

8.6.1.3 The second-stage sampling unit

In this stage, sampling households were selected from total household lists of marine fishery households, coastal aquaculture households and marine fishery/coastal aquaculture employees' households. The lists were obtained by enumeration of the villages/blocks sampling frame. Sample households were randomly systematic selected. Before selection, households were divided into 10 groups as follows:

- 1) Employees' households
 - Household group 1: comprises marine capture fishery or coastal aquaculture employees' households
- 2) Marine capture fishery households
- 3) Household group 2: comprises marine capture fishery households without boat or using non-powered boats only
- 4) Household group 3: comprises marine capture fishery households using outboard-powered boats
- 5) Household group 4: comprises marine capture fishery households using inboard-powered boats of at least 10 gross tonnage
- 6) Household group 5: comprises marine capture fishery households using inboard-powered boats of 10-20 gross tonnage
- 7) Household group 6: comprises marine capture fishery households using inboard-powered boats of 20 gross tonnage and over
- 8) Coastal aquaculture households
 - Household group 7: comprises shrimp culture households
 - Household group 8: comprises fish culture households
 - Household group 9: comprises mollusc culture households
 - Household group 10: comprises other aquaculture households

In each village/block, the number of sample fishery households of each household type was assigned as follows:

- Household group 1: every employee's household was assigned as sample household except for villages/blocks in Groups 2, 3, 4 ... 11; only one sample household was selected.
- Household groups 2 to 4: three sample households were selected, except for Chachoengsao, Phatthalung and Narathiwat where six sample households were selected.
- Household groups 5 and 6: every household was the sample household.
- Household groups 7 to 10: four sample households were selected, except in eight provinces where every household was the sample household, namely Rayong, Chonburi, Phetchburi, Chumphon, Phatthalung, Narathiwat, Ranong and Phuket. For Bangkok Metropolis, 16 households were selected.
- The total estimated sample households, obtained from the 1995 marine fishery census, was 18 816, distributed as follows:
 - Household group 1: 2 184 sample households
 - Household groups 2 to 6: 9 094 sample households
 - Household groups 7 to 10: 7 538 sample households

8.6.2. Method of estimation

The results of the 2000 intercensal survey of marine fishery were presented at provincial level, for the 24 coastal provinces, coastal zones and the whole country (the total number of 24 coastal provinces). The estimation was undertaken with the following assignments:

h represents coastal zone, h = 1, 2 ... 5

i" province, i = 1, 2 ... A_h

j" village/block group, j = 1, 2 ... 11

k" sample village/block, k = 1, 2 ... m_{hij}

p" household group, p = 1, 2 ... 10

r" sample household, r = 1, 2 ... n_{hijkp}

Total estimation

1) Provincial estimation

The formulae for total estimation of character under study X, province i, coastal zone h are as follows:

$$X'_{hi} = X'_{1hi} + X'_{2hi} \dots \dots \dots 1 \lambda$$

in which

X'_{1hi} = total estimated value of characteristic under study x of village/block no. (j) 1-10, province I, and coastal zone h

X'_{2hi} = total estimated value of characteristic under study x of village/block no. (j) 11, province I and coastal zone h

$$X'_{1hi} = \sum_{j=1}^{10} \frac{1}{m_{1hij}} \sum_{k=1}^{m_{1hij}} \frac{1}{p_{1hijkp=1}} \sum_{p=1}^{10} \frac{N_{1hijkp}}{n_{1hijkp}} \sum_{r=1}^{n_{1hijkp}} X_{1hijkpr} \quad (2)$$

in which

- $X_{2hijkpr}$ = characteristic under study x of sample household r, household group p, sample village/block k, village/block group (j)11, province i and coastal zone h
- N_{2hijkp} = total number of households of household group p, sample village/block k, village/block group (j)11, province i, and coastal zone h
- n_{2hijkp} = total number of sample households of household group p, sample village/block k, village/block group (j)11, province i and coastal zone h
- M_{2hij} = total number of villages/blocks of village/block group (j)11, province i, and coastal zone h
- m_{2hij} = total number of sample villages/blocks of village/block group (j)11, province i, and coastal zone h

2) Coastal zone estimation

The formula for total estimation of characteristics under study x of coastal zone h is as follows:

$$X'_h = \sum_{i=1}^{A_h} X'_{hi} \dots \dots \dots .4).$$

in which

- A_h = total number of villages/blocks of village/block group (j)11, province i, and coastal zone h= 3 where h = 1
7 where h = 2
3 where h = 3
5 where h = 4
6 where h = 5

and $\sum_{h=1}^5 A_h = 24$

3) Country estimation

The formula for total estimation of characteristics under study x for the whole country is as follows:

$$X' = \sum_{h=1}^5 X'_h \dots \dots \dots .5 \}$$

8.6.3 Data collection

In this survey, the staffs of the National Statistical Office and of the Department of Fisheries were assigned to list and interview all households in the 1 829 villages or blocks of the 24 coastal provinces. The listing was undertaken using listing form SM1 to identify marine capture fishery or aquaculture households and marine capture fishery or aquaculture employees' households. Some 19 000 sample households were selected and detailed

information was recorded in enumeration forms SM2, for marine capture fishery or aquaculture household, and SM2/1, for employees' households.

8.6.4. Data processing

All filled questionnaires which had been primarily edited at the field office were then manually encoded and verified for accuracy, completeness and consistency before microcomputer recording. All data were again edited by computer at the provincial statistical office. The data were then delivered to the central office for tabulation processing, accuracy assessment and result determination before publication and dissemination. Provincial reports were published by each provincial statistical office and the national report was done at headquarters.

8.6.5 Data evaluation (error)

The survey errors may include both sampling error caused by sample household selection and non-sampling error caused by wrong response or non-cooperation of respondents.

8.7 Summary findings of the 2000 intercensal survey of marine fishery for the whole country and by province

1. Marine capture fishery/coastal aquaculture
 - 1.1 Number of marine fishery establishments by type of fishery and by type of management
 - 1.2 Number of persons engaged in marine capture fishery or coastal aquaculture by source of person and by type of worker
2. Marine capture fishery
 - 2.1 Type of management
 - 2.2 Size of management
 - 2.3 Type of worker
 - 2.4 Type of employment
3. Fishing boats
 - 3.1 Type of boat
 - 3.2 Number of inboard-powered boats by size of boat
 - 3.3 Number of inboard-powered boats by type of main fishing gear
4. Coastal aquaculture
 - 4.1 Number of coastal aquaculture establishments and area under culture
 - 4.2 Type of main culture
 - (1) shrimp culture
 - (2) fish culture
 - (3) mollusc culture
 - (4) crab culture
5. Fisherfolk and persons engaged in coastal aquaculture
6. Socioeconomic structure of fishery households and fishery employees' households (excluding company and juristic partnership)

METHODOLOGICAL REVIEW OF DATA COLLECTION, ANALYSIS, USE AND DISSEMINATION BY THE OFFICE OF AGRICULTURAL ECONOMICS

1. OAE responsibilities

- (1) Analyse the agricultural policy and agricultural cooperatives' development plans for submission to the committee;
- (2) Study and analyse the planning of agricultural production and sources of cultivation, and livestock production;
- (3) Study and analyse the formation of marketing and transport system and development of farm products;
- (4) Study and analyse sources and use of agricultural resources;
- (5) Compile agricultural statistical information;
- (6) Analyse and evaluate the outcome of investment in agricultural projects, follow up progress and evaluate the performance of the projects;
- (7) Analyse the economic development of other sectors as relevant to the formulation of agriculture and cooperative development planning;
- (8) Develop registration with regard to agricultural enterprises;
- (9) Coordinate with related government agencies and state enterprises in setting up agricultural policies and agricultural and cooperative development plans; and
- (10) Perform any other action specified by law as function of the committee or of the Office of Agricultural Economics.

2. OAE organization chart

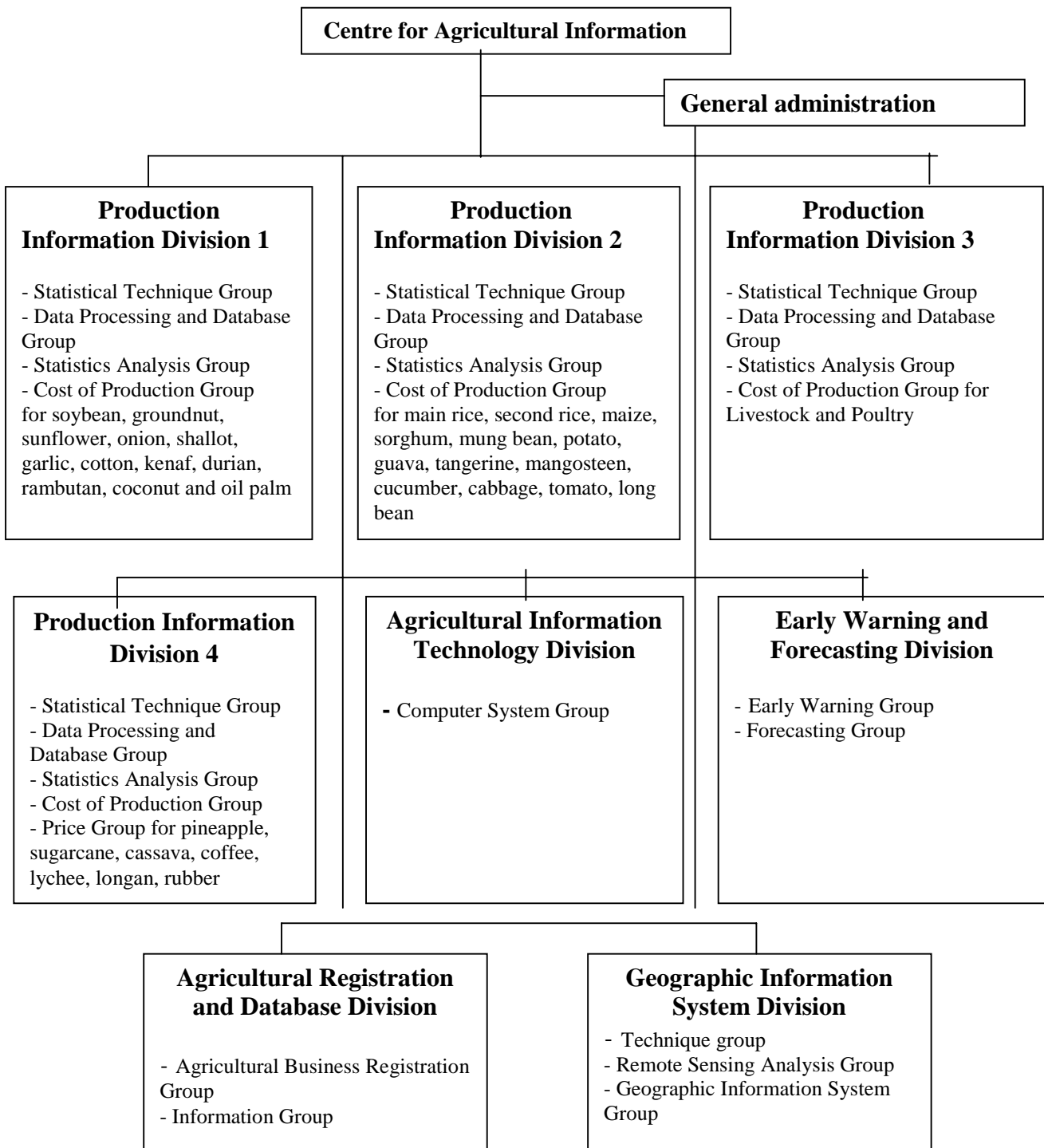


3. Centre for Agricultural Information

3.1 Responsibilities

- (1) Collect and disseminate data on agricultural economics;
- (2) Study, undertake research and development of activities, and determine survey methods;
- (3) Supervise and train enumerators;
- (4) Carry out sample checks for quality control;
- (5) Be the centre of the ministry providing services on data collection and compilation;
- (6) Study and register agricultural business enterprises in accordance with ministerial policy;
- (7) Prepare an information technology system for administration, study the application of GIS for agricultural development planning; and
- (8) Coordinate with concerned agencies as assigned.

3.2 CAI organization chart

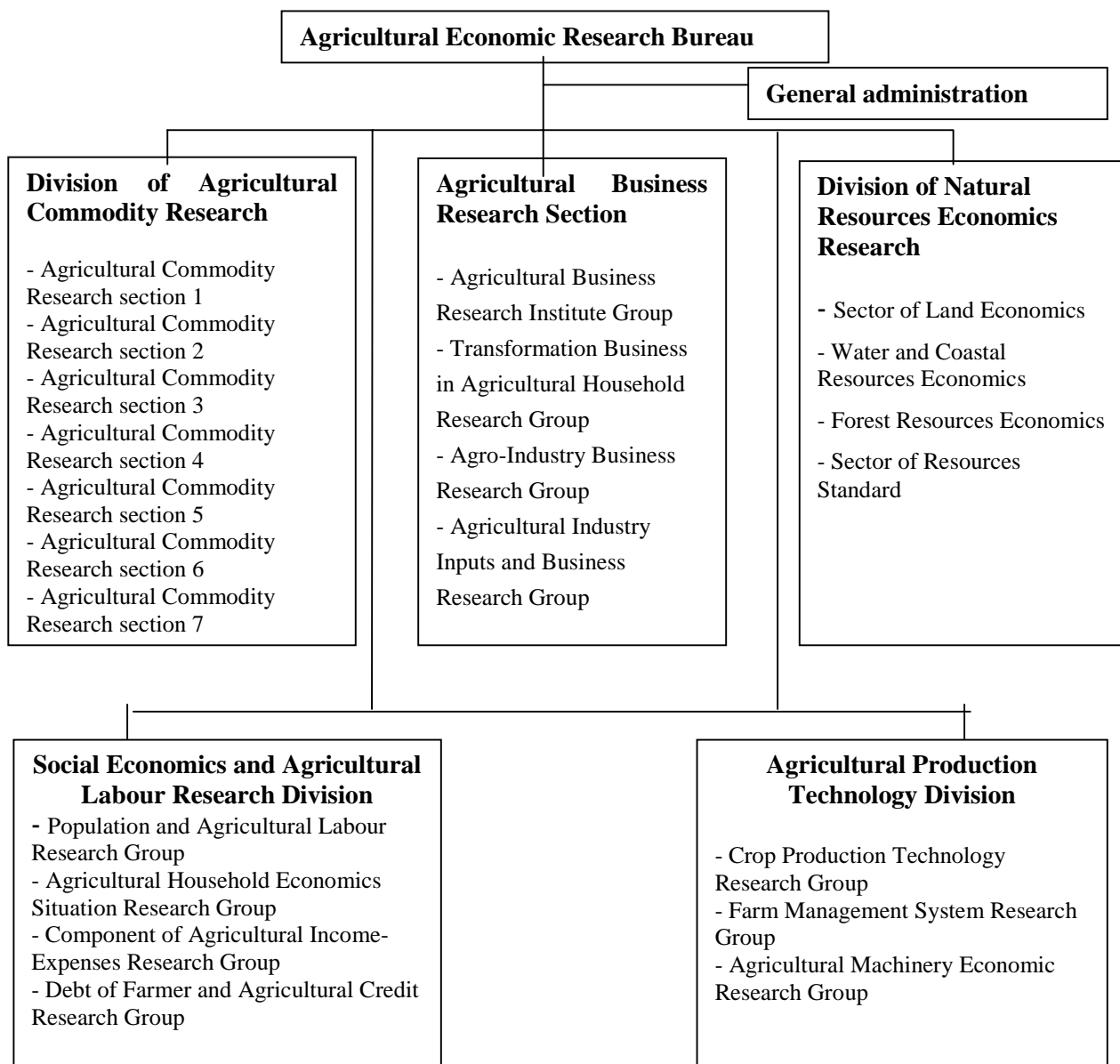


4. Agricultural Economic Research Bureau

4.1 AERB responsibilities

1. Study and analyse the planning of agricultural production and sources of cultivation, and livestock production;
2. Study and analyse the formation of marketing and transport system and development of farm products;
3. Study and analyse the income and expenses of agricultural households;
4. Carry out natural resource economic research;
5. Carry out agricultural business research;
6. Carry out socioeconomic research;
7. Carry out agricultural labour research; and
8. Carry out agricultural production technology research.

4.2 AERB organization chart



5. Methodological review of activities on data collection and analysis of agricultural surveys by the Centre for Agricultural Information

There are nine survey items undertaken by the Centre for Agricultural Information in the Office of Agricultural Economics, namely:

1. Agricultural commodity production
2. Agricultural commodity production cost
3. Agricultural commodity forecasting
4. Agricultural production monitoring and reporting
5. Geo-information
6. Farmers' registration
7. Agricultural landholding and land use
8. Food consumption quantity
9. Geographical data for disaster-prone areas

5.1 Agricultural commodity production survey

This item has two categories, crops and livestock. The survey is conducted annually. The data collected for each category can be described as follows:

5.1.1 Crop production survey

Twenty eight crop types are included in the survey, namely main rice, second rice, maize, sorghum, soybean, groundnut, mung bean, sugarcane, pineapple, cassava, onion, garlic, potato, jute, kenaf, cotton, sunflower, oil palm, para rubber, coffee, pepper, coconut, rambutan, durian, mangosteen, lemon, longan and lychee.

The survey covers villages and households cultivating those crops in each province. The data collected for each crop comprise:

- planted area/ harvested area/production
- existing tree crop area/ crop removal area/ crop productive area

Data collection is undertaken separately in accordance with the following factors: variety, quantity of seeds, planting method, crop stage, irrigation supply, crop characteristics, business type, and fertilization.

- Number of crop-planting households
- Number of tons/*rai*
- Monthly production at national level
 - monthly planted area
 - monthly harvested area
 - monthly product
 - monthly percentage of product selling
- Product distribution
 - sale/sale for factory/cash sale
 - household consumption/other
 - seeds
 - storage of seeds
 - other

5.1.2 Livestock production survey

Nine kinds of livestock are included in the annual survey, with inventory data as of 1 January. They are beef cow, dairy cow, buffalo, swine, meat chicken, egg chicken, native chicken, meat duck and egg duck. The survey covers villages and households raising livestock in each province. The data collected for each livestock are as follows:

- Production quantity in each province
- Inventory data as of 1 January
 - number, by age
 - number, by gender
 - number, by type
 - number, by characteristics
 - birth rate
 - egg production rate
 - number of livestock-raising households
- Product distribution
 - sale
 - household consumption
- Monthly product distribution

5.2 Agricultural commodity production cost survey

This survey has two categories: crop production cost survey and livestock production cost survey. The data collected for each category can be described as follows:

5.2.1 Crop production cost survey

The production cost includes both cash and kind. The survey of each commodity is undertaken once every three to five years. The latest survey was conducted in 2001. The survey results are presented at provincial, regional and national levels. Survey coverage is assigned for each commodity. The data collected are:

5.2.1.1 Variable costs

(1) Labour expense including:

- soil preparation expense
- crop planting expense
- crop maintenance expense
- crop harvesting expense
- after harvesting expense

(2) Materials and other expenses including:

- crop seeds expense
- fertilizer expense
- weed control chemical expense
- pesticide expense
- other chemical expense
- soil improvement materials expense

- other materials expense
 - agricultural equipment repair expense
- (3) Cost of interest and capital opportunity loss

5.2.1.2 Fixed cost

- land rental fee
- agricultural depreciation cost
- cost of investment opportunity loss
- average cost before obtaining product (only for fruit trees)

5.2.1.3 Total cost per rai

5.2.1.4 Product/rai (kg)

5.2.1.5 Total cost per ton

5.2.1.6 Farm gate price (baht/ton)

5.2.1.7 Return rate per rai (baht)

5.2.1.8 Net return per rai (baht)

5.2.1.9 Net return per ton (baht)

5.2.2 Livestock production cost survey (swine, fresh milk)

The survey is conducted twice a year. The latest survey was carried out in 2001. The coverage includes swine-raising household and dairy cow-raising household. The data collected are:

5.2.2.1 Variable cost

- stock expense
- food expense
- labour expense
- medicine and care expense
- water and electricity expense
- equipment expense
- fuel expense
- maintenance expense
- materials and other expenses
- loss expense
- capital opportunity loss

5.2.2.2 Fixed cost

- land use cost
- farmhouse depreciation cost
- farmhouse opportunity loss

5.2.2.3 Total fixed cost

5.2.2.4 Total production cost

5.2.2.5 Variable cost per 1 kg of livestock weight

5.2.2.6 Total cost per 1 kg of livestock weight

5.2.2.7 Product farm price (baht/kg)

5.2.2.8 Blended food price (baht/kg)

5.3. Agricultural commodity forecast

5.3.1 Planted area and production forecast at provincial level

The forecast is undertaken before production season and is conducted every three months, i.e. four times a year, in March, June, September and December. The forecast is reported at provincial, regional and national levels. The forecast coverage includes:

- crop cultivation/ livestock-raising provinces
- 15 field crops, namely main rice, jute/kenaf, maize, sorghum, cotton, sugarcane, cassava, soybean, groundnut, second rice, garlic, shallot, onion and pineapple
- 5 types of fruit trees, namely coffee, pepper, oil palm, longan and para rubber
- 3 types of livestock, namely swine, meat chicken, and cattle.

5.3.2 Production quantity forecast at national level

The forecast is undertaken before production season and is conducted every six months, i.e. twice a year, in June and December. The forecast coverage includes 65 agricultural commodities for the whole country.

5.4 Agricultural commodity monitoring and reporting

This item comprises three categories: agricultural commodity production status; agricultural commodity price; and agricultural commodity wage rate change.

5.4.1 Agricultural commodity production status

This is a monthly report on the status of agricultural commodity production, including crop, livestock and fishery. The report is conducted at provincial level and for OAE internal use only.

5.4.2 Agricultural commodity price

The report is conducted weekly and monthly for each commodity and distributed daily, weekly and monthly. It covers:

- central and/or important market daily price as sold by farmers
- weekly farm-gate price

5.4.3 Agricultural commodity wage rate change

The report is quarterly and the survey is conducted in February, May, August and November, at provincial level. Sample households are purposively selected from farmers who grow crops or raise livestock in the main production areas of the province. This report is for OAE internal use only.

5.5 Geo-information

5.5.1 Land use map at 1:250 000

This map is produced every five years. It covers the whole country and is reported at various levels: *tambon*, district and province, and for the 25 main watershed areas. The information is distributed in paper reports and on CD-ROMs or diskettes. It covers:

- satellite image interpretation
- ground truth investigation
- accuracy assessment by using random sampling and the Geo-positioning System (GPS)

5.5.2 Physical suitability analysis for crop cultivation and economic crop suitability mapping at 1:250 000

This is done every three years and covers the whole country. The information is presented at *tambon*, district and province levels and for the 25 main watershed areas. The information covers rice, jasmine rice, maize, cassava, sugarcane, soybean, pasture, fast-growing trees, para rubber, pineapple, coffee, durian and longan.

5.5.3 Agro-economic zoning and agro-economic mapping at 1:250 000 for important agricultural commodities

This is conducted countrywide and reported at *tambon*, district, provincial and national levels. Frequency of performance depends on policy. The latest mapping was carried out in 1999. The results are distributed in paper reports and on CD-ROMs or diskettes. The methodology is to gather and group the data relevant to the physical and socioeconomic characteristics of each crop.

5.6 Farmers' registration for crop cultivation and livestock farming

The frequency of the survey depends on government policy or the resolutions of the Committee on Agriculture and Cooperatives Policy and Development Plan. The latest survey was conducted in 2000 for addition registration of cotton-planting farmers. The information is usually reported at district, provincial and national levels and disseminated in the form of reports. The coverage of the survey includes farmers in the provinces under the registration announcement for each crop or livestock.

The methodology comprises: announcement of agro-economic zones for crop/livestock registration, announcement of the decisions of the Committee on Agriculture and Cooperatives Policy and Development Plan, schedule of registration period, announcement of OAE methodology and conditions for registration, preparation of registration documents, registration, data verification, data entry, and reporting.

5.7 Agricultural landholding and land use

The survey is conducted every two years and covers agricultural households and villages. The results are reported at provincial, regional and national levels and distributed in document or report form. The latest survey was conducted in 1999. The data collected includes agricultural land tenure and land use classified in accordance with:

- water supply (in/outside of irrigation zone)
- land use type
- land use problem
- landholding type
- landholding size
- type of mortgage (period specified/unspecified)

5.8 Food consumption quantity

The survey is conducted four times a year. In 2001, the survey's schedule was as follows:

- 1) 25-31 March
- 2) 17-23 June
- 3) 9-15 July
- 4) 2-8 December

The survey covered households both in and outside of municipality areas for the whole country (except households of diplomats and temporary residents). The results were reported at regional and national levels and distributed in document or report form. The methodology applied was purposive sampling and means calculation using specifically developed software. The data collected consisted of:

- 1) Basic information of household members :
 - number of members
 - member status
 - age
 - gender
 - religion
 - educational level
 - occupation/income
- 2) Information of food consumption in households, including main food ingredients consumed daily by full members during the specified week:
 - self-cooked food
 - instant food
 - party
- 3) Information on consumption rate, food type, seasoning, spices and other ingredients for food cooking in the household

5.9 Geographical mapping of disaster-prone areas

The map is produced for the coverage of areas prone to drought and flood affecting agricultural production. It is occasionally conducted in accordance with disaster events and presented at provincial level. The information is distributed in both document or report and CD-ROM or diskette forms. The methodology applied includes satellite image interpretation, geo-information system (GIS) and GPS, using remote-sensing data analysis and GIS software.

5.9.1 Statistical methodology

5.9.1.1 Agricultural commodity production survey

Two methodologies are applied, stratified two-stage random sampling and stratified one-stage random sampling. The details of each methodology are as follows:

a) Stratified two-stage random sampling techniques

- (1) Surveyed commodities: main rice, second rice, maize, sorghum, cassava, mung bean, groundnut, soybean, kenaf, cotton, para rubber, coffee, pepper, durian, longan, mangosteen, sunflower, rambutan, coconut, oil palm, non-commercial livestock, and land use.
- (2) Surveyors: agro-economic zone officers and agro-economic village officers.
- (3) Variables used for frame construction
 - The crop survey uses planted area within the village boundary
 - The land use survey uses the number of households in the village
 - The non-commercial livestock survey is included in other surveys such as the land use and main rice surveys.
- (4) Frame construction: the survey sampling frame is updated from the previous year frame undertaken by the respective agro-economic zones.
- (5) Sample size
 - sample village: average of 10 percent
 - sample household: depends on surveyors
 - sample households or less conducted by agro-economic zone officers
 - 30 sample households or less conducted by agro-economic village officers

b) Stratified one-stage random sampling technique

- (1) Surveyed commodities: oil palm, onion and commercial livestock
- (2) Surveyor: agro-economic zone officer
- (3) Variables used for frame construction
 - The crop survey uses planted area of respective household (except oil palm whose sampling frame is separated in accordance with the type of business, such as company, cooperative or private).

- The commercial livestock survey uses the number of livestock raised by a household.
Frame construction: updated from the previous-year frame undertaken by the agro-economic zone.

(4) Sample size: average of eight percent

5.9.1.2 Production cost survey

Purposive sampling is used in accordance with the conditions assigned for each commodity, for example:

Main rice : non-glutinous/transplanting/irrigation supply/land rent/land owner
 : non-glutinous/transplanting/non-irrigation supply/land rent/land owner
 : non-glutinous/broadcasting/irrigation supply/land rent/land owner

Oil palm : private business/age of 1, 2, 3, 4-10, 11-15, > 15 years
 : governmental settlement business/age of 1, 2, 3, 4-10, 11-15, > 15 years
 : company business/age of 1, 2, 3, 4-10, 11-15, > 15 years

- (1) The sample size is of two to six samples per cell obtained from a combination of various categories of each commodity. The category is assigned by users. The number of samples per cell varies depending on the importance of the production source of the commodity in each province. This is determined from the size of the planted area or the number of livestock in the province obtained from the previous year's survey.
- (2) Variables used for assigning categories depend on users' demand such as production size, production source or commodity type.
- (3) Definitions and questionnaire are separated in accordance with commodity type and/or category as follows:
 - 3.1) The same definitions are used for a production survey when commodities such as kenaf in crop year X have been surveyed for production quantity.
 - 3.2) Information on commodities not covered by a general production survey is obtained from the production status and other sources of information. Definitions are then assigned, such as kenaf planted before the main rice crop in Year X, chilli crop in Year Y, eucalyptus including cutting age, cutting round, very fast growing tree, etc. Definitions will be additionally assigned especially for the production cost of each commodity.
- (4) Work undertaken by the agro-economic zone officer consists in:
 - 4.1) Field data collection from sample household
 - 4.2) Data processing of collected data from 4.1), including data entry and programme execution
- (5) The results including commodity production cost in both document and digital forms are delivered to the Centre for Agricultural Information. In this regard, the production cost table will primarily be analysed.

5.9.2 Data processing

Data processing is computerized because a sample survey needs to be estimated in accordance with the survey methodology. The methods of data processing include:

- survey result reported at provincial, regional and national levels
- total estimation using stratified two-stage and one-stage random samplings

a. Stratified two-stage random sampling

Stratified two-stage random sampling is used for the survey of each agricultural commodity. The village where the surveyed crop is planted is stratified using the total planted area in the village. That information is obtained from the agro-economic zone office. The surveyor then lists all households in the sample village that plant the surveyed crop. Sample households are then random selected and interviewed for data collection.

In conclusion, the stratified two-stage random sampling comprises two steps:

- primary sampling unit (selected village)
- secondary sampling unit (selected household)

Total estimation (\hat{Y})

$$\hat{Y} = \sum_{h=1}^L \frac{N_h}{n_h} \sum_{i=1}^{n_h} \frac{M_{hi}}{m_{hi}} \sum_{j=1}^{m_{hi}} y_{hij} \quad (1.1)$$

in which

\hat{Y} = total estimation

y_{hij} = value of characteristic of household j from village i, stratum h

M_{hi} = number of households listed from village i, stratum h

m_{hi} = number of sample households of village i, stratum h

N_h = total number of village, stratum h

n_h = number of sample village, stratum h

h = 1, 2, 3 ... L

i = 1, 2, 3 ... n_h

j = 1, 2, 3 ... m_{hi}

M_{hi}/m_{hi} = expansion factor at primary sampling unit level

N_h/n_h = expansion factor at stratum level

Estimation of variance [$\hat{V}(\hat{Y})$]

$$\hat{V}(\hat{Y}) = \sum_{h=1}^L N_h^2 \left(\frac{N_h - n_h}{N_h} \right) \frac{s_b^2}{n_h} + \sum_{h=1}^L \frac{N_h}{n_h} \sum_{i=1}^{n_h} M_{hi}^2 \left(\frac{M_{hi} - m_{hi}}{M_{hi}} \right) \frac{s_w^2}{m_{hi}} \quad (1.2)$$

in which

$$s_b^2 = \frac{1}{n_h - 1} \sum_{i=1}^{n_h} (\hat{y}_{hi} - \hat{y}_h)^2 \quad (1.3)$$

$$s_w^2 = \frac{1}{m_{hi} - 1} \sum_{j=1}^{m_{hi}} (y_{hij} - \hat{y}_{hi})^2 \quad (1.4)$$

$$\hat{y}_h = \frac{1}{n_h} \sum_{i=1}^{n_h} \hat{y}_{hi} \quad (1.5)$$

$$\hat{y}_{hi} = \frac{1}{m_{hi}} \sum_{j=1}^{m_{hi}} y_{hij} \quad (1.6)$$

b. Stratified one-stage random sampling

Stratified one-stage random sampling includes sampling unit stratification and the selection of sampling unit for data collection.

Total estimation (\hat{Y})

$$\hat{Y} = \sum_{h=1}^L \frac{N_h}{n_h} \sum_{i=1}^{n_h} y_{hi} \quad (2.1)$$

in which

\hat{Y} = total estimation of character of study

N_h = total sampling unit, stratum h

n_h = number of samples, stratum h

y_{hi} = character to be estimated of sample i, stratum h

i = 1, 2, 3 ... n_h

h = 1, 2, 3 ... L

N_h/n_h = expansion factor

Estimation of variance [Var. (y)]

$$\hat{V}(\hat{Y}) = \sum_{h=1}^L N_h^2 \left(\frac{N_h - n_h}{N_h} \right) \frac{s_h^2}{n_h} \quad (2.2)$$

$$s_b^2 = \frac{1}{n_h - 1} \sum_{i=1}^{n_h} (\hat{y}_{hi} - \hat{y}_h)^2 \quad (2.3)$$

$$\hat{y}_h = \frac{1}{n_h} \sum_{i=1}^{n_h} \hat{y}_{hi} \quad (2.4)$$

n_h = number of samples of stratum h

h = 1, 2, 3 ... L

5.9.3 Problems and constraints

The number of samples is too small: due to the large number of commodities to be surveyed and disseminated, the number of samples is assigned in accordance with the allocated budget and available manpower and vehicles. This causes high fluctuation and inaccuracy of the survey results of some commodities. The problems include:

- Imperfect and obsolete sampling frame
- Insufficient cooperation from informants
- Lack of supplementary information for data analysis
- Inability to sufficiently respond to data users' needs
- Lack of continuity of supplementary data from local area
- Lack of supported information from local area
- The per-capita consumption survey has a high volume of work, lacks editing officers and budget for editing work.

Some commodities need to be surveyed early in the cropping season to obtain forecasted yield.

Inconsistent results usually occur with the production quantity data of some commodities such as cassava, soybean and maize. This affects import/export quotas, farm-gate price and subsidy funds for both farmers and traders.

The survey results of some commodities are uneven and inaccurate due to the large number of commodities to be surveyed and disseminated. It is therefore necessary to properly allocate the number of samples within the constraints of available budget, manpower and vehicles.

Data dissemination and publication are slow and not timely for users at various levels. Private-sector firms therefore conduct surveys or prepare information by themselves. This causes inconsistency of information through the recourse to different concepts.

The development of analysis software is not yet complete and needs to be improved for better efficiency in data analysis.

5.9.4 Future development

1. To establish LAN and WAN computer systems for various OAE units including offices, divisions, headquarters and zones to enable them to run their specific tasks smoothly and effectively.
2. To develop the data system for socioeconomic planning and warning. This is to be conducted by surveying minor commodities such as vegetables, fruit trees and standing trees, and fishery and aquaculture. This is to increase the capability in supplementary data preparation for economic accounting so that it is effective and timely.
3. To unite and link the information systems among operational agencies within the Ministry of Agriculture and Cooperatives, such as the Department of Livestock Development and the Department of Fisheries.
4. To develop an information network system linking every unit between OAE in Bangkok and in the provinces. The linkage should also extend to other relevant agencies regarding agricultural data preparation. The network will therefore rapidly, accurately and in a timely fashion facilitate data retrieval, exchange and transfer. It will also enhance the capacity of OAE as the high-quality information centre of the Ministry of Agriculture and Cooperatives.
5. To develop an agro-economic database system to fully and effectively support administration, management and decision-making at executive, technocratic and technical levels.
6. To provide and distribute agricultural information to users focusing on farmers as the main target. Provision and distribution must reach users in good time if competitiveness with other countries is to be improved.
7. To develop an information service and distribution system by using up-to-date technology such as Internet for both users and data-producing agencies.

8. To allocate an appropriate agro-economic zone for each commodity. Each zone then will conduct a study and analysis of physical feasibility over such things as soil and water supply. The study would incorporate a socioeconomic aspect by covering demand, production cost, price and return rate, using the geo-information system. This information is useful to adjust the agricultural production system to the physical potential and market demand of each commodity. It also helps decrease production costs and increase price competitiveness. It is therefore necessary to issue measures and conditions to support and promote production efficiency in high-potential zones. The measures and conditions can be manipulated by farmers' institutions, joining with state projects, in the respective agro-economic zones.
9. To establish an agricultural warning system by developing a network among relevant agencies such as the Royal Forest Department, the Department of Agricultural Extension and the Royal Irrigation Department. Warning information is publicized weekly as hard-copy documentation and through websites. An operation room should be established to assess hazards such as flooding, drought, livestock epidemic diseases or aquatic animal diseases. Such operation systems, warning over time and events, are in the experimental stage, including a work system test for methodology adjustment and an operational feasibility study.
10. To develop an agricultural information distribution system to farmers by improving both the format of information and the distribution system to obtain the highest return. Farmers or farmer representatives can easily access information from the network at the centres for agricultural technology transfer of the agriculture ministry.
11. To develop a sampling frame database system for the agricultural survey of all 24 agro-economic zones, so that each zone can enter the agricultural data of villages and crop-planting and livestock-raising households within its area, as well as use the collected data by data retrieval and report printing. In addition, the system would select automatically random sampling households and villages for agricultural surveys. This would help decentralization and promote the growth of regional offices, as most data are obtained by the agro-economic zone, and it would be in accordance with current implementation trends of most organizations.
12. To conduct sample checks after field surveys for quality control. The sample check is to be undertaken, under the annual work plan, by both the control office and the agro-economic zone, either separately or jointly. This is to control field work continuously and systematically, so that the results are reliable and can be publicized confidently.

6. Methodological review of activities on data collection and analysis of agricultural surveys by the Bureau of Agricultural Economic Research

There is only one statistical activity undertaken by the Bureau of Agricultural Economic Research: the agricultural household socioeconomic and labour survey. The survey is conducted every two years and the results are reported at provincial, regional and national levels. The survey covers agricultural villages and households. Agricultural household socioeconomic and labour data are separated as follows:

- Land holding/ land use/crop cultivation
- Crop cultivation, income obtained from crop product sale and distribution
- Livestock farming, income obtained from livestock product sale and distribution
- Crop agricultural cash expense
- Livestock agricultural cash expense
- Income obtained from other agricultural cash and non-agricultural products
- Other agricultural cash and non-agricultural expenses
- Agricultural household debt, credit and loan payment
- Agricultural household farm and non-farm properties
- Job and labour transfer of household members
- Group membership, training, job and income of household members

The data are processed by using own-developed software and the results are distributed and publicized in report or document form.

6.1 Utilization of the results

- For revising the CPI weighting patterns;
- For studying the distribution of income;
- For analysing the variation of levels of living and disparities among households in different socioeconomic groups, geographical areas and community types;
- For evaluating the impact on household living conditions under existing plan and development programmes; and
- For estimating the private-consumption expenditure component in the national accounts.

6.2 Data processing

Data processing is computerized because sample surveys need to be estimated in accordance with the survey methodology. The method of data processing includes:

- survey result reported at provincial, regional and national levels and
- total estimation undertaken through stratified two-stage random sampling.

6.2.1 Stratified two-stage random sampling

Stratified two-stage random sampling is used for the survey of each agricultural commodity. The village where the surveyed crop is planted is stratified using the total planted area in the village. The information is obtained from agro-economic zone offices. The surveyor then lists all households in the sample village that plant the surveyed crop. Sample households are then random selected and interviewed for data collection.

In conclusion, stratified two-stage random sampling comprises two steps:

- primary sampling unit (selected village)
- secondary sampling unit (selected household)

Total estimation (\hat{Y})

$$\hat{Y} = \sum_{h=1}^L \frac{N_h}{n_h} \sum_{i=1}^{n_h} \frac{M_{hi}}{m_{hi}} \sum_{j=1}^{m_{hi}} y_{hij} \quad (3.1)$$

in which

- \hat{Y} = total estimation
 y_{hij} = value of characteristic of household j from village i, stratum h
 M_{hi} = number of households listed from village i, stratum h
 m_{hi} = number of sample households of village i, stratum h
 N_h = total number of villages, stratum h
 n_h = number of sample villages, stratum h
h = 1, 2, 3 ... L
i = 1, 2, 3 ... n_h
j = 1, 2, 3 ... m_{hi}

M_{hi}/m_{hi} = expansion factor at primary sampling unit level

N_h/n_h = expansion factor at stratum level

Estimation of variance [$\hat{V}(\hat{Y})$]

$$\hat{V}(\hat{Y}) = \sum_{h=1}^L N_h^2 \left(\frac{N_h - n_h}{N_h} \right) \frac{s_b^2}{n_h} + \sum_{h=1}^L \frac{N_h}{n_h} \sum_{i=1}^{n_h} M_{hi}^2 \left(\frac{M_{hi} - m_{hi}}{M_{hi}} \right) \frac{s_w^2}{m_{hi}} \quad (3.2)$$

in which

$$s_b^2 = \frac{1}{n_h - 1} \sum_{i=1}^{n_h} (\hat{y}_{hi} - \hat{\bar{y}}_h)^2 \quad (3.3)$$

$$s_w^2 = \frac{1}{m_{hi} - 1} \sum_{j=1}^{m_{hi}} (y_{hij} - \hat{\bar{y}}_{hi})^2 \quad (3.4)$$

$$\hat{\bar{y}}_h = \frac{1}{n_h} \sum_{i=1}^{n_h} \hat{y}_{hi} \quad (3.5)$$

$$\hat{\bar{y}}_{hi} = \frac{1}{m_{hi}} \sum_{j=1}^{m_{hi}} y_{hij} \quad (3.6)$$

6.3 Problem

Lack of sampling frame of the target group due to budget constraint. The existing frame is obtained from the Ministry of the Interior and cannot be separated to be consistent with the target population.

6.4 Future development

To conduct the survey covering every target population by using a specific sampling frame. The outcome is therefore useful for agricultural policy formulation. It also helps solve problems in accordance with real situations. Moreover, the results indicate farmers' quality of life and socioeconomic situation.

METHODOLOGICAL REVIEW OF DATA COLLECTION, ANALYSIS AND USE BY THE DEPARTMENT OF AGRICULTURAL EXTENSION

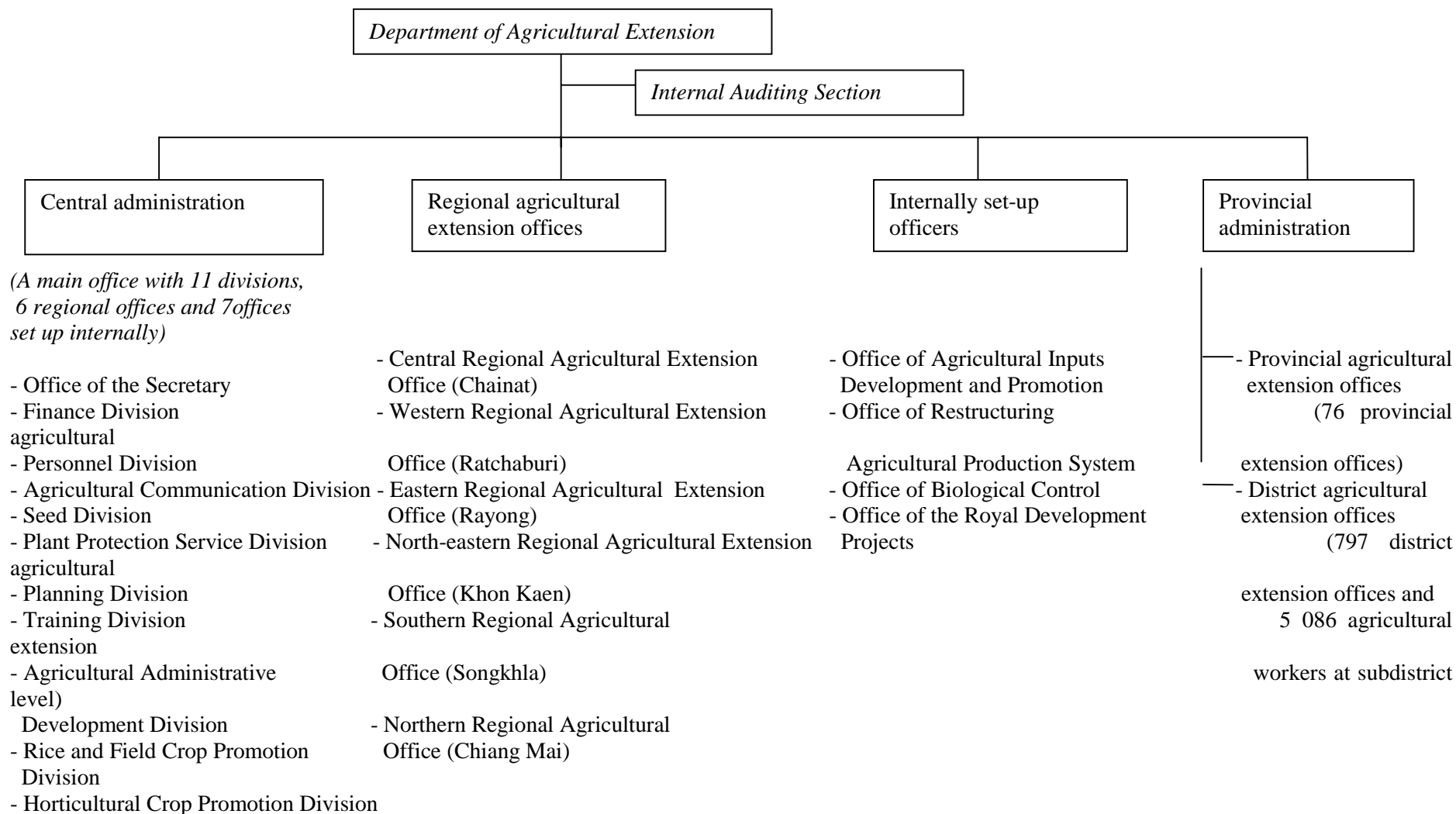
1. DOAE responsibilities

The Department of Agricultural Extension (DOAE) of the agriculture ministry has been tasked with: providing extension on crop production and agribusiness to farmers; promoting and enhancing the formation of farmers' groups as centres to obtain and disseminate agricultural information; and carrying out other activities as specified in the Act or as assigned by the ministry or the cabinet.

The ultimate goal of agricultural extension is to help raise farm income and upgrade rural standards of living, which result in stability of the economy and society as a whole. To enhance stable farm occupations and improve the quality of rural life in both economic and social aspects for farm and rural populations, the DOAE organizes its responsibilities as follows:

1. To give ideas to target farmers so that they can manage their occupation in line with natural environment, biology, production technology, economic, social, cultural and political aspects.
2. To serve as a means of transferring agricultural knowledge and technology from research institution and other technical sources to target farm population, while taking into account field problems which must be resolved.
3. To promote production of agricultural commodities for local and national consumption, agro-industrial use, and export.
4. To provide services and production inputs for farmers such as natural disasters, serious plant disease outbreaks and whenever farmers are not able to help themselves; this is intended to ensure continuous farm productivity.
5. To promote and encourage farm families to form farmer institutions and production groups, in order to ensure cooperative participation in the use of production technology, improve selection of type, quantity and quality of products; and to use groups as a base for marketing and fair distribution of income.
6. To coordinate with other agencies in the Ministry of Agriculture and Cooperatives in dissemination of technical knowledge on crop production, livestock, fishery and forestry at farm level; and to cooperate with relevant government agencies and private sector in promoting agricultural development for the benefit of farmers and the country as a whole.

2. DOAE organization chart



106 regional offices

- Seed multiplication centres (23)
- Sericulture extension centres (9)
- Horticultural crop propagation and promotion centres (12)
- Agricultural Youth Promotion Centre/National Farm Youth Promotion Centre (1)
- Bookkeeping centres (5)
- Sugarcane control centres (7)
- Farm mechanization centres (4)
- Highland agricultural extension subdivision centres (21)
- Production development and pest control for fruit and vegetable export centres (4)
- Plant propagation and tissue culture centres (10)
- Biological control centres (9)
- Operating centres of radiation for agricultural extension (1)

3. List of data

3.1 Monthly and annual report on crop production at district level

Data items

- (1) Number of planted areas
- (2) Number of productive stump areas
- (3) Number of product and yield per *rai*
- (4) Number of absolutely damaged areas
- (5) Number of harvested areas

Coverage: crop-planted area in each district

Methodology: Information is obtained from the observations of *tambon* agricultural extension officers. Additional information given by farmers and local leaders is included. The report is therefore reported from the lower level as follows:

Tambon > district > province > central office (Planning Division)

The collected data are then analysed and finally the DOAE annual report on agricultural statistics is prepared.

Frequency: every month

Report presentation: at district, provincial, regional and national levels

Problems/obstacles

- Those who work in this field still lack sufficient knowledge on statistics and opportunities for training.
- Lack of budget for human resource and work system development.

3.2 Planted areas of rice/economic crops by variety

Coverage: total planted area of the whole country

Methodology: survey

Frequency: every year

Presentation: reported at provincial level

3.3 Basic information on agricultural households

Data items:

- 1) Information collected from head of farmer households covering name, address, year of birth, identification card number, level of education, number of household members, agricultural household's labour, landholding, land use, land topography, soil type, water resource for agriculture, dry-season crop cultivation, membership of agricultural institute, and problems.
- 2) Agricultural activities
- 3) Number of fields
- 4) Form of activity (crop, livestock, integrated farm)
- 5) Place of activity
- 6) Area of planting or size of fish pond
- 7) Number of livestock
- 8) Total product
- 9) Main career of the head of household
- 10) Agricultural main income of household
- 11) Value of total product

Coverage: agricultural households countrywide

Methodology: survey

Frequency: every five years

Presentation: reported at *tambon*, district, provincial, regional and national levels

Problems

- (1) Budget constraint;
- (2) The existing processing system is unable to facilitate huge volumes of data.

3.4 Data on agricultural household needs

Data items

- (1) Crop cultivation (main rice, second rice, field crops, fruit trees, permanent trees, vegetables, other crops) covering:
 - planted area
 - variety
 - product
 - use of fertilizer
 - use of pesticide (chemical)
 - cultivation problems
 - assistance requirement from government agencies
- (2) Livestock (beef cow, milk cow, swine, poultry) covering:
 - name of variety
 - number of livestock
 - objective of livestock farming, farming system
 - vaccination for disease prevention and vaccine producer
 - area of pasture
 - food preservation
 - use of concentrated food
 - problems
 - assistance requirement
- (3) Household indebtedness (source and amount of loan)

- (4) Household income
- (5) Use of agricultural machinery
- (6) Assistance or service requirement from government agencies
- (7) Problems and recommendations

Coverage: total agricultural households of the village

Methodology: select 20 samples from total agricultural households

Data processing: one-stage random sampling

Frequency: every year

Presentation: reported at *tambon*, district, provincial, regional and national levels

3.5 Seed production and distribution

Data items

- (1) Seed products classified by seed variety, place of production (plant propagation centre), season of production
- (2) Seed distribution results classified by crop type, variety, distribution channel and place of distribution (plant propagation centre)
- (3) Quantity of seeds available for distribution classified by crop type, variety and place of distribution (plant propagation centre)

Coverage: the 23 plant propagation centres of DOAE covering the whole country

Methodology: report

Frequency

- (1) once per season
- (2) every month
- (3) every 15 days

Presentation: reported at the levels of plant propagation centres, district, province and region

Problem/obstacle: the difference of production season of each crop in each area makes data collection time consuming

3.6 Main cultivators of crops

Data items: data collected from farmers or groups of farmers cultivating fruit trees, permanent trees, vegetables, flowering plants and ornamental plants, covering name, address, place of activity, type of activity, planted area, total product, harvesting period, product distribution, average farm gate price

Coverage

- (1) Farmer households cultivating 39 assigned fruit trees/permanent trees of 10 *rai* or more
- (2) Vegetable cultivation groups established by:
 - legal registration
 - natural group
 - agricultural extension group
 - group established for vegetable production or distribution
- (3) Farmers cultivating flowering plants and ornamental plants of 100 wa^2 or more

Methodology: survey

Frequency: every three years

Presentation: reported at *tambon*, district, provincial, regional and national levels

Problems

- (1) Delay in data delivery
- (2) Incorrectness of data
- (3) Incompleteness of data

3.7 Cultivation of fruit trees and permanent trees (KP3)

Data items

- (1) Crop type classified by year of planting, district
- (2) Productive and non-productive planted areas
- (3) Total product and average product
- (4) Farm-gate price: maximum, minimum

Coverage: planted area of fruit trees and permanent trees in every province of the country

Methodology: survey

Frequency: every year

Presentation: reported at district, provincial, regional and national levels

3.8 Annual dry-season crop cultivation

Data items

- (1) Planted areas of dry-season crops classified by target and water source (irrigation, electric pump, other)
- (2) Crop type (rice, field crop, vegetable) and planted source compared to target

Coverage: planted area of every dry-season crop countrywide

Methodology: information obtained from *tambon* agricultural extension officers by observation, farmers, farmer leaders and relevant agencies

Frequency: twice a month

Presentation: reported at provincial, regional and national levels

Problem/obstacle: highly erroneous data due to frequency of report

3.9 Yield forecasting

Data items: classified by crop type, crop year, province of forecast, total planted area, productive area, last year's product, product estimate of this year, productive period

Coverage: farmers planting fruit trees and permanent trees in every province

Methodology: survey

Frequency: every year

Presentation: reported at provincial level

3.10 Survey of production input price (soil and fertilizer)

Data items

- (1) Data of agricultural production input prices including prices of chemical fertilizers, organic fertilizers, bio-fertilizers and soil improvement material
- (2) Fertilizer price at factory

Coverage: dealers and distributors for soil and fertilizer inputs in various provinces

Methodology: survey by random method in six regions

Presentation: reported at *tambon*, district and province levels

Frequency: every four months

Problems/obstacles

- (1) Not in accordance with statistical system as should be
- (2) Budget and manpower constraints

3.11 Information on farmers' groups/farmer housekeeping/agricultural youth**Data items**

- (1) Name of group, address, type of business, group's activity, other activities
- (2) Number of members, source of capital and assets, circulatory capital, members' welfare

Coverage: legal farmers' groups countrywide

Methodology: survey

Frequency: every year

Presentation: reported at *tambon*, district, provincial and national levels

Problem: data collection methodology to be improved to obtain up-to-date information

3.12 Project on agricultural development for industry

Data items: data obtained from group of farmers cultivating crops as raw material for industrial factories, covering group's name, address, type/quantity, quality of material and name of the factory

Coverage: every group of farmers cultivating crops as raw material for industrial factories countrywide

Methodology: survey

Frequency: every year

Presentation: reported at provincial, regional and national levels

3.13 Pest epidemics and assistance provision

Data items: data of pest epidemics and assistance provision are classified by crop type, growth stage, pest type, epidemic area, area under assistance, method of assistance, quantity, and source of assistance

Coverage: pest epidemics in each *tambon* countrywide

Methodology: survey of all pest epidemics

Frequency: monthly

Presentation: reported at *tambon*, district, provincial and national levels

Problems/obstacles

- (1) Delay in data delivery
- (2) Lack of high-capacity computer

3.14 Raw material requirement of industrial factory (vegetable, fruit and permanent tree)**Data items**

- (1) Number of industrial factories requiring each raw material
- (2) Type of products produced by each factory
- (3) List of factories and addresses for each province, raw material requirements and type of products

Coverage: agro-industrial factories in every province for the whole country

Methodology: survey

Frequency: every year

Presentation: reported at provincial, regional and national levels

3.15 Data of agricultural business network

Data items: the data of agricultural businesses producing commodities and converted products are of two kinds:

- (1) Data of business groups: name, address, type, number of members, etc
- (2) Detail of commodities: type, name, raw material, quality certification, power of production, production period, packaging, wholesale price, minimum order, method of payment, transportation, components of commodity

Coverage: agricultural institute's gathering of data for business agricultural production countrywide

Methodology: survey

Frequency: every year

Presentation: reported at provincial, regional and national levels

3.16 Farmers' technology and agricultural local wisdom

Data items

- (1) Farmers' technology
 - use of plants, fertilizer applications, maintenance, pest prevention, product harvest, post-harvest practice, use of agricultural machinery, soil management and conservation
- (2) Local intelligence (agriculture)
 - proven wisdom
 - local sages
 - name, address
 - expertise

Coverage

- (1) Farmers cultivating important economic crops defined under the agricultural development plan
- (2) Data item (2) is under consideration

Methodology: survey/interview

Frequency: every five years

Presentation: reported at provincial, regional and national levels

3.17 Geographic information

Data items

- (1) Topographic map at a scale of 1:50 000 whose areas are classified into various types such as flat plain, terrace, mountain, etc
- (2) Map of repeatedly damaged areas due to natural disasters at a scale of 1:50 000
- (3) Land use map at a scale of 1:50 000
- (4) Map of agricultural extension zones at a scale of 1:50 000

Coverage

- (1) Includes every topographic area except Bangkok
- (2) Includes every type of disaster except for Bangkok
- (3) Detail covers level 3 except Bangkok

- (4) Detail of *tambon* available in each district except Bangkok

Methodology

- (1) To be in accordance with cartographic technique, data analysis from the Royal Thai Survey Department topographic map whose contour lines are available
- (2) To be in accordance with cartographic technique
- (3) Landsat 5-TM image interpretation and random accuracy assessment
- (4) Use of GIS and cartography

Data processing: using Arc-Info software

Frequency

- (1)^{/1} 1 time/area
- (2)^{/1} 1 time/area
- (3)^{/1} 4 years/time
- (4)^{/1} 4 years/time

Presentation: reported at *tambon*, district, provincial, regional and national levels

3.18 Project on physical information system development for agricultural extension

Data items

- (1)^{/1} Land use map at a scale of 1:50 000
- (2)^{/1} Base map including information on communication network, water bodies and important places of each *tambon* such as product terminals, farmer group offices
- (3)^{/1} Map of agricultural extension zone at a scale of 1:20 000 with detail of villages

Coverage

- (1)^{/1} Detail of villages countrywide available at *tambon* level, detail of data collected at level 3
- (2)^{/1} Detail of villages countrywide available at *tambon* level
- (3)^{/1} Detail of villages countrywide available at *tambon* level

Methodology :

- (1)^{/1} Interpretation from satellite image using GPS and verified by local leaders (heads of village and *tambon*)
- (2)^{/1} Use of GPS plus interview of local people and satellite imagery
- (3)^{/1} Agricultural extension zone analysis using GIS technique based on soil series map at a scale of 1:50 000

Frequency: every four years (the number of *tambon* conducted depends on DOAE policy)

Presentation: reported at *tambon* level with detail of villages

4. Present situation

Implementation of agricultural extension requires direct contact and coordination with farmers and farm families to effectively impart appropriate agricultural technology from academic institutions, so that farmers can adapt the acquired knowledge to improve production, obtain higher yield and develop a better life.

The present situation of agricultural production and marketing, as well as the economic and social aspects of farm population, has undergone considerable changes. To attain its objectives, the Department of Agricultural Extension has continuously evaluated and improved its approaches in

line with the changing conditions. The field operational system and its supporting system were set up in 1994 and later modified to the new system, which became operational in 1997.

The general principle of the present agricultural extension system emphasizes human resource development for both extension personnel and farmers; use of appropriate technology; increased responsibilities to regional and provincial offices; and closer coordination among government, private-sector and local organizations.

The existing agricultural extension approach comprises two systems, which are the operation at district level and the supporting operation.

1. The operation at district level includes:
 - (1) Clear work assignment by the chief of the district agricultural extension office to all district officers;
 - (2) Identification of target areas;
 - (3) Formulation of the work plans: five-yearly, yearly and monthly;
 - (4) Meetings:
 - district monthly meeting
(on the first week of the extension working schedule)
 - district weekly meeting
(on Monday except in the week that coincides with the monthly meeting)
 - (5) Selection of farmers in each village to act as a core to perform the work related to farm occupation development and to assist extension personnel.

2. The supporting operation
 - (1) Systematic and continued technology transfer by means of
 - national seminars
 - annual workshops
 - technical workshops
 - regional task forces
 - provincial task forces
 - farmers' task forces
 - (2) Administrative meetings/seminars
 - (3) Monitoring and supervision at central, regional, provincial and district levels
 - (4) Data management and information technology to serve for work plan/project formulation and agricultural extension development in line with farmers' needs and area potential

5. Problems

1. Technical problems include: unclear questions and answers on some items, unclear concepts and regulations for consideration of answers.
2. Problems of management include:
 - (1) Attitude of work implementation: some local officers think that they do not obtain any benefit from working as all collected data are delivered to the central office.
 - (2) Local officers at district level in some provinces are not provided with enough information. This problem was found to be less severe in the provinces where officers are well supervised and trained.

- (3) Supervision and monitoring of work by *tambon* and district officers is often insufficient and results in delays in work and deviation from the concepts and methodology assigned.
- (4) Quality control before data analysis was found not to have been done in some districts and provinces, leading to the persistence of errors in data.
- (5) Personnel constraint: so far, the number of officers is insufficient; the data of some *tambon* are therefore missing.
- (6) It was found that data collection conducted at the low level and submitted to the higher level causes a problem of report preparation at district level, as some *tambon* cannot submit in time and the report from district to provincial office is thus delayed. Data processing and report preparation at the central office are also delayed. In this regard, district and province offices should cooperate in the preparation of the implementation plan in their respective provinces so that report preparation at each level can be finished as scheduled. The missions to be undertaken by agricultural extension officers at *tambon*, district and provincial levels are plentiful. Such missions will be more sophisticated and numerous, especially the mission on agricultural data collection and report. A suitable management system is therefore necessary. *Tambon*, district and province offices should prioritize the works to be undertaken and be aware of time management. All officers should keep in mind how to obtain reliable data.

6. Future development

1. Strengthen farmers' job security to obtain continuous income, be self-reliant and enjoy a better quality of life:
 - (1) Promote the unity of farmers to transfer knowledge, management and marketing in line with communities' needs;
 - (2) Help the agricultural organization network to exchange knowledge and experience for more efficient results;
 - (3) Promote self-reliant agricultural systems, self-sufficient systems and the new agricultural theory;
 - (4) Support local agricultural organizations to enable, analyse and formulate production plans at *tambon* level;
 - (5) Ensure farmers' participation-based learning by having farmers train farmers;
 - (6) Have agricultural institutes and local organizations procure and provide seeds, stocks and other production inputs of high quality at reasonable prices;
 - (7) Promote product conversion at household and community levels to add value to their products and to develop and diversify products to meet market needs;
 - (8) Transfer technology and skills to farmers in the areas of technology administration and management production, conversion and marketing;
 - (9) Support the use of local intelligence in the production of agricultural commodities as well as development research.
2. Develop capability in production, food and agricultural commodity marketing for domestic consumption and international competitiveness:
 - (1) Follow the government policy on One Village One Product;
 - (2) Produce high-quality seeds as well as expedite and encourage the production and propagation of high-quality seeds with the quantity needed;

- (3) Develop production in line with the assigned agricultural economic zone by transferring agricultural technology;
 - (4) Improve the quality of agricultural products and processed commodities to meet the standards assigned by the ministries of agriculture, industry and public health;
 - (5) Adjust the structure of production to be appropriate for the area potential;
 - (6) Consider the increase of production efficiency as the very first priority under the sustainable use of natural resources, with suitable inputs focusing on important economic crops:
 - rice
 - soybean
 - pineapple
 - maize
 - sugarcane
 - coffee
 - para rubber
 - durian
 - longan
 - oil palm
 - cassava
 - orchid
 - (7) Develop the infrastructure necessary for production, management, post-harvesting and marketing through potential organizations or communities. Participate in the development and support farmers' organizations or communities to be the centres for commodity exchange and distribution.
3. Conservation of natural resources and promotion of sustainable production:
- (1) Transfer knowledge, encourage farmers and their institutions to be aware of the important of natural resources;
 - (2) Promote safe production for producers, consumers and the environment, focusing on the use of bio-technique and integrated management to control pesticide;
 - (3) Promote potentially suitable land use in accordance with assigned agricultural extension zones;
 - (4) Promote the use of organic fertilizer and bio-materials to reduce costs and increase products and soil fertility;
 - (5) Promote the environmental rehabilitation of the areas repeatedly damaged by natural disasters.
4. Contribution to the promotion of efficient production of agricultural commodities:
- (1) Establish *tambon* centres for agricultural technology transfer as centres for agricultural technology and one-stop service;
 - (2) Under the *tambon* centre for agricultural technology transfer, an agricultural extension pilot group is initiated to demonstrate the process of farmers' participation-based technology transfer before extension to farmers;
 - (3) Establish a fund for the centre for agricultural technology transfer to contribute agricultural development plans or projects;
 - (4) Improve existing irrigation systems and reservoirs for the efficient use of water;

- (5) Construct an accurate and rapid system for the collection and distribution of agricultural produce and for marketing information so that government officers and farmers can benefit from the system for their work and decision making;
 - (6) Encourage farmers to develop their knowledge and be aware of the quality of commodities and of sanitary standards;
 - (7) Monitor and supervise important projects of the Department of Agricultural Extension.
5. Restructure and develop human resources so that DOAE becomes the core agency in transferring every kind of agricultural technology in line with the integrated development of agriculture.

METHODOLOGICAL REVIEW OF STATISTICAL ACTIVITIES ON LIVESTOCK BY THE DEPARTMENT OF LIVESTOCK DEVELOPMENT

1. DLD responsibilities

1. To prevent and eradicate economically important contagious animal diseases and to ensure the safety of livestock products.
2. To increase livestock production both in quantity and in quality.
3. To encourage scientific studies and research relating to animal production and health.

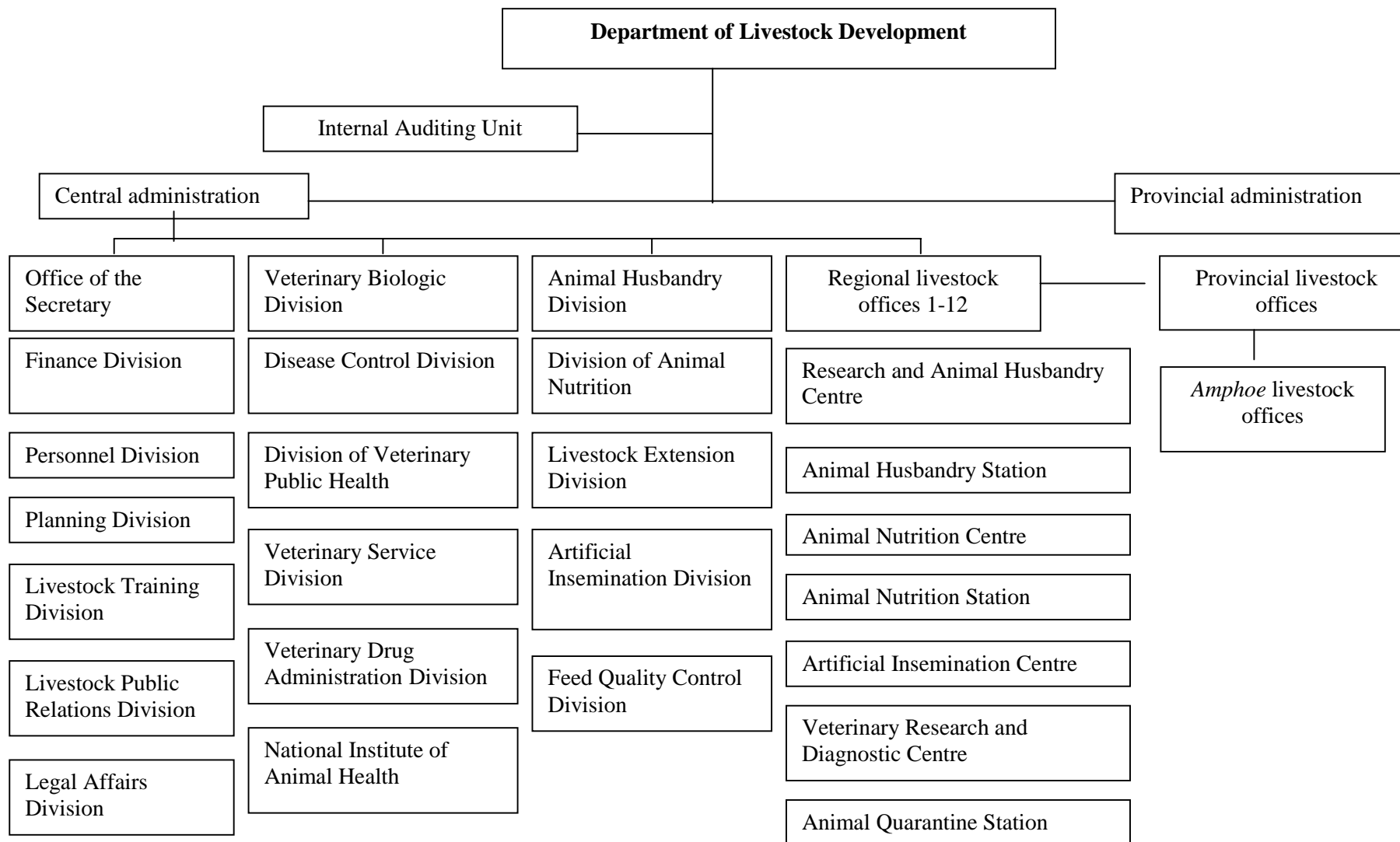
1.1 Animal health

A great variety of research conducted by the Department of Livestock Development (DLD) relates to animal health, ranging from disease detection, prevention, diagnosis and zoonosis to veterinary public health control and treatment. In addition, DLD plays an important role in the development of vaccines and vaccination programmes to combat all main animal diseases.

1.2 Animal production

DLD has conducted animal breeding trials for selection of the most suitable breeds under local production, as well as research trials on feedstuffs, on improved management practices and on the implementation of artificial insemination to improve quality and productivity and decrease the cost of production.

2. DLD organization chart



3. DLD provincial offices

- Regional livestock offices: 12 zones
- Provincial livestock offices: 76 provinces
- District livestock offices: 788 districts
- Subdistrict livestock offices: 57 subdistricts
- Artificial insemination centres: 9 centres
- Veterinary research and diagnostic centres: 7 centres
- Animal nutrition research centres: 8 centres
- Research and animal husbandry centres: 8 centres
- Animal nutrition stations: 25 stations
- Animal husbandry stations: 30 stations
- Animal quarantine stations: 50 stations
- Institute of Poultry Research and Development: 1 institute
- Swine Test Station, Pak Chong: 1 station

4. Livestock-raising farmer survey

Coverage: livestock-raising households countrywide

Data collection

- a. Enumerate animal-raising farmers and interviews conducted by village and *tambon* livestock volunteers
- b. Livestock infrastructure information
 - Number of livestock farms
 - Beef cattle
 - Dairy cattle
 - Buffalo
 - Breeding swine
 - Fattening swine
 - Native chicken
 - Broiler
 - Laying hen
 - Meat duck
 - Egg duck
 - Statistics of livestock in Thailand on 1 January
 - Cattle (dairy, beef)
 - Buffalo
 - Swine
 - Goat
 - Sheep
 - Deer
 - Camel
 - Elephant
 - Horse
 - Statistics of poultry in Thailand on 1 January
 - Duck (meat, egg, Muscovy)
 - Chicken (broiler, laying. hen, native chicken)
 - Goose
 - Quail

- Emu
 - Ostrich
- c.
 - Dairy cattle
 - Female calves
newborn–1 year/1 year–first pregnancy
 - Cow
milking/dry
 - Sire
 - Raw milk at sampling
 - Farm household
 - Beef cattle
 - Native cattle
male/female (new born–2 years, 2 years up)
 - Pure/crossbred cattle
male/female (new born–2 years, 2 years up)
 - Farm household
 - Buffalo and farm household
male/female (new born–2 years, 2 years up)
- d.
 - Swine and farm household
 - Native
 - Breeding swine
sire/sow/piglet
 - Fattening swine
 - Goat and farm household
male/female
 - Sheep and farm household
male/female

Data processing: questionnaires are verified and gathered by district livestock officers. Provincial livestock officers then enter data by using DLD-developed software. The data are subsequently transferred to regional offices and the department.

Frequency: every two years

Summary findings

- 1) Number of animal-raising farmers and number of animals classified by type, gender and age;
- 2) Number of commercial animal farming classified by animal type and farm size;
- 3) Area for planting grass/animal food crops, and public range land.

Data presentation/distribution

- At district, provincial, regional and national levels
- Publicized by report or document
- Through the website www.dld.go.th

Problems/obstacles

- Data collection is time consuming.
- Lack of sufficient attention from volunteer surveyors.
- Lack of accuracy assessment.
- DLD officers should oversee every step of the work

5. Data on livestock

The data collected from reports/those who ask permission for animal feed business/factory examining/secondary data. Data collection is undertaken every year countrywide. Some items are reported monthly. Report is done at district, provincial, regional and national levels, covering:

5.1 Number of animal-food factories classified by food type/kind

- Collected from those who ask permission for animal-food business and from factory examining
- Conducted every year
- Reported at provincial and national levels

5.2 Number of businesses involved in livestock

- Classified by type of business (rice mill, abattoir, tanning plant, processing plant, AI unit)
- Collected from reports
- Conducted every year
- Reported at district, provincial and national levels

5.3 Slaughtered livestock statistics

- Collected from reports
- Conducted every month
- Reported at district, provincial, regional and national levels

5.4 Livestock import-export statistics

- Collected from reports
- Conducted every month
- Reported at national level

Problem/obstacle

Complete data collection is time consuming, which causes delays in reporting.

6. Animal epidemic diseases classified by disease type/animal type

- Collected from reports on epidemic occurrence by DLD officers
- Conducted every year
- Reported at village, *tambon*, district, provincial and zone levels

7. Increase of production efficiency and reduction of production cost

This item is undertaken by:

1. Measures on suitable livestock technology research and development focusing on biotechnology for both animal health and production. The measures also include development and conservation of native Thai animal- and Thai livestock-related genes.

2. Measures on animal disease control, prevention and eradication to develop animal health and to reduce animal production loss caused by epidemic diseases. The measures are undertaken by epidemic monitoring and prevention, vaccine production and immunization. They enhance farmers' knowledge on animal health care and thus increase animal production efficiency. Intensive animal quarantine for both animal transfer and import is applied to prevent induction of animal disease.
3. Development and improvement of breeding stock and animal food crop seeds to obtain high-quality products, strong and tolerant to the Thai environment. Encourage farmers to produce animal breeding stocks for distribution. Use artificial insemination to improve and expand animal breeding.
4. Measures strengthening farmers' potential to increase production efficiency by:
 - 1) contributing to the implementation of *tambon* centres for agricultural technology transfer;
 - 2) demonstrating suitable farming methods and publicizing livestock technology and information; and
 - 3) training livestock volunteers and livestock youth to be the local core for technology transfer.

8. Improvement of product processing quality and solution of environmental pollution problems

1. Measures on animal commodity quality development for both domestic consumption and export.
 - 1) Assign standards for animal farms, slaughterhouses, meat quality, animal product processing factories and livestock commodity products. The standards are certified by the DLD.
 - 2) Promote sanitary slaughter by using two demonstration places: the swine slaughterhouse and processing factory in Chachoengsao and that for cattle in Chumphon province.
2. Measures on control, regulation and distribution of animal feed, medicine and chemicals safe to use, in order to decrease the use of chemicals and residual effects in animal products.
3. Measures on the promotion of animal export production zones to strengthen the export capability of farmers and traders; focused on using potential and suitable areas for animal farming and epidemic disease-free zones.
4. Measures on cooperation with government agencies, education institutes and the private sector to participate in new markets and in the processing of new products to meet market needs. Cooperation also includes monitoring, problem solving and agreement preparing on non-tariff trade barriers to defend the country's interest and avoid disadvantage.

9. Contribution to the promotion of animal farming

1. Support subsidiary farmers in running integrated farms to increase income focusing on both household consumption and sales in accordance with the economic theory of self-sufficiency.

2. Support schools in raising animals for protein production for children focusing on primary schools in poor rural areas.
3. Contribute to community animal markets, fresh milk dealerships and processing factories.

10. Administration, public relations and distribution

1. Measures on strengthening DLD capability to be up-to-date in the procurement of new technologies, including communications, data linkage and laboratory focusing on organization development in accordance with international standards.
2. Measures on development of personnel efficiency by enhancing knowledge and experience in theory and practice through training, seminars, brainstorming and exchanging ideas as well as supporting higher education.
3. Contribution on decentralization or partial release of some missions to local organizations and the private sector.
4. Expedite budget payment at both central and regional offices to increase efficiency, flexibility and timeliness.
5. Widely publicize information.

METHODOLOGICAL REVIEW OF STATISTICAL ACTIVITIES OF THE DEPARTMENT OF FISHERIES

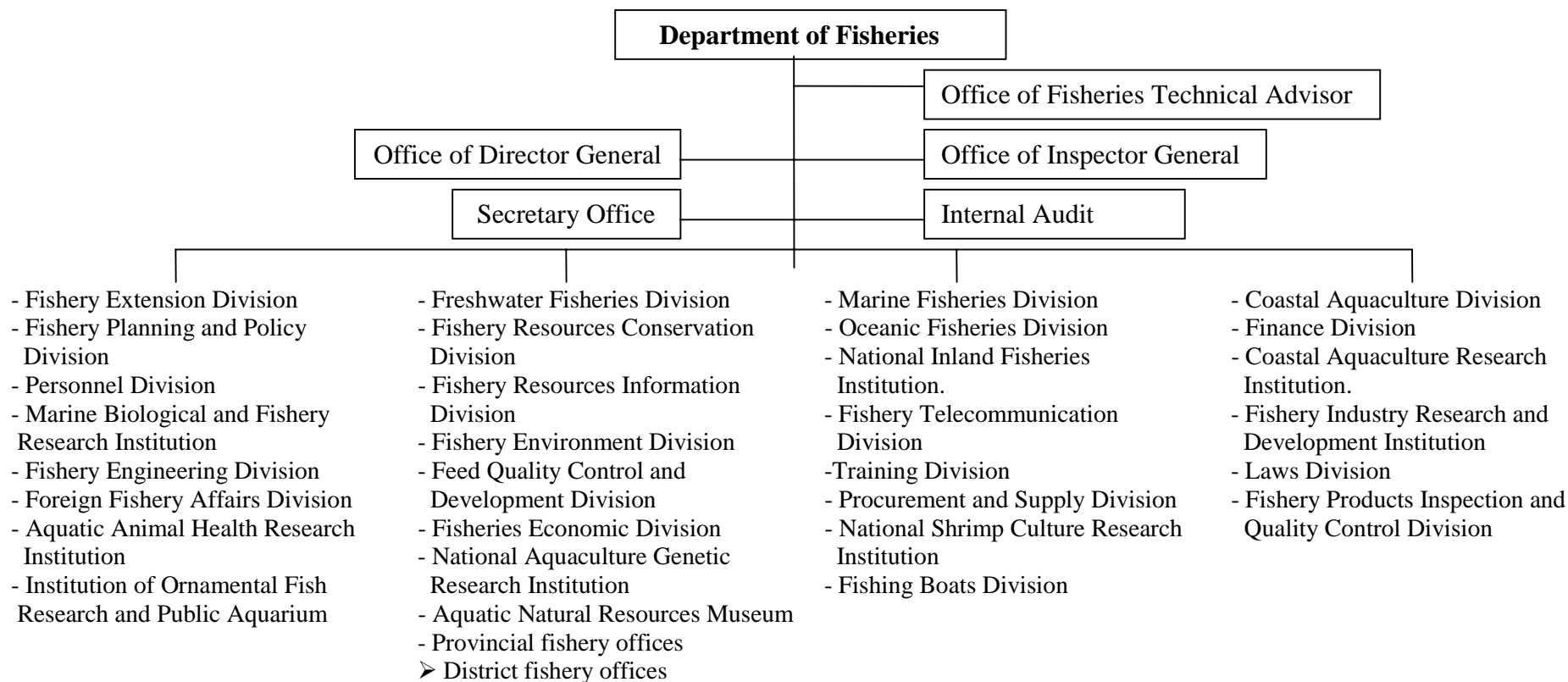
1. DOF responsibilities

The Department of Fisheries (DOF) is the research-and-development and production department of the Ministry of Agriculture and Cooperatives. It was established in 1926 to serve the country's growth of fishery in order to achieve sustainable fishery development for food security and foreign-exchange earning. The national policy on fishery development covers local fisheries, overseas fisheries, aquaculture and fishery processing. The duties of the department are:

1. Implement the relevant legislation, i.e. the Fisheries Act BE 2490 (1947), the Wildlife Conservation and Protection Act BE 2535 (1992), the Hazardous Substance Act BE 2535 (1992) and other relevant acts.
2. Conduct study, research and experiment in every field of fishery.
3. Explore, analyse and research fishing grounds beyond Thai waters and promote fishery cooperation with other states.
4. Promote and develop all occupations relating to fishery.
5. Implement other duties as legally entrusted to the department or any task assigned by the ministry or the cabinet.

161. Fishery products contribute to improve people's nutrition and represent an important part of the country's exports. The statistical data on fishery are collected by DOF through the logbook, fishing community and shrimp culture surveys. It is significant to know what kind of data are collected and stored in the country.

2. DOF organization chart



3. Provincial administration

162. Provincial offices are responsible for: conservation and control of fishery resources; collection of taxes and fishing fees; provision of information on fishery conservation; professional promotion and extension; and provision of guidance and service to fishery employees. They are divided into 12 zones as follows:

1. Nonthaburi, Patum Thani, Ayutthaya, Angthong and Samut Prakarn.
2. Singburi, Saraburi, Lopburi, Chainat, Suphanburi and Nakhon Nayok.
3. Chachoengsao, Chonburi, Rayong, Chantaburi, Prachin Buri, Trat and Srakaew.
4. Samut Sakhon, Samut Songkhram, Nakhon Pathom, Ratchaburi, Kanchanaburi, Phetchaburi and Prachuap Khiri Khan.
5. Nakhon Ratchasima, Chaiyaphum, Buri Ram, Surin, Mahasarakam and Sisaket.
6. Khon Kaen, Udon Thani, Nong Khai, Loei, Sakon Nakhon and Nongbualamphu.
7. Yasothon, Kalasin, Roi-Et, Mukdahan, Nakhon Phanom, Ubon Ratchathani and Amnart Charoen.
8. Uthai Thani, Nakhon Sawan, Kampaeng Phet, Tak and Sukhothai.
9. Phitsanulok, Pichit, Phetchabun, Nan, Phrae and Uttaradit.
10. Chiang Mai, Lamphun, Lampang, Phayao, Chiang Rai and Mae Hong Son.
11. Phuket, Krabi, Nakhon Si Thammarat, Surat Thani, Chumphon, Ranong and Phang-nga.
12. Songkhla, Phatthalung, Trang, Satun, Yala, Narathiwat and Pattani.

4. Commercial fishery data preparation

4.1 Fishery business unit survey

Data items

- (1) Number of factories or number of households operating fishery-related businesses or processing aquatic animals.
- (2) Quantity of fresh aquatic animals supplied to factories for processing.

Coverage: factories and households operating fishery-related businesses or processing aquatic animals which are located in 22 of the 24 coastal provinces.

Methodology: survey by dividing business units into two types:

- (1) Factory or household operating a fishery-related business or a large aquatic animal processing unit such as:
 - cold storage
 - canning factory
 - fish-ball factory
 - fish sauce factory
 - ice for fishery factory

The survey is conducted to find out the quantity of fresh aquatic animals utilized in every factory.

- (2) Another aquatic animal processing factory survey is undertaken by random sampling of processing households, in accordance with processing type and through simple random sampling.

Data analysis: fresh aquatic animals used in various processing

$$\hat{Y} = \frac{N}{n} \sum_{i=1}^n x_i \quad (1)$$

\hat{Y} = Total quantity of fresh aquatic animals used for conversion by processing type

N = Number of total processing establishments classified by processing type

n = Number of sample processing establishments classified by processing type

X = Quantity of fresh aquatic animals used for processing classified by sample processing establishment

Frequency: every year

Presentation: provincial and national levels

Problems

- (1) Lack of field operation officers at provincial level
- (2) Lack of cooperation from business owners
- (3) Lack of budget for monthly data collection

4.2 Data collection on marine fishery production by logbook survey

Data items

- (1) Catch of marine fishery by nine main fishing gear types
- (2) Fishing effort: as classified in (1)

Coverage: fishery establishments in 22 coastal provinces using 9 main fishing gear types

Methodology: samples of fishery establishments are selected from 9 types of fishing gear, using stratified random sampling

Frequency: every year

Presentation: national level

Problems

- (1) Delay of field survey due to lack of officers
- (2) Lack of cooperation from fisherfolk
- (3) Unavailability of sample fisherfolk, who usually go fishing

4.3 Marine fishery production and value at landing place

Data items: quantity and value of marine fishery classified by main landing place, month, species and average price at main marine landing place

Coverage: main marine landing places in 22 coastal provinces

Methodology: stratified random sampling of 22 coastal provinces as total strata; one day each week is randomly selected for data collection on quantity and value of marine fishery from wholesaler

Frequency: every year

Presentation: district, provincial and national levels

Problem: lack of data collection officers

5. Data preparation for native fishery

5.1 Thai fishing boat statistics

Data items

- (1) Name list of fishing boats with registered fishing gear
- (2) Name list of fishing boats with registered fishing gear; classified by gear type, size and gross tonnage; in each province

Coverage: 22 coastal provinces, providing opportunity for licensing mobile marine fishing gear

Methodology: data collection from registration record covering:

- (1) Number of fishing boats applying for fishing gear license in the year of survey
- (2) Type of fishing boat, type of fishing gear, length of boat, gross tonnage, engine power and engine type
- (3) Locality of fishing boat owner/holder applying for registration

Frequency: every year

Presentation: provincial and national levels

5.2 Production of marine fishery community survey

Data item: fishery production captured by native marine fishing gear classified by gear type, species and zone.

Coverage: small-scale marine fishery establishments except 9 fishing gear types in logbook survey in 22 coastal provinces

Methodology: stratified two-stage random sampling is used. In the first stage, the marine fishery village is divided into five fishery zones. Each zone is divided into two strata, Stratum A and Stratum B, by using fishing boats as weighting factor for village size classification. The sampling village is then randomly selected from both strata. In the second stage, every fishery establishment in each village using each fishing gear is enumerated. Sample establishments are then selected. Five samples are selected for each fishing gear.

Frequency: every year

Presentation: fishery zones countrywide

Problem: delay of field operation due to lack of personnel and budget

6. Freshwater fishery data preparation

6.1 Statistics of freshwater fishery production at various landing places

Data items

- (1) Quantity and value of freshwater at each landing place by month by species
- (2) Price of freshwater fishery distributed at landing places

Coverage: area where fishery is landed

Methodology: data collected by sampling survey and total production estimation by landing place and by species

Data processing: fishery production estimation by

$$Q_h = \frac{N_h}{n_n} \sum_{j=1}^n \sum_{i=1}^m x_{hij}$$

$$V_h = \frac{N_h}{n_n} \sum_{j=1}^n \sum_{i=1}^m x_{hij} p_{hij}$$

in which

Q_h = Quantity of fishery at landing place of h^{th} month

V_h = Value of fishery at landing place of h^{th} month

N_h = Total number of fishing boats at landing place at h^{th} month

n_n = Total number of sample fishing boats at landing place at h^{th} month

X_{hij} = Quantity of i^{th} species at landing place of j^{th} sample boat in h^{th} month

h = Month ($h = 1, 2, 3 \dots 12$)

i = Species ($i = 1, 2, 3 \dots m$)

j = Sample boat ($j = 1, 2, 3 \dots n$)

P_{hij} = Average price of i^{th} species of j^{th} sample boat in h^{th} month

The total quantity and value of fishery at landing place for the whole year can be obtained by:

$$Q = \sum_{h=1}^{12} Q_h$$

$$V = \sum_{h=1}^{12} V_h$$

Frequency: monthly

Presentation: at each freshwater fishery landing place

Problems

- (1) Lack of budget and personnel for data collection
- (2) Lack of cooperation from operators

6.2 Statistics on freshwater fishery production from public ponds and trapped ponds

Data items

- (1) Quantity and value of caught fishery by water source and by trapped pond
- (2) Statistics of freshwater production from public pond:
 - Quantity and value of caught freshwater fishery by water source and by trapped pond
 - Quantity of freshwater fishery by species and by water source/trapped pond
 - Number of units and area of water source by type and by number of units of trapped ponds
 - Number of units and area by size of area and water source
 - List and address of water source by type of water source and list of trapped pond fisherfolk

Coverage: freshwater sources and trapped ponds in every province countrywide

Methodology

- (1) Random sampling of water sources by type and by size; public ponds include three types:
 1. Reservoir: lake, man-made reservoir
 2. Public water body: canal, swamp, pond
 3. Fish dyke, village pond, school fishing pond, etc
- (2) Trapped pond by using random sampling from the total list of ponds for production survey

Frequency: once a year

Presentation: provincial and national levels

6. Freshwater aquaculture production statistics

Data items

- (1) Name list of freshwater fish farmers
- (2) Number and area of freshwater fish farms
- (3) Product of freshwater aquaculture by species and by culture type
- (4) Average farm-gate price of freshwater fisherfolk by type and by province

Coverage: Total freshwater aquaculture establishments in every province countrywide by culture type or by characteristics of culture unit:

- pond culture
- culture in paddy field
- culture in ditch
- culture in cage

Methodology: Select sample establishments from the name list of freshwater cultivators at district level by using stratified sampling. Establishments of the same species and same type of culture are stratified into the same stratum. Ten percent of establishments in each stratum are then selected by using systematic random sampling. Data collected include products of freshwater culture during the past year.

Frequency: every year

Presentation: provincial level

8. Coastal aquaculture data preparation

8.1 Marine shrimp culture statistics

Data items

- (1) Name list of marine shrimp cultivator
- (2) Number and area of marine shrimp culture by type of culture
- (3) Quantity of marine shrimp by type of culture
- (4) Production of marine shrimp farm by type of culture

Coverage: Marine shrimp farms in 22 coastal provinces, shrimp-culturing nearby provinces and the provinces of low-salinity shrimp culture. Culture is classified into three types: extensive, semi-intensive and intensive.

Methodology: Select sample establishments from the name list of shrimp farm cultivators at district level by using stratified random sampling. Establishments of the same species and same type of culture are stratified into the same stratum. Ten percent

of total establishments in each stratum are then randomly selected. Data collected include information of the past year from January to December.

Frequency: every year

Presentation: provincial and national levels

8.2 Brackish water fish culture statistics

Data items

- (1) Name list of brackish water fish cultivators
- (2) Number and area of brackish water fish culture by species and by type of culture
- (3) Quantity and value of products by species and by type of culture
- (4) Average price by species

Coverage: brackish water fish cultivators in every province countrywide. The culture unit is classified into two types:

- 1) pond culture
- 2) cage culture

Methodology: Select sample establishments from the name list of brackish water fish cultivators by using stratified random sampling. Establishments cultivating the same species and same type of culture are stratified into the same stratum. Ten percent of total establishments in each stratum are then selected for data collection. The data collected include information on brackish water fish culture during the past year (1 January–31 December)

Frequency: every year

Presentation: provincial and national levels

8.3 Marine shellfish culture statistics

Data items

- (1) Name list of marine shellfish cultivators
- (2) Number and area of shellfish culture by species
- (3) Quantity and value of product by species
- (4) Average price by species

Coverage: Marine shellfish establishments in all coastal provinces. Shellfish culture is classified into six types:

- 1) oyster
- 2) bloody cockle
- 3) green mussel
- 4) horse mussel
- 5) pearl culture
- 6) mussel production from bamboo trap

Methodology

- (1) Randomly select sample establishments from the list of shellfish culture establishments at district level by stratified random sampling. Ten percent of each stratum are selected for data collection.
- (2) Randomly select sample establishments from list of bamboo trap operators by district using simple random sampling. Twenty percent of total bamboo trap establishments are selected for data collection.
- (3) Data collected cover information of shellfish culture during the past year (1 January–31 December).

Frequency: every year

Presentation: provincial, regional and national levels

METHODOLOGICAL REVIEW OF THE STATISTICAL ACTIVITIES OF THE COOPERATIVE PROMOTION DEPARTMENT

1. CPD responsibilities

The Cooperative Promotion Department (CPD) is responsible for promoting and disseminating cooperatives in the country and for implementing activities according to the Cooperative Act BE 2511 (1968) and the Land Allocation for Livelihood Act BE 2511 (1968) on the matters relevant to land settlement cooperative promotion and related laws.

The duties include:

1. Promoting and disseminating the cooperative ideology, principles and practices, and producing publications and cooperative magazines.
2. Studying and conducting research on cooperatives and providing cooperatives with education and training.
3. Guiding and promoting the organization and business operation of cooperatives.
4. Assisting cooperatives and cooperating with agencies so that cooperatives will receive technical and financial support and other necessary services enabling them to be self-reliant.
5. Consolidating and allocating land to landless farmers following the cooperative practices.
6. Supervising the cooperatives to operate according to the Cooperative Act, regulations, by-laws and the cooperative registrar's orders.

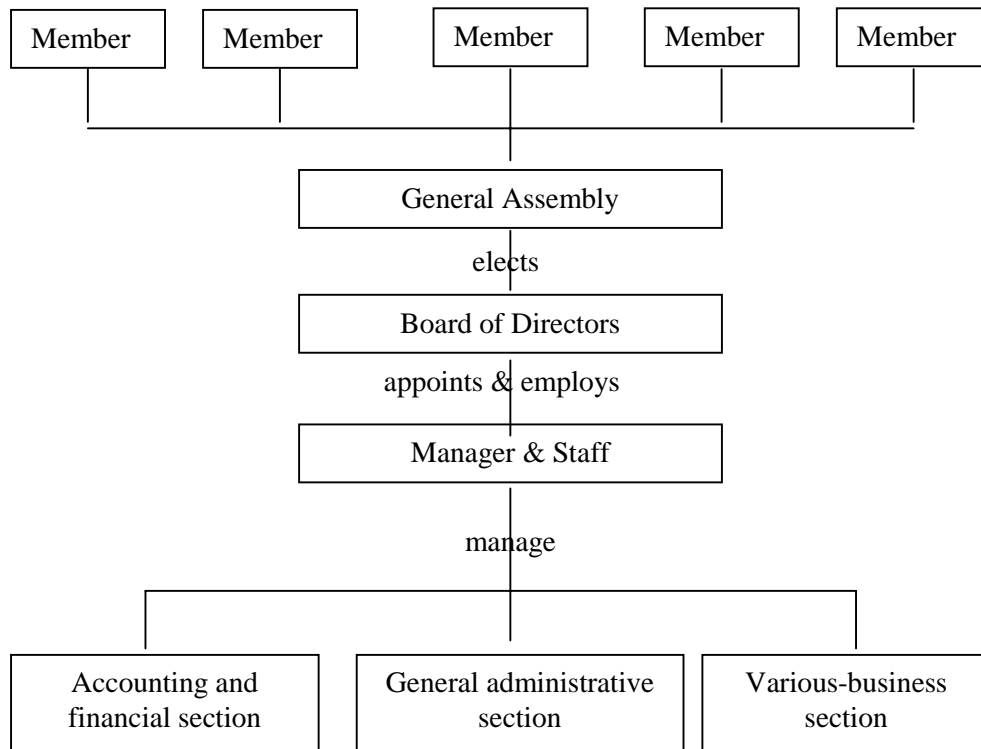
Cooperatives in Thailand are vertically organized in a three-tiered system: primary cooperative at district level and federation at provincial and national levels. The primary cooperative consists of individual members, while the members of provincial and national federations are cooperatives. The members elect the board of directors through the general assembly; the board may not have more than 15 persons for cooperative development policy formulation. The board of directors appoints a manager and staff to run the cooperative business.

Five or more cooperatives at primary or provincial level can together form a provincial or national federation to undertake joint activities on behalf of their primary affiliation, such as processing and trading of agricultural produce.

At national level, there is the Agricultural Cooperative Federation of Thailand, to which all 76 provincial agricultural cooperative federations are affiliated. There are also the Sugarcane Growers' Cooperative Federation of Thailand, the Swine Raisers' Cooperative Federation of Thailand, the Dairy Cooperative Federation of Thailand and the Onion Growers' Cooperative Federation of Thailand. Land settlement cooperatives, however, have only a regional federation in the central region whereas thrift and credit cooperatives and consumer cooperatives are affiliated in a national federation of their own.

All types of cooperatives at all levels, according to the Cooperative Act BE 2511, have implicitly to be the affiliates of the Cooperative League of Thailand. The CLT functions as an apex body of the whole cooperative movement. It does not run as a business enterprise but acts as a facilitator, coordinator and educational supporter for the promotion of cooperative progress.

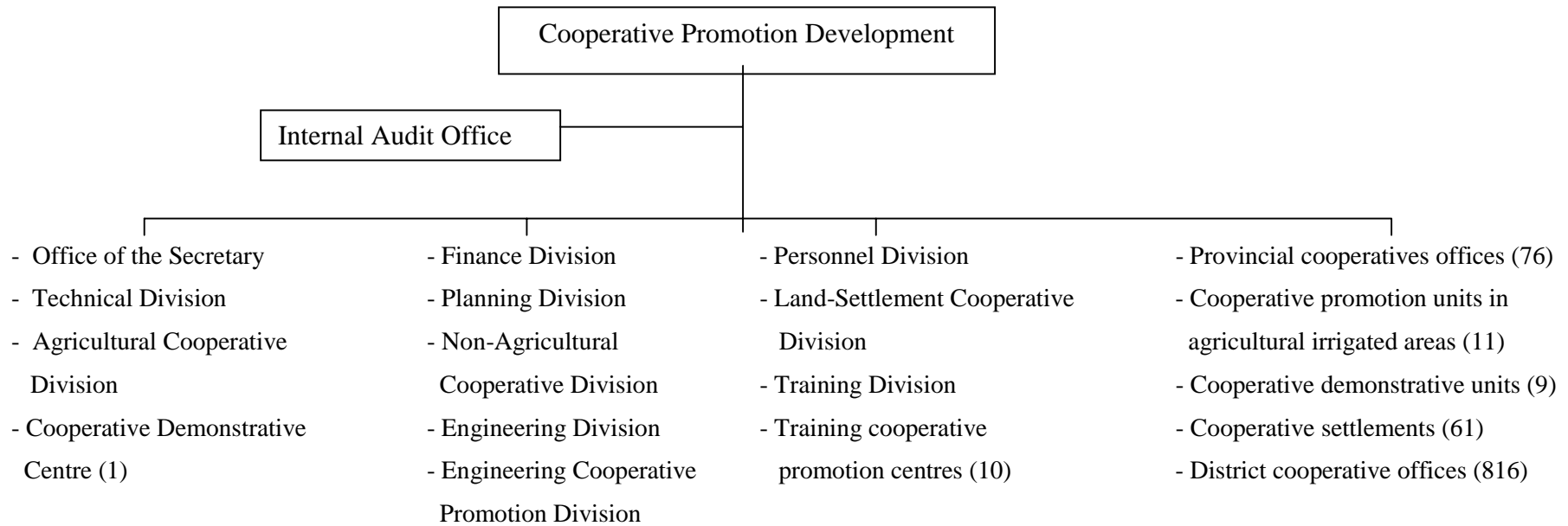
General organizational structure of Thai cooperatives



At present, the cooperatives in Thailand are categorized into six types, namely:

- (1) Agricultural cooperatives
- (2) Land settlement cooperatives
- (3) Fishery cooperatives
- (4) Consumer cooperatives
- (5) Thrift and credit cooperatives
- (6) Service cooperatives

2. CPD organization chart



3. Item of statistics

3.1 Thailand cooperatives and members

Data items

- (1) Number of cooperatives and members by agricultural and non-agricultural sectors, district, province and official audit zone
- (2) Number of cooperatives and members by type of cooperative (agricultural, land settlement, fishery, savings, shop, service)
- (3) Cooperative member distribution

Coverage: every type of cooperative countrywide

Methodology: Survey

Frequency: every year

Presentation: provincial, regional and national levels

3.2 Agricultural development for industry project

Data items

- (1) Types of crop, animal, fishery and other agricultural activities by cooperative
- (2) List, address and affiliation of agricultural cooperative members
- (3) Landholding of cooperative members by type of holding and by area under cultivation
- (4) Labour used for agricultural activities

Coverage: members of agricultural cooperatives countrywide

Methodology: survey

Frequency: every three years

Presentation: provincial, regional and national levels

3.3 Production and marketing database of agricultural cooperative member survey project

This project is contractually implemented by the National Electronics and Computer Technology Centre for software development and by the Suan Dusit Rajabhat Institute for data collection.

3.4 Preparation of list of businesses/facilities by province and official audit zone

- (1) Markets such as central market, warehouse, rice granary, drying space, multipurpose silo
- (2) Processing factories such as dairy factory, rice mill, vegetable preservation factory, dry roast factory by size and by processing capacity
- (3) Others such as fuel station by brand

4. Main cooperative development schemes

Besides the governing cooperative principles, the running of a cooperative business is generally based on the same methods as other business organizations use. Successful cooperative performance requires, for instance, good leadership and efficient management. However, the uniqueness of the cooperative method is in self-help and mutual help.

The CPD has continuously invested large amounts of resources for cooperative development through various programmes and projects, most of which are for cooperatives in the agricultural sector. Here are some of the most important cooperative development schemes:

1. *Credit linkage project for production and rice marketing services of cooperatives.* In this project, the CPD allocates funds for cooperatives to collect members' paddy for processing and distribution at higher price levels. Since its first implementing in the crop year 1980/81, the participating farmer members have generally obtained paddy prices 200-300 baht per ton higher than the market price.
2. *Establishment of tambon agricultural product central markets by cooperatives.* The CPD started to provide financial support in grant terms for cooperatives to set up such markets in 1993. The assistance package generally comprises:
 - (1) a drying space, 2 rai
 - (2) a paddy warehouse of 500-ton capacity
 - (3) a moisture reduction machine of 30 tons a day capacity and
 - (4) a weighing scale of 40-ton capacity with its plant
3. *The integrated farming promotion project in small farm pond project areas:* at the initiative of His Majesty the King, the CPD is promoting integrated farming in small farm pond project areas where ponds of 1 250 m³ capacity were developed by the department in earlier years.
4. *The hygienic vegetable production promotion project:* with increasing concern for health care, a clean environment and sustainable development, green production was recently introduced among cooperative members. Through this project, the CPD will provide interest-free loans to participating cooperatives for further lending to their members for the construction of green houses and for related production activities.
5. *The cooperative woman development project:* recognizing the important role of women in households and society, in 1985 the CPD launched a cooperative woman development project to encourage women to organize themselves as groups or cooperatives in order to improve their occupations, attitude and general knowledge.
6. *The savings promotion programme among cooperative members:* in order to ensure self-reliant operation of cooperatives, the CPD has continuously encouraged each cooperative to accumulate its own capital through various means such as share capital building and deposit campaigns for business expansion.

METHODOLOGICAL REVIEW OF STATISTICAL ACTIVITIES ON AGRICULTURAL PRICES BY THE DEPARTMENT OF INTERNAL TRADE

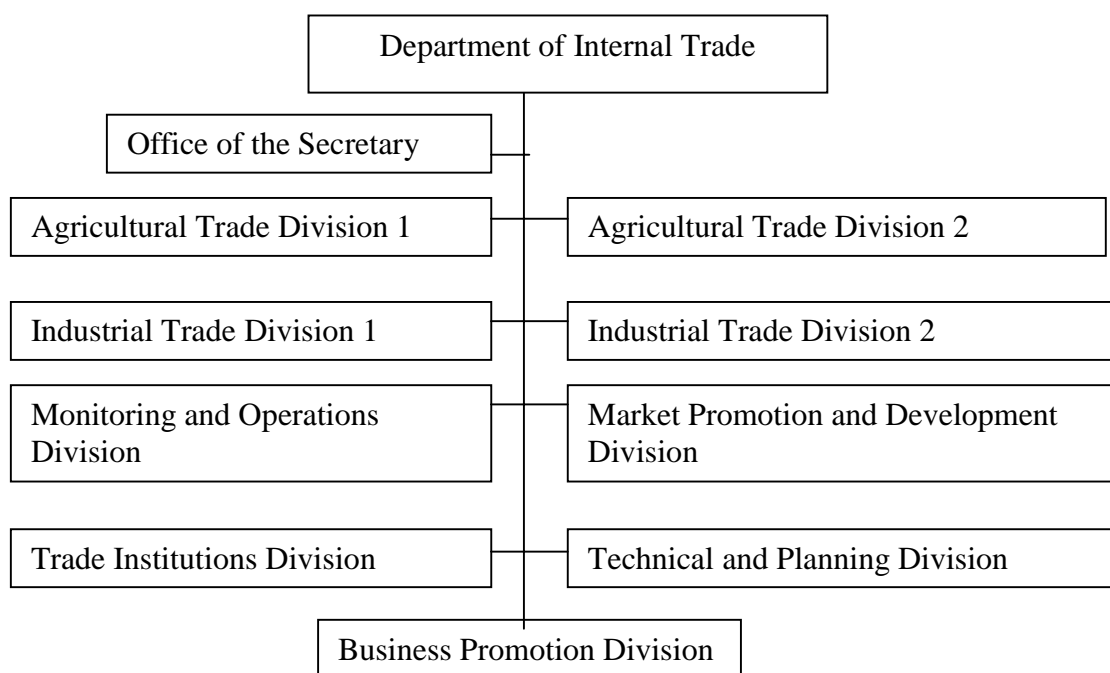
1. DIT responsibilities

1. To implement the tasks according to the Rice Survey and Prohibition of Rice Overstocking Act, the Rice Trading Act, the Business Competition Act, the Price on Goods and Services Act, the Act on Control of Consumable Goods and other Articles in the State of Emergency, the Commodity Control Act, the Trade Association Act, the Chamber of Commerce Act, the Thai Shippers' Council Act, the Laws concerning Control on Business of Warehouse, Silo and Cold Storage Act and relevant acts.
2. To set up, coordinate and work out the overall plans according to the policies and master plans of the Ministry of Commerce including supervision, stimulation in follow up and evaluation of the performance of plans, collection of data and statistics.
3. To promote and develop trade, marketing and the domestic market.
4. To regulate and promote the trade system in order to maintain price stability for agricultural products.
5. To promote fair trade competition and prevent monopoly.
6. To regulate trade flows and marketing indices in order to indicate and evaluate business trends.
7. To produce all series of economic indices in order to indicate and evaluate business trends.
8. To help consumers obtain their rights and to maintain fairness, including promotion and development of consumer institutions, in order to help consumers to protect themselves.
9. To fulfil other tasks as empowered by law or assigned by the ministry or the cabinet.

2. DIT organization chart

The DIT has the following sections:

- Office of the Secretary
- Agricultural Trade Division 1
- Agricultural Trade Division 2
- Industrial Trade Division 1
- Industrial Trade Division 2
- Monitoring and Operations Division
- Market Promotion and Development Division
- Trade Institutions Division
- Technical and Planning Division
- Business Promotion Division



3. Markets

3.1 Agricultural central markets

- Encourage the private sector to establish and manage central markets with the support of the province and the department.
- Departmental regulation on market establishment promotion 1998. At present, the market is divided into three categories:
 - paddy and crops central market
 - fruit and vegetable central market
 - marine central market

There are 86 markets under promotion in each region, as follows:

- (1) 39 markets in the northern region:
 - 38 paddy and crops central markets
 - 1 fruit and vegetable central market
- (2) 18 markets in the northwest region:
 - 14 paddy and crops central markets
 - 4 fruit and vegetable central markets
- (3) 26 markets in the central region:
 - 18 paddy and crops central markets
 - 6 fruit and vegetable central markets
 - 2 marine central markets
- (4) 1 fruit and vegetable central market in the eastern region
- (5) 2 fruit and vegetable central markets in the southern region

3.2 Agricultural commodity future exchange market

Background

The first commodity future exchange market was established in 1730 in the Dochima district of Osaka, Japan. The Japanese government realized that farmers needed an institution to reduce the risk of fluctuation in rice prices, which was a great burden to them. Farmers suffer a loss when the market price of rice is lower than production costs. To have traders share the farmers' burden and to stabilize prices, the idea of commodity future exchange markets was mooted. In the course of the next century, such markets were established in Holland, England and the United States. The first in the United States was set up in Chicago, Illinois, in 1848 with 82 members.

Meaning

A commodity future exchange market is a centre for sellers and buyers to bid or bargain openly and have contracts for specific delivery of commodities at a given quantity, quality, place and delivery time under the regulations established by brokers who are the members of the market at a definite date and time.

Characteristics of commodities

- (1) The commodity must have the quality standard specified in the contract.
- (2) The commodity must be provided in sufficient quantity.
- (3) The commodity can be stored for a long time.
- (4) The commodity can be raw material or semi-processed.
- (5) The trading price must be free from government control.

Corporate structure and implementation

The market management committee has the following responsibilities:

- establish the place to be the centre for trading;
- write regulations and standards for trading;
- collect and publish production and marketing information on price movements for members and for the public;
- arbitrate; and
- formulate measures for sellers and buyers to trade according to the contracts.

Membership

Only market members can trade in the market. The members of the market are farmers, processing factories, exporters, importers, traders, brokers including investors, individuals and legal persons that have been approved by the committee.

There are three kinds of membership:

- (1) Trading for oneself
- (2) Trading for oneself and others
- (3) Trading for others

The members who do trading for others are called "brothers"; they have to serve customers by

- carrying out commodity future exchange bills;
- carrying out the customer margins, guarantees, account balance, etc;
- providing information; and
- providing advice for investors who do trading in the market.

Structure of the agricultural commodity future exchange market

- (1) The trading house is the place where market members trade openly in a limited time.
- (2) The clearing house prepares the trading and clearing system, records and registers, and guarantees trading in the market.
- (3) Customers who wish to trade in the market can do so through agents or brokers. There are two types of customer:
 - 1) Guarantors, meaning the persons who have agricultural produce or the right of possession and/or want to guarantee or disseminate the risk of loss; and
 - 2) Investors, meaning the persons who want to profit from the change or difference in price in the future.

Trading methodologies

- (1) Non-member buyers and sellers must trade through agents or brokers who are market members.
- (2) The brokers send a buying order or the order of a customer to the company for document stamping, including details of date, time, customer's number, etc.
- (3) Trading orders pass through the trading house for stamping of date and time.
- (4) The offices of the market members will be the trading house.
- (5) After the deal has been made, market officers record the details and information on prices for publicity.
- (6) The officers confirm the exchange in the market to their company.
- (7) Agents or brokers confirm the exchange to the customers.
- (8) Each trading participant's documents are cleared through the clearing house.

Advantages of a commodity future exchange market

- (1) The commodity future exchange market will solve the price fluctuation problem and ensure the income of farmers by providing planning information for cultivation and distribution.
- (2) The commodity future exchange market helps traders and manufacturers by fixing prices and quantities.
- (3) Investors can benefit from trading in the market rather than keeping their money in the bank.
- (4) The commodity future exchange market leads to and helps connected businesses such as warehouses, silos and cold storage, including information and data services.

3.3 Contract market

Meaning: It is a market which the Department of Internal Trade of the Ministry of Commerce establishes for agriculturists or agricultural institutes as sellers signing contracts with processing factories and for all kinds of traders as buyers in the form of standard contracts under the supervision and collaboration of the authorities.

Necessity

- The fluctuations in price and quantity of agricultural produce are a problem for agriculturists when there is no guarantee for trading.

- Processing factories or exporters face production and marketing problems.
- The cash market is unable to serve the needs of processing factories and exporters.
- Increasing marketing channels is a way for trading to reduce risk from price and produce fluctuation.

Methodology of establishing contract markets

To establish a farming contract market, both buyer and seller should be sincere for their mutual benefit and act fairly under the supervision and with the collaboration of the authorities.

- (1) Consider the suitability and possibility of each product; and
- (2) Promote a commodity trading contract by setting up a meeting between buyer, seller and the public-sector organization concerned.

Advantages

- (1) Agriculture side
 - 1) Increasing the choices for agriculturists
 - 2) Eliminating market problems
 - 3) Ensuring certainty of income
 - 4) Increasing credit for producer
- (2) Processing-factory side
 - 1) Increases quality and standard of production as needed; reduces losses in the production process, which can reduce the cost of production
 - 2) Stabilizes cost and quantity of products
- (3) Consumer and economic side
 - 1) Good quality and standard products for consumers
 - 2) Increased export of any kinds of products
 - 3) Leading to continuity in industry

The products that can be traded in contract markets are tomato, ginger, baby corn, Chinese mustard, asparagus, bamboo shoot, rambutan, lychee, longan, pineapple, papaya, soybean and others.

4. Prices and indexes

4.1 Price of agricultural products

There are several types of price of agricultural products:

- (1) Retail price of fresh food in Bangkok
 - Rice such as *Hom Mali* rice (dept), *Hom Mali* rice (store), rice 100 % (dept), rice 100 % (store)
 - Meat such as pork cut in pieces, chicken not cut in pieces and fresh, chicken eggs No. 3, duck eggs medium size
 - Fresh vegetable Chinese *kales*, water spinach, parsley, Chinese cabbage, cabbage, hot pepper (*Jinda*), lime (Nos. 1-2), lime (Nos. 3-4),
 - Fruit such as tangerine (Rangsit No. 1) and banana
- (2) The wholesale price of important agricultural products in Suphanburi, Nakhon Ratchasima, Bangkok, Hat Yai, Krabi, Nakhon Pathom, Ratchaburi, Chonburi and Chachoengsao is as follows:

- Second crop paddy 15 % moisture or less; cassava 25 % starch; maize (buying price at factory); soybean, Class 2 (crusher price); rubber sheet, Class 3; oil palm fresh fruit bunch, weighing more than 15 kg; dry coconuts, large (Tap Sakae district); garlic, large (new); onion (Fang district); shallot, large (northern region); mung bean (Class 1); black pepper (Class 1); hot pepper (*Jinda*)
 - Fishmeal; live swine (Bangkok outskirts); live chicken (slaughterhouse); chicken eggs (mixed sizes); black tiger shrimp, 90-100 shrimp/kg (the Fish Marketing Organization, Bangkok)
- (3) Retail price of fresh food with information reviewed daily
- Meat such as pork cut in pieces (farm price); ham, shoulder and cuts of pig; fat; chicken not cut in pieces; and edible offal
 - Fresh duck egg (medium size), chicken eggs (No. 3)
 - Vegetables such as Chinese *kales*, water spinach, cabbage, Chinese *pakchoi*, cucumber, tomato, yard-long bean, white gourd
 - Spices such as coriander, green onion, lime (Nos. 1-2), hot pepper
 - Fruit such as tangerine (No. 1), banana (*kluai hom*), papaya (*kag dam*), banana (*kluai khai*), guava (*sali*), mango (*khieo sawoei*)
- (4) Farm crop and animal feed price
- Silo
 - Animal feed factory
 - Mung bean Class 1 and Class 2
 - Sorghum (white sorghum and red sorghum)
 - Cassava chips and pellets
 - Tapioca super flour
 - Black matpe bean (black matpe bean Class 1, black matpe bean Class 2, red bamboo bean, white bean, black bean)
 - Soybean Class 1, soybean Class 2 (for oil crushing)
 - Gunny bags such as new bags unit, used bags unit and used bag with logo unit
- (5) Rice price and situation
The price of rice in each item is divided by the percentage of moisture and grade of rice.

4.2 Prices of consumer agricultural products

The prices of consumer agricultural products are reviewed for the average price and monthly reports as follows:

- Food and beverage at department stores and retail shops
 - UHT milk (natural-flavour Foremost 250cc)
 - Bear brand honey-flavoured powdered milk (450 g)
 - Sweetened condensed milk (395 g Mali brand)
 - Vegetable oil of soybean and palm (1 litre)
 - Tipparos brand fish sauce (700 cc)

4.3 Thailand's general consumer price index from 1994 to 2000

The consumer price index is reviewed for the whole country, Bangkok Metropolis and the central, northern, north-eastern and southern regions each year with 1994 as benchmark.

4.4 Producer price index

Meaning: The producer price index measures the average price change of producer prices compared with the same period in the base year.

Objective: To measure the change of revenue or income of producers by the change in producer prices while other production factors are fixed.

Advantages

- 1) To deflate gross output and/or value added and/or intermediate cost from current price to constant or benchmark price in order to measure the economic growth rate of producers
- 2) To measure inflation of producer
- 3) To indicate the trading situation of the country
- 4) To use as guideline for budget allocation and monetary policy formulation
- 5) To use for production and marketing policy and planning
- 6) For adjusting long-term trading contracts

Methodology

- 1) Base year: 1995
- 2) Create a producer price index structure by using the input/output table from NESDB, which is separated into three groups: products of agriculture, mining products and manufactured products.
- 3) Indicate important weight of commodity by calculating the proportion of gross output of the group of commodities in each item.
- 4) Indicate data source and select sample of item of commodity.
- 5) Indicate specific characteristics of commodities such as type, size, biological characteristics, unit of commodity, packaging, raw material, code of commodity, producer's company, brand name, etc
- 6) Collect data of price for 441 items:
 - weekly for rapidly changing price commodities
 - monthly for slowly changing price commodities
- 7) Calculate the price index by using the Laspeyres formula.

Classification: Products are classified using two methods:

1. Classification of products by activity (CPA), which is composed of a total index and three categories: agricultural product, mining product and industrial product. The CPA of agricultural products is divided into two subsectors as follows:
 - 1) Agriculture, livestock and forestry products
 - 2) Fishery products
2. Stage of processing (SOP), which is divided into three categories as follows:
 - 1) Finished goods
 - Consumer goods
 - Capital equipment
 - 2) Intermediate materials
 - Intermediate materials for industry
 - (1) Intermediate foods and feeds
 - (2) Intermediate materials less foods and feeds
 - Intermediate construction goods
 - 3) Crude material commodity
 - (1) Crude material for food
 - (2) Crude non-food materials

Source of data: Most agricultural prices are collected from the Office of Agricultural Economics. Prices not collected by the office are obtained from the officers of DIT or related offices in each province.

Dissemination

- ❑ Reported every month, every six months and annually
- ❑ Reported on the website <http://www.dit.go.th>

4.5 Consumer price index

Meaning: the statistics applied to measure change in retail prices and services

Objective: to measure changes of retail price and service in the city (urban area), of those who have a B6 000-36 000 income by using the base year of 1994

Methodology

- 1) Benchmark year 1994
- 2) Criteria for sample selection are determined from scale of distribution, popularity, quality, necessity (relative importance)
- 3) Specifications of a commodity such as brand, raw material, concrete feature, abstract feature, size, quality, version, grade, packaging, producer's country and price unit are defined centrally. Price of goods and service data collection conducted by central and regional offices can be described as follows:
 - Classification by frequency of data collection
 - Central office collects weekly price of 74 items for 12 months
 - Regional offices collect weekly price
 - 1) From urban informants (food) in 4 regions, 36 provinces and 71 items in each province
 - 2) From rural informants (food) in 4 regions, 23 provinces and 63 items in each province
 - Classification by consumer price index
 - Food and beverage
 - Other (non-food and beverage)
- 4) Food and beverage of the general consumer price consists of seven subgroups with 115 items:
 - ❑ General consumer price index: To calculate the general consumer price index, retail goods are divided into seven groups: food and beverage and six groups of non-food and beverage. Food and beverage comprises seven subgroups with 115 items as follows:
 - 1) Rice, flour, flour products totalling 6 items
 - 2) Meat, duck, chicken and fishing products comprising three groups with 32 items:
 - Meat, 8 items
 - Duck, chicken, 3 items
 - Fish and marine fishing products, 21 items
 - 3) Vegetable and fruit comprising two groups with 33 items:
 - Vegetable, 25 items
 - Fruit, 8 items
 - 4) Egg and dairy products, 7 items
 - 5) Other food bought from market, 17 items
 - 6) Non-alcoholic drink, 11 items
 - 7) Food bought for consumption, 9 items

- ❑ Low-income consumer price index: comprises seven groups: food and beverage and six groups on non-food and beverage. Food and beverage comprises seven subgroups with 104 items as follows:
 - 1) Rice, flour and flour products, 5 items
 - 2) Meat, duck, chicken and fishery products comprising three groups with 27 items (meat, 8 items; duck, chicken, 3 items; fish and marine fishery products, 16 items)
 - 3) Vegetable and fruit comprising two groups with 32 items (vegetables, 24 items; fruit, 8 items)
 - 4) Egg and dairy products, 7 items
 - 5) Other food bought from market, 16 items
 - 6) Non-alcoholic drinks, 9 items
 - 7) Food bought for consumption, 8 items
- ❑ Rural consumer price index: classified by retailed goods items into seven groups: food and beverage and six groups on non-food and beverage. Food and beverage comprises seven subgroups with 107 items as follows:
 - 1) Rice, flour and flour products, 6 items
 - 2) Meat, duck, chicken and fishery products comprising three groups with 26 items (meat, 7 items; duck, chicken, 2 items; fish and marine fishery products, 17 items)
 - 3) Vegetable and fruit comprising two groups with 34 items (vegetables, 26 items; fruit, 8 items)
 - 4) Egg and dairy products, 7 items
 - 5) Other food bought from market, 18 items
 - 6) Non-alcoholic drinks, 8 items
 - 7) Food bought for consumption, 8 items

5. Period of data collection

- ❑ collected weekly for commodities with frequent price fluctuations (fresh food)
- ❑ collected monthly for all other commodities

6. Source of retail price data collection

- ❑ Fresh markets
- ❑ Retail shops
- ❑ Department stores

Data are collected from 12 markets in Bangkok, city (urban) markets in 36 provinces, and rural markets in 23 provinces.

USE OF AGRICULTURAL STATISTICS IN THE DEVELOPMENT OF POLICY AND PLAN

I. Data obtained from the agriculture ministry for quarterly and annual GDP analysis by product and by province

OAE

- Product obtained from survey and forecast, production cost, ex-farm price of 25 economic crops, i.e. main rice, second rice, cassava, vegetable, fruit, peanut, maize, mung bean, oil palm, pineapple, soybean, sugarcane, castor bean, chilli, paprika, cotton, garlic, shallot, onion, jute, kapok, pepper, sesame, coconut and sorghum
- Forecast of three livestock productions, namely swine, beef cow, and buffalo
- Product, price and production cost of raw milk
- Production cost and price of five livestock types, namely swine, meat chicken, egg chicken, meat duck and egg duck

DOAE

- Product obtained from survey and forecast, production cost, ex-farm price of three economic crops, namely cocoa, tobacco and watermelon
- Product, cost and price of weft silk and warp silk

DLD

- Statistics of criminal license (number of animals permitted for slaughter) of swine, cow and buffalo
- Statistics of various livestock types, namely beef cow, milk cow, chicken, duck, sheep and goat
- Statistics of livestock import and export

DOF

- Statistics of fishery in Thailand
- Statistics of marine fishery
- Statistics of quantity and value of freshwater fishery at various landing places

RRI, DOA

- Export quantity of various rubber types
- Rubber quantity for domestic use

RFD

- Statistics of forestry

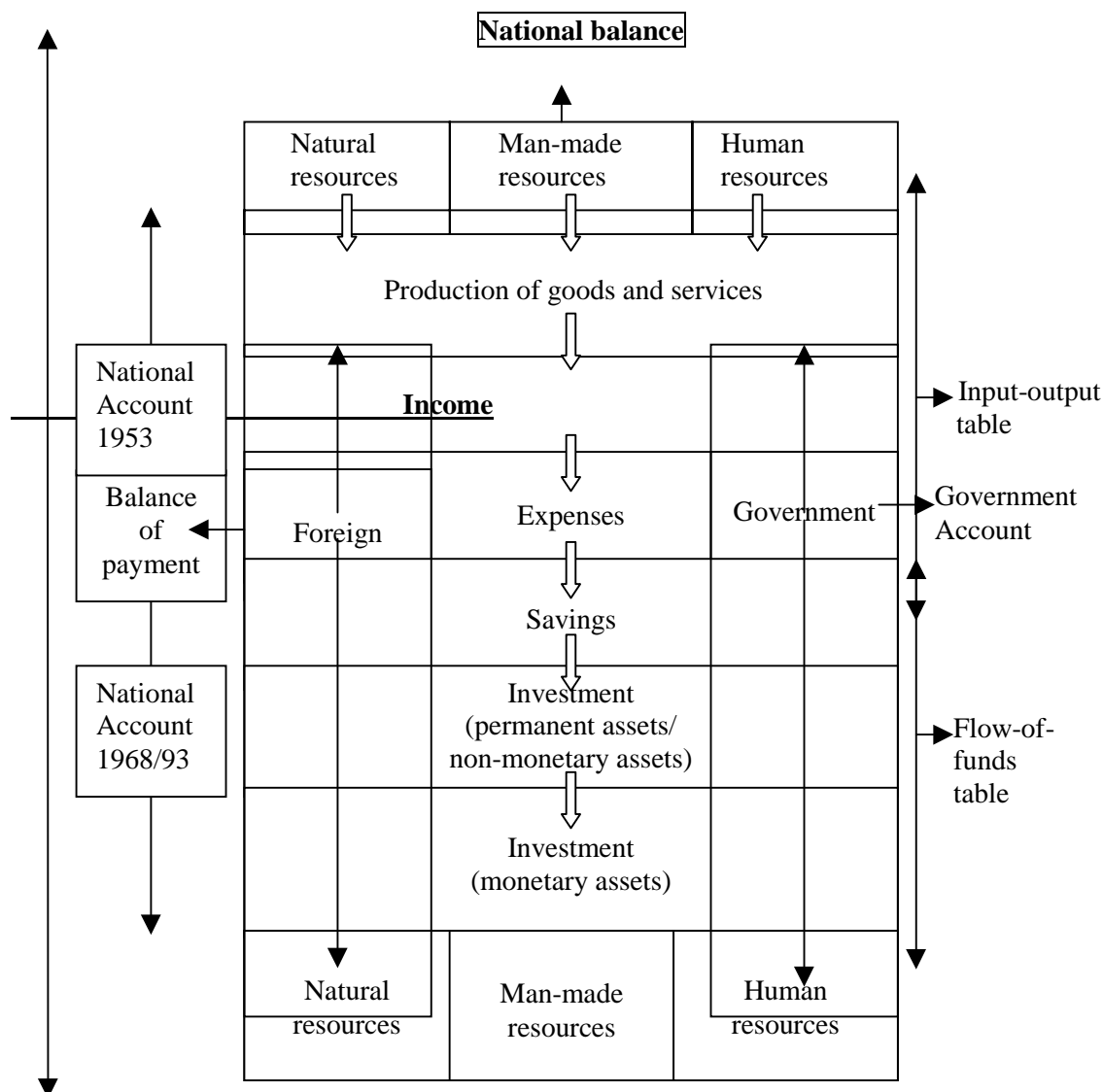
II. Data constraints

- Improvement and correction of previous data: It is often found that the result of product forecast is different from that of the previous year. This causes inconsistency in the quarterly GDP analysis of the agricultural sector, especially the crop product forecast obtained from the OAE.
- Data delay: It is often found that fishery statistics of DOF are two years late. Current year statistics must therefore be estimated by using previous trends and other indicators such as export quantity of shrimp and fish.
- Data completeness: affects both coverage and accuracy of GDP analysis such as production of new popular vegetables, fruit and ornamental plants.

III. Economic account and agricultural data requirement for economic account preparation

1. Data system for national policy and planning

Data system for planning is established to demonstrate the economic and social mechanisms of the country. This shows the component and economic linkage which is related to data use and reference.



2. Components of important economic accounts

2.1 National income account

The existing Thailand national income account is the combination of the system of national accounts and supporting tables (1953) and of the system of national accounts (1968). The Thailand national income account includes National income accounts,

Input-output table, Flow of fund accounts and National balance sheet. This is consistent with the system of national accounts (1968). As for the national income accounts, the account system is still the system of national accounts and supporting tables (1953).

The national income account comprises six main accounts as follows:

- 1) *The domestic product account* shows production in the economic system of 11 production sectors and their product distribution.
- 2) *The national income account* shows the return of production input whose Thai resident economic units are obtained from the production of goods and services as appears in the domestic product account.
- 3) *The domestic capital formation account* shows the country's investment and savings. The value of savings is obtained from income, as appears in the national income account, less expenses obtained from the domestic product account. Savings and investment in this table covers both private investment and public investment, including government and state enterprises. If the savings are used for investment, a savings-investment gap can occur if the substituted savings are not sufficient. This amount of value demonstrates the surplus of the nation on current account or the balance on current account.
- 4) *The household and private non-profit institution account* shows income and expenses of the household and private non-profit institution production sector.
- 5) *The general government account* shows government income and expenses including central government, local government, non-profit state enterprises, state-run funds such as the social insurance fund, and other independent organizations established under the constitution. Such expenses cover only fixed expenses. The difference between income and expenses is defined as the national finance balance.
- 6) *The external transaction or the rest of the world account* shows economic transactions between Thai residents or Thai and non-Thai residents such as export and import of goods and services, transfer of income obtained from business and from working in foreign countries.

Generally, the figures that appear in the foreign account table must be the same as those that appear in the balance of payment account table of the Bank of Thailand, such as export, import, return of foreign input, and transfer. In addition, the surplus of the nation on current account in the foreign account table must be the same as the balance on current account in the balance of payment account table. However, Thailand's account still shows differences in the item of foreign assistance, the information for which is obtained from the Department of Technical Cooperation. The assistance includes both cash and non-cash (in kind) contribution while the Bank of Thailand estimation is mainly focused on cash.

Other important detailed tables are available, such as the balance sheet of national income and expenditure at current market price table. The table demonstrates the balance in GDP between production and expenses as follows:

$$Y = C+I+G+X-M$$

However, in practice, the results obtained are different, and the difference is called statistical discrepancy. In the case of Thailand, the statistical discrepancy, as it appears in the annual national account, is less than 2.5 percent compared to GDP of

production. As for the quarterly national account, the value can be higher than 2.5 percent. This is because the annual account is obtained from the results of data analysis whereas the quarterly account is derived from a combination of data analysis and other indicators.

In the current national account of Thailand, current market prices and constant prices are presented in GDP, expenditure and capital formation tables. However, only current market prices are presented in the items of export, import, services and national income.

2.2 Input-output table

The input-output table shows the correlation between production and uses, including final use of goods and services, and intermediate consumption. It is noted that the items existing in the input table are commodities and services, not activities as appear in the national income account. In the case of Thailand, the table includes 180 items of commodities and services and is called the 180 x 180 table, as it comprises 180 items in both row and column. These items are also grouped into 58 x 58 and 26 x 26 tables. The input-output table of Thailand is prepared every five years as it is believed that production structure and input do not change much during the period. So far, the tables of 1975, 1980, 1985, 1990 and 1995 have been analysed and publicized. In the past, the input-output table comprised two types: non-competitiveness and competitiveness. Non-competitiveness means that domestic products and imported products cannot be substituted for each other, whereas they can be replaced for competitiveness. At present only competitiveness is available, as it is assumed that there is no non-competitive structure.

The criteria to define items for the input-output table are not fixed as applied in the national account system. The items in the table are allocated in accordance with the structure of important commodities and services in the industrial sector which is linked to inter-industry demand, the most important key of the input-output table.

Final use of goods and services covers final consumption expenditure, gross fixed capital formation, increase in stocks, and exports. Final consumption comprises final consumption expenditure of household, purchase of durable and non-durable goods subtracted by net sale of used goods, and final consumption expenditure of government services. The final consumption expenditure of government services includes value of goods and services produced and used by government as appears in the current account, capital goods which cannot be extracted from government investment, and final consumption expenditure of private non-profit services to household.

Intermediate consumption comprises intermediate consumption of industries, intermediate consumption of government, and intermediate consumption of private non-profit services to households. The intermediate consumption of industries means non-durable goods and services consumed by the production process. This item includes expenses for maintenance, research and development, indirect expenses, and transfer costs of land transfer and monetary assets.

The following table shows input and output distribution in row and column respectively.

	→ Output distribution		
↓ Input distribution	Intermediate demand	Final demand	Total product
	Value added		
	Gross output		

From the above table, the matrix can be shown as follows:

$$X = AX + FD$$

or

$$X' = X'A' + VA$$

in which

- X = gross output
A = coefficient matrix
FD = final demand
VA = value added

According to Thailand's input-output table, FD includes:

1. C = private consumption expenditure
2. I = gross fixed capital formation (private investment + public investment) and change in inventories
3. G = government consumption expenditure (current consumption expenditure)
4. X = export of goods and services
5. M = import of goods and services

VA includes:

1. Wages and salaries
2. Operating surplus
3. Depreciation
4. Net indirect taxes

2.3 Flow of fund accounts

Flow of fund accounts demonstrate transactions of both monetary and non-monetary funds flowing among economic institutions within 1 year of account period. At present, the flow of fund account system of Thailand comprises the following economic institutions:

- (1) Household (HH)

- (2) Registered business (BINC)
- (3) Central government (GC)
- (4) Local government (GL)
- (5) State enterprise (BSE)
- (6) Foreign sector (R/W)
- (7) Financial institution (FIN.CON)

The flow of fund accounts describes the investment in each economic institution starting from gross savings. The details of savings are also described, including the amount of savings in each institution, and gross capital formation. Gross capital formation comprises fixed assets including building, machinery, equipment, vehicle and transportation devices, furniture, forest plantation and intellectual property such as computer software. Net investment on land business (real estate) of each institution is also included. The value of this item becomes zero for the whole country. The difference between savings and investment shows the savings situation of each institution and the savings-investment gap of the country, which is equal to the balance on current accounts in the balance of payment of the country.

The flow of fund accounts comprises two parts. The first or upper part of the account is called “non-financial accounts” and shows non-financial assets. The detail includes savings and investment of fixed assets and net land business income. The second or lower part of the account is called “financial accounts” and shows financial assets. The assets are separated into (1) acquisition of financial assets comprised of monetary assets such as cash, deposit and loan, and (2) incurrence of liabilities, meaning monetary debt including the same categories as assets. The difference between debts and assets is called the financial surplus (or deficit) showing the change of net wealth of each economic institution. The consolidation of that is therefore equal to the current account in the balance of payment of the country.

2.4 Financial balance table

The table illustrates public economic transactions covering government operation, sources, payment, and cash balance. This table is found in the manual of public financial statistics preparation of the International Monetary Fund. The latest improved version has two main tables, as follows:

1. The government operation table, which includes the following main items:
 - 1.1 Income such as tax, provident fund, subsidy and other
 - 1.2 Expenses such as salary/wage, goods/service consumption, depreciation, support fund, subsidy, and other
 - 1.3 Non-financial asset transactions includes net investment on fixed assets, net investment on valuables, exchange value of reserve goods, and net investment on non-reproducible assets
 - 1.4 Holding of net financial assets includes financial assets for the target of public policy administration, and financial assets for the target of liquidity administration
 - 1.5 Net debt

Item 1.1 subtracted by Item 1.2 is called the net operating balance. When the net operating balance is included in depreciation cost, the gross operating

balance is obtained. When the gross operating balance is added to Item 1.3, a surplus result means net lending and a minus result means net borrowing.

2. The statement of sources and uses of cash illustrates the use or circulation of cash involved in transactions of income and expenses, investment assets, financial assets and debt; the net change of the cash balance; and improvement of the cash system as reserve financial system.

2.5 Balance of payment

This table shows the transactions between Thai resident and non-Thai residents as analysed by the Bank of Thailand; it can be found as Table 44 Balance of Payments in the bank's monthly economic report. The analysis system of this table is prepared in accordance with the *Balance of Payments Manual* of the IMF. The latest version was improved and distributed in 1977.

The main components of the balance of payments are as follows:

- I. Current account
 - A. Goods and services
 - a. Goods
 - b. Services
 - B. Income
 - C. Current transfer
- II. Capital and finance accounts
 - A. Capital account
 - B. Finance account
- III. Allocation of SDRs
- IV. Errors and omissions
- V. Overall balance
- VI. Reserve assets

2.6 National balance sheet

The national balance sheet is under preparation. At present, stock capital has been estimated as one of the components of the national balance sheet by using the perpetual inventory model. Under this model, capital stock is estimated from gross fixed capital formation of the expected economic lifetime of each asset, i.e. the lifetime of a building is 50 years, that of machinery and equipment 10-15 years.

The capital stock obtained from this method is different from what is estimated by book value as appears in the balance sheet of each business in some countries such as Japan. This method is undertaken by surveying capital stock and using it as current benchmark. This method provides highly accurate information but is expensive.

The important components of the national balance are as follows:

1. Opening the balance sheet
2. Capital assets obtained from investment during the year, including:
 - 2.1 Capital accounts
 - 2.2 Financial accounts
3. Changes of capital assets value including:

- 3.1 Other changes in the volume of assets accounts
- 3.2 Revaluation accounts
 - 3.2.1 Neutral holding gains and losses
 - 3.2.2 Real holding gains and losses
- 4. Closing the balance sheet

If all tables are put together, the social accounting matrix is obtained and its size can be assigned as needed. The social accounting matrix shows the balance or outlays of transactions and receipts of each account. In the matrix, any account in the national account is represented by one row and one column. The rows represent receipts while outlays are shown by columns. The number of rows and columns must be the same, i.e. if number 1 represents the production account, Row 1 and Column 1 show receipts and outlays of the production account. In any social accounting matrix, the number of rows must be equal to the number of columns and the total element of row must be equal to that of column. It means that total receipts must be equal to total outlays as shown in the account balance.

As rows represent receipts and columns are outlays, the element value in each cell shows the receipt value of one account caused by the outlay value of another account. This is the same concept as the national account system using the dual account method, that is, any element must be found twice; the left-hand side represents the receipts and the right-hand side the outlays of that account.

From the above concept, matrix formation shows the systematic and consistent linkage of all accounts in the national account system. It is noted that receipt and outlay in every account of the matrix must be equal or balanced. As the social account matrix shows the value of the whole macroeconomic system, the straight line mathematical analysis technique can therefore be applied for economic value analysis. This technique can also be applied to economic analysis relating to social and environmental aspects.

3. Use of agricultural statistics in economic accounting

3.1 National income

- 1) Product obtained from survey and forecast
- 2) Agricultural area such as crops planted and harvested areas, areas under fishery culture or number of ponds
- 3) Production cost, labour wage
- 4) Product price
- 5) Cultivation period
- 6) Crops and agricultural products for household consumption
- 7) Agricultural household income and expenses classified by type of income and expenses
- 8) Use of agricultural machinery and equipment: hire, rent
- 9) Export and import of agricultural commodities
- 10) Criminal license of cow, buffalo and swine
- 11) Food balance sheet
- 12) Data classification at provincial and regional levels
- 13) Frequency of monthly data record

3.2 Production input and product sheet

The information needed is similar to that of the national income but focused on the detail of the production cost structure.

3.3 Capital economic account

The data used includes monetary stock and flow of agricultural household, comprising debts and assets. Assets cover both fixed assets and monetary assets during the account period or one year. So far, the agricultural household sector account has not been separately shown in the capital economic account; such data have therefore not been used. However, it will be useful to conduct comparative analysis between agricultural and non-agricultural households for the social accounting matrix.

3.4 National balance sheet

The information covers farmers' assets and debts, including fixed assets, land, farm house, intellectual property and monetary assets. Similar to the capital economic account, at present it is not necessary to collect that information. Several countries, including Thailand, have produced national balance sheets for the whole country or separated into public and private sectors.

IV. Questions, answers and comments

NSO

◆ Agricultural census

Q: What are the guidelines for solving the problems of the 1993 agricultural census?

A: 1) Administration/management

- Village public health volunteers of the Ministry of Public Health will be assigned as enumerators.
- Subdistrict agricultural officers of the ministry of agriculture will be assigned as technical officers.

2) Intelligent characteristic restricted (ICR) will be used for scanning information from the questionnaire instead of manual data entry to prevent errors in entering the data.

◆ Marine fishery census

Q: Why has the marine fishery survey been conducted in only 22 provinces?

A: Because of constraints of cooperation from operators, and the questions are not understandable.

Q: Is there any training for enumerators?

A: Two training courses are provided: master training for technicians and group training for enumerators.

Q: Will there be improvement regarding agricultural coverage in SK46 to reflect the present situation?

A: Coordination with users is usually undertaken, and this year the freshwater fishery culture household is included in the FAO project.

- C: NSO is suggested to cooperate with OAE in data collection to avoid data inconsistency as the agriculture ministry already has subdistrict centres for technology transfer and the subdistrict agricultural officers are responsible for data collection and reporting to the centre.

**DOAE
DLD**

- Q: How to obtain the list of animal food factories?
A: From license applications granted to ground fish factories.
Q: How to obtain the total production quantity?
A: NESDB estimates from inventory subtracted by criminal license slaughter.
C: As the quantity survey is undertaken every two years, NSO should investigate how to obtain precise information from the main producers.
Q: How to solve the problem of illegal import of cow and buffalo in border areas?
A: The estimation is adjusted from the import criminal license.

**DOF
CPD**

- Q: How is the accuracy of cooperative statistics conducted by the Suan Dusit Rajabhath Institute?
A: 90-percent accuracy for name and address; 60 percent of detail not available; questions of crop cultivation and animal raising are missing.

DIT

- Q: How are the 24 provinces of data source to be fixed or changed?
A: Subject to change depending on each index.
Q: What is the present base year? And after economic change, is there any change of the base year?
A: The NESDB 1995 base year is used for the producer price index; the NSO 1998 is adjusted for calculation of the 2002 consumer price index.
C: A base year during the economic crisis should be considered, as the data involved might have changed.
C: So far, NESDB uses 1988 as base year, it is recommended to be replaced by 2000 or 2001. However, more comments from users are also important.
C: NESDB will change the formula for fixed price calculation; cooperation from the agriculture ministry and other agencies is therefore necessary. In this regard, Laspeyres Chain will be replaced by Chain Index.
C: Before the economic crisis, NESDB used 1995 as base year and data were obtained from the OAE and the Ministry of Industry. In 2001, factory information was changed, DIT might therefore change its base year to reflect the real economic situation.
C: Laspeyres is usually used for export index price calculation in which every factor is fixed. In reality, the sample improvement technique is applied, such as rotation of sample/commodity item. Laspeyres, Fisher, Chain Fisher can therefore be used for export index price calculation as the commodity price changes rapidly.
Q: Can one request a password to access non-distributed data?
A: To be considered case by case.

NESDB

- Q: Is there any guideline to adjust simple processing data from NESDB and OAE to be in the same series?
A: New series must be set up. However, this will cause problems with users as they usually do not agree with two series of data. At present NESDB tries to

retain the series for about ten years, after that it will adjust both database and system. In case of minor changes, it can be connected; in case of big changes, all series will be adjusted.

- C: At present USDA changes the series which is similar to NESDB. More details of data are needed. Data producers and users must understand each other before using the data.
- C: The development of a data system is interesting as it will be conducted within one year, by using budget for economic stimulation, for research and training.
- C: NESDB and relevant agencies have prepared related issues and can start working as soon as budget is approved. OAE for example has two projects. However, there is no project on personnel training in 2002. The NESDB board suggests that statistics personnel should be developed to strengthen capability. So far, they have been ignored by decision-makers.
- C: NESDB would like to produce a balance sheet but still lacks several levels of information, such as production cost of permanent tree data including planting, fertilizing, maintenance and so on. This needs cooperation from the relevant agencies.
- C: Some comments from the NESDB board:
 - The government does not realize the importance of statistics work. This should be reviewed and improved. Budget is also one of the problems.
 - Statistics personnel are qualified but lack training.
 - There is very little statistics research; its role should be increased.
- C: The Ninth Economic and Social Development Plan will focus on the following:
 - to increase agricultural efficiency by increasing total factor productivity;
 - to strengthen farmer institutions; and
 - to sustain the agricultural production potential without natural resource destruction.
- C: Simple processing of agricultural produce will be more important. Data collection on related issues is therefore useful.
- C: Additional comments from NSO:
 - Statistics personnel development is to be considered by NSO.
 - NSO usually organizes training on data processing/new software.
 - NSO tries to serve users about simple agricultural processing and finds that data are not missing but still not clearly separated.
 - The household industry survey is usually conducted every two years. The latest survey was undertaken in 2001 and simple processing industry was included.

**AGENDA OF THE NATIONAL SEMINAR ON THE SYSTEM OF
FOOD AND AGRICULTURAL STATISTICS IN THAILAND
Ministry of Agriculture and Cooperatives
Office of Agricultural Economics
19 December 2001, Bangkok, Thailand
Meeting Room 1, 8th floor, OAE Building.
&
FAO Regional Project
" Improvement of Agricultural Statistics in Asia and Pacific Countries "
GCP/RAS/171/JPN**

PROGRAMME

- 08.30 – 09.00 AM : Registration
- 09.00 – 09.40 AM : Opening Ceremony
- Welcome Statement by Dr. Adisak Sreesunpagit
Secretary General of Office of Agricultural Economics
- 09.40 – 09.50 AM : Introduce guest and contents of the seminar
- 09.50 – 10.10 AM : Coffee break
- 10.10 – 10.50 AM : Project Introduction
“Improvement of Agricultural Statistics in Asia and Pacific
Countries” by Mr. Ryuki Ikeda
Agricultural Statistics Expert , FAO RAP
- 10.50 – 11.20 AM : System of Agricultural Statistics in National Statistic Office
by Ms. Jirawan Boonperm
Director of Economic Statistic Division
National Statistical Office
- Discussion
- 11.20 – 11.50 AM : Methodology for data collection in
Office of Agricultural Economics
by Mr. Chalit Amnuay,
Director of Center for Agricultural Information
- Discussion
- 11.50 – 13.00 PM : LUNCH
- 13.00 – 13.30 PM : Data compilation for Agricultural Extension
by Mr. Ekachai O-Charoen
Director of Planning Division
Department of Agricultural and Extension
- Discussion

- 13.30 – 14.00 PM : Data collection for Livestock
by Mr. Trisadee Chaosuanchareon
Director of Planning Division
Planning Division
Department of Livestock Development
- 14.00 – 14.30 PM : Discussion
: Data collection for Fishery
by Mr. Wattana Leelapat
Director of Fisheries Economics Division
Department of Fisheries
- 14.30 – 14.50 PM : Coffee break
- 14.50 – 15.20 PM : Data Compilation and Analysis in Ministry of Commerce
by Ms. Nateetip Tongkou - on
Director, Trade and Economic Indices Bureau
Ministry of Commerce
- 15.20 – 15.50 PM : Discussion
: Data compilation for cooperatives promotion
by Mr. Sutut Wongsumpanchai
Director of Planning Division
Cooperative Promotion Department
- 15.50 – 16.20 PM : Discussion
: Application of the use of Agricultural statistics
in planning and policy making in Thailand
by Mr. Pak Tongsom
Director of National Accounts Division
Office of the National Economic and
Social Development Board
- 16.20 – 16.40 PM : Discussion
: Conclusion
by Ms. Anchalee Ouraikul
Deputy Secretary General
Office of Agricultural Economics
- 16.40 – 17.00 PM : Closed session

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OPENING ADDRESS

by

Dr Adisak Sreesunpagit

Secretary General of the Office of Agricultural Economics

Deputy Secretary General of the Office of Agricultural Economics,
Mr Ryuki IKEDA, FAO expert,
Distinguished guests,
Ladies and gentlemen,

I am very pleased to be here today to preside over the opening ceremony of the “National seminar on the system of food and agriculture statistics in Thailand” organized at the Centre for Agricultural Information. Let me first extend sincere thanks to the United Nation’s Food and Agricultural Organization for Asia and the Pacific (FAO RAP) for supporting this seminar.

As we are aware, FAO realizes the importance of agricultural statistics, which can be seen from FAO participation in agricultural statistics activities both in Thailand and in other countries.

The participants to this seminar are from various agencies responsible for the main agricultural statistics of Thailand, including direct and indirect data producers and users. I am confident that all of us are aware of the importance of agricultural statistics to our respective agencies as well as to our country as a whole. We also realize the problems encountered during data collection and distribution.

It is opportune that we participate in the seminar today to discuss problems and exchange ideas and suggestions which will lead to good cooperation in the future. I therefore encourage all of you to use this important opportunity to propose and recommend guidelines for the operation of agricultural statistics activities relevant to your and others’ responsibilities. This is for the benefit of the country as a whole to obtain complete and reliable information sufficient for the development of the country.

I was informed that FAO will contribute to the improvement of the agricultural statistics system for data exchange among agencies involved by using a computer system. In the future, database linkages among agencies in Thailand and the Asia Pacific region will be available.

In this regard, it is necessary for every agency to be prepared to facilitate such a system, especially in the aspects of personnel development and statistics improvement.

On behalf of the Office of Agricultural Economics, I am pleased to take this opportunity to welcome all of you and I wish this seminar every success. I now declare the seminar open.

Thank you.

OPENING STATEMENT

by

Ryuki IKEDA

Agricultural Statistics Expert

Dr Adisak Sreesunpagit, Secretary General of the Office of Agricultural Economics,
Distinguished guests,
Ladies and gentlemen,

On behalf of the FAO regional project “Improvement of agricultural statistics in Asia and Pacific countries”, it is my great pleasure to deliver an opening statement for the “National seminar on the system of food and agriculture statistics in Thailand”.

This seminar, which is held jointly by OAE and the project, is to review the current state of food and agriculture statistics among relevant organizations, discuss issues on data gaps and identify demand and expectations of data users.

We recognize that all the countries in the region have endeavoured to develop their food and agriculture statistics. It is indispensable for every country to have sound statistics not only for the country’s development but also for world food security.

In Thailand, relevant organizations such as the NSO, the OAE and other technical departments of the Ministry of Agriculture and Cooperatives have developed a good data collection system corresponding to the administrative and political demand. However, further development is being considered.

I know that the OAE intends to formulate the development plan of agricultural statistics for good coordination and to avoid duplication of work among relevant organizations. The plan will be generated and submitted to the National Statistics Committee in the near future.

I hope that this seminar will contribute to the formulation of the plan through mutual understanding and discussion among relevant organizations.

Ladies and gentlemen,

Taking this opportunity, I would like to introduce my project and future plan of activities. In order to assist the countries, FAO and other international organizations have implemented the technical cooperation programmes. This project is one of the projects in the field of food and agriculture statistics.

The project was formulated based on the recommendation of the sixteenth session of the Asia and Pacific Commission on Agricultural Statistics (APCAS) of FAO in Tokyo in 1996, which discussed the importance of collaboration among countries to share statistics on food and agriculture. The project has been implemented since 1998 with a contribution from the government of Japan.

The project covers sixteen developing countries out of 24 APCAS member countries. So far the project has accomplished several tasks. The first achievement was the evaluation of the

countries' situation on food and agriculture statistics and information through country studies, seminars and workshops, which assisted the participating countries in the development of their statistics and formulation of statistical improvement plans on agriculture. In fact, the seminar is related to this purpose. The other achievement was the formulation of the master plan and the project proposal to establish the statistical data exchange system on agriculture in this region.

The project is now in its last stage. My terms as the project officer will expire in December 2001 and the project itself will end in April 2002. During the project period, the follow-up phase project, entitled "Strengthening the regional data exchange system on food and agriculture statistics in Asia and Pacific countries", has been formulated and will begin in December 2001. The follow-up phase project is expected to contribute to the development of data use for the countries and the region through data analysis, dissemination and sharing based on the formulated master plan of the data exchange system.

Ladies and gentlemen,

Regarding the data exchange system on agricultural statistics, some of you may already know that there is a plan for the development of an ASEAN food security information system or AFSIS. The plan aims to strengthen food security in ASEAN countries. It was officially proposed by OAE on behalf of the government of Thailand in the ASEAN meeting which was held in Medan, Indonesia, on 5 October.

I understand that the concept of AFSIS is similar to the proposed data exchange system of the FAO follow-up phase project in terms of data sharing on food and agriculture. I would like to emphasize the importance of cooperation between the two programmes to use the expertise of both sides and avoid duplicating efforts. We will be able to obtain good results through close cooperation. The results could be disseminated outside of the ASEAN countries and contribute to the food security in Asia and the Pacific region as a whole by improving agricultural statistics and data sharing.

I understand that Thailand is expected to take an initiative for the data exchange system in this region, and relevant organizations have the potential and capacity. However, we should not forget that appropriate data collection is as important as timely data distribution and sharing. In this regard, this seminar will be a forum for future development of Thailand's food and agriculture statistics through active discussion.

Finally, I would like to express my sincere gratitude to the staff of the OAE for their efforts in organizing and making the seminar possible.

Thank you very much.

CLOSING ADDRESS

by

Ms Anchalee Ooraikul

Deputy Secretary General of the Office of Agricultural Economics

Mr Ryuki IKEDA, FAO expert,
Distinguished participants,
Ladies and gentlemen,

Let me congratulate everyone on the success of the “National seminar on the system of food and agriculture statistics in Thailand”. The success can be determined from the participation of the representatives from all involving organizations in agricultural statistics activities in Thailand. Though the seminar lasted only one day, we could achieve our objectives as targeted.

During the seminar, many problems regarding the agricultural data collection system have been identified and discussed. Some of those have been solved; some need to be further discussed among relevant agencies. However, all presentations, questions, recommendations and discussions undertaken today are valuable and of benefit to the development of the agricultural statistics data collection system in Thailand.

On behalf of the organizer, I would like to take this opportunity to extend heartfelt thanks to all participants in this seminar. My sincere thanks are also extended to Mr Ryuki Ikeda and the UN Food and Agriculture Organization for contributing to the event.

I hope that we will have close cooperation in the development of agricultural statistics data collection for the benefit of the country as a whole.

Finally, I wish you all every success in your work.

Thank you.