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IMPROVEMENT OF AGRICULTURAL STATISTICS
IN ASIA AND PACIFIC COUNTRIES
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CURRENT SITUATION OF CAMBODIA'S AGRICULTURAL STATISTICS SYSTEM AND DEVELOPMENT GOAL

Mr Kith Seng
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1. Overview of agriculture

The agricultural sector plays a very important role in Cambodia's economy. Some 85 percent of the Cambodian people rely on agriculture, and since 1960, the agricultural sector has contributed 45-50 percent of the country's gross domestic product in most years.

The current Royal Government of Cambodia considers that its primary task is to alleviate poverty and improve the standards of living of the population, and it views agriculture as the basis for socio-economic development. The vital objective of its development policy is to secure food sufficiency for all people through sustainable production, processing and marketing.

Food security and sustainable agricultural development are interrelated. To implement such a strategic guideline, the Ministry of Agriculture, Forestry and Fisheries is required to adopt appropriate programmes and implementation rules. Data gathering needs to be comprehensive and systematic, so that correct appraisal of the information gathered can contribute to the implementation of current development programmes and definition of future policy plans and goals.

2. Definition, significance and overview of agricultural statistics

Agricultural statistics can be defined as an information and data package covering all areas of agriculture. A working agricultural statistics system is essential in an agricultural economy, as it conditions the success or failure of agricultural planning. Policymakers rely primarily on accurate statistics and, here as in other countries around the world, statistics must be updated according to the requirements of social development and users' needs.

For ten years until 1989, Cambodia was under a socialist regime with a centrally planned economic system. Since then, a market-driven economy has progressively taken over. The agricultural statistics system in particular has been decentralized: individual ministries have set up their own statistics offices to collect data and other information at province level. Besides, within the Ministry of Agriculture, Forestry and Fisheries, the

Department of Planning, Statistics and International Co-operation was set up to gather data and provide agricultural statistics. The various statistics offices play an important role in the collection and publication of data.

Agricultural data collection covers:

- cultivated and harvested area, production and yield of all primary crops;
- cultivated area destroyed by insects, diseases and natural disasters;
- use of fertilizer, chemicals and pesticides as well as rice seeds;
- market price of agricultural products;
- forest exploitation;
- rubber exploitation;
- poultry production; and
- fish catch.

Previously, agricultural statistics took the form of administrative reports, and the primary data was obtained from the village heads. Village heads were required to report on crops and livestock as well as sundry events taking place in their villages to the commune, where their observations were collated and summarized in one more report addressed to the district agriculture office. And so on up to the provincial agriculture department and finally to the ministry of agriculture.

In the current transition from central planning to a free-market system, local-level reports are neither sufficient nor timely. Now that the farmers decide freely on what to grow and to whom to sell their produce, officers in the village and the commune are unable to provide regular or complete reports, which makes it very difficult to get an accurate overall picture. In reality, most of the data are “guestimated” by the district and province agriculture officers.

There are several disadvantages to gathering data through administrative reports. The concept, definition and methodology for making reports being the same, the end result is difficult to interpret, and comparisons between provinces are meaningless. Furthermore, all staff officers are not equally well trained on the methodology used for making such reports. Data are obtained from a single source, which makes it is difficult to assess their correctness and completeness. In the process of being reported from village to ministry, data get distorted, sometimes considerably. And, as the process is slow, data are not obtained on time.

Cambodia’s economy relies heavily on agriculture, so the statistics of cultivated area by varieties of crops and production are very important for the government, the business sector and the general public, especially when there is a food shortage countrywide and market prices of agricultural products are high.

Agricultural statistics have three vital roles, as they provide basic data: for agricultural development planning and import-export policy; for the evaluation of actual

performance; and for the distribution of food from surplus to shortage areas through the monitoring of prices of agricultural products.

There are all sorts of agricultural data, whose use vary greatly. This paper will not attempt to be exhaustive, but will consider only the main categories and uses.

Crop statistics are classified by category of crop (seasonal, yearly, perennial), by region and by season, with the following specifications: planted area, harvested area, destroyed area, weekly or monthly growth, etc; production by category of rice seed, by season, by year, by province or region; and crop yield by season, by year and by region, province or city.

Livestock statistics are classified by category, by year and by province or city, specifying animal age, animal usage (species, draught animal, meat, eggs, etc) and such things as natural animal products, average growth over several years, and so on.

Climate and flood statistics deal with monthly, yearly heat averages, rain and flood by region, etc. Weekly, monthly and yearly climate data allow government agencies to compare current to normal conditions and to make forecasts for the next season.

Prices of agricultural produce are divided into daily, weekly, monthly and yearly wholesale prices as well as daily, weekly, monthly and yearly retail prices, and prices at farm gate or in rural areas by time of year (harvest season, pre-harvest season, in times of shortages, etc).

Statistics of farm holding size by region, category of soil and variety of crops are very important for policy guidelines, land reform programmes or selected development projects.

Besides the primary statistics, there are lots of important statistics which are useful for the preparation of development policy guidelines and production reforms, such as:

- statistics concerning a given crop for the purpose of developing such a crop;
- statistics concerning prices and revenues derived from agricultural products by farmers or agricultural enterprises, which can help assess capital investment requirements, production costs and income derived from other crops, animal husbandry or fish raising;
- statistics on farmers' revenues and expenses to assess living standards in rural areas and determine price indicators;
- statistics on harvest losses to accurately assess yields;
- statistics on food supply and consumption to monitor the level of supply and demand and monitor and evaluate the food balance;
- statistics of cattle slaughtered in slaughterhouses by type, age and weight of animal, etc, to measure meat consumption;
- statistics providing marketing information of use to government agencies, businessmen as well as producers; and more.

Regular information on the state of crops as reported by local officers can be used to forecast cropping trends and thus enable the government to make contingency plans to tackle food shortages. Such information is very important because the climate in Cambodia is not predictable.

Despite limitations in human resources and available means, agricultural statistics activities must be strengthened and improved year by year to satisfy the needs of a growing market.

3. Crop assessment

In the last three years, in collaboration with the World Food Programme and with the support of FAO, crop assessments have been made at the end of each wet season to provide statistics on cultivated area, harvested area, damages and losses, and other information such as population count. The survey incorporates the reports on crop situation provided by each commune head. Each commune head is required to fill a questionnaire about the cultivated area, damages and losses, yield by variety of wet-season rice and estimate for the next dry season. Meanwhile a crop-cutting survey is also made by the sample-selection method. The results of the survey are used to estimate rice production, and rice surplus for the following year.

4. Cost of production

The agriculture ministry has carried out a cost-of-production survey with the support of FAO RAP and ADB. This is the second such survey. The first was carried out by the National Institute of Statistics.

The cost-of-production survey was carried out to be of use to:

- farmers in planning their production and marketing activities;
- government planners in designing appropriate development programmes and projects for the agricultural sector;
- policymakers in the formulation and implementation of appropriate market intervention schemes and the promotion of the country's interregional specialization in agricultural production;
- financial institutions in assessing the feasibility of alternative agricultural ventures; and
- the country's statistical system in estimating the gross value added by agriculture, the current cost of producing paddy rice and maize at national and provincial level, and various measures of profitability in rice and maize farming.

The survey covered rice (wet- and dry-season), maize (white and yellow) in eight provinces, five of which grew mainly dry-season rice and four, maize. The survey used the random sample selection method. In general the cost items included in the cost of production were divided into two main categories: variable cost and fixed cost. Each category was further broken down into cash (paid) and imputed (unpaid) cost.

5. Marketing price information system

The collection of information on market prices is being carried out by the Agricultural Price Office of the Department of Planning, Statistics and International Co-operation of the Ministry of Agriculture, Forestry and Fisheries. The collection of data on wholesale prices covers rice, maize, soybean, other vegetables, orange, banana, other fruit, chicken, duck, pig, sea fish, other seafood, fresh-water fish, dried fish and smoked fish. The information is collected at designated market places and recorded in specific forms designed by the Agricultural Price Office, which are faxed to the central marketing office in Phnom Penh on a daily basis. The marketing office collates the daily information for broadcasting by radio and television. The data are further compiled into monthly information and data bulletins and monthly and yearly analytical reports disseminated among the relevant government agencies and provincial offices, as well as international organizations, humanitarian concerns and other institutions.

6. Statistics dissemination

The statistics office publishes weekly or fortnightly agricultural statistics, depending on the availability of data at local level. Such data are supposed to be sent every week. The main purpose of such reports is to inform on the progress of crops and the advent of natural disasters. Quarterly and yearly bulletins are also published. As already stated, the agricultural market prices are broadcast daily by radio and television, as well as published in the bulletins.

7. Difficulties in data collection

There are a number of constraints that hamper the collection and dissemination of agricultural statistics. As we have seen, administrative reporting results all too often in delayed, inaccurate and incomplete information. The ministry of agriculture lacks the ability and capacity required to substantially improve operations in data collection, data analysis and planning. There are shortages in funding, human resources, transportation and communication means, and in training on agricultural statistics activities. Salaries of the technical staff are very low, and there is no clear-cut system of division of tasks and responsibilities.

8. Agricultural statistics priorities

Given the current situation of Cambodia as a developing country, food crop statistics are given high priority, as there is a constant basic need for planning agricultural production at the national as well as individual levels. Of course, in the context of agricultural development, which conditions economic development in general, all agricultural statistics are important. Actual prioritization of statistical data depends on users' needs, on the level and nature of economic and technological growth searched and achieved, and ultimately on farmers' knowledge as well.

9. Development of agricultural statistics

To upgrade agricultural statistics, we have to strengthen and improve data collection based on the appropriate metrology of statistics, which stresses data collection mainly from farmers. Even if we are unable to collect data regularly and directly from the farmers, sample surveys must be done on a regular basis.

Meanwhile, it is acknowledged that administrative reports are still an important source of agricultural statistics. Therefore, measures must be taken to improve these reports so that we can obtain better results. We must concentrate on staff training in how to make good reports by using accurate monitoring and data collection methodology and by correctly monitoring the report formats.

As in other countries, an agricultural census is carried out every ten years. Such a census has three main objectives: to provide information on livestock and agricultural structural information, provide a plan for sample surveys, and provide basic information and data to organize current crops and livestock statistics.

To achieve this triple aim, a fourth element is required: a review of the management and administration network and monitoring of the agricultural statistics data and information collection. The respective responsibilities of all entities in charge of agricultural statistics activities at central, provincial and district levels must be clearly identified in order to improve efficiency and generate co-operation and synergy among the various entities concerned.

As for our own plans to develop agricultural statistics in Cambodia, the main points are as follows:

- to improve the administrative report system and the management, implementation and monitoring system;
- carry out a survey of rice and livestock for the year 2000;
- carry out the agricultural census;
- develop the food security information system;

- undertake other agricultural surveys (farmers' income and expenditure, price of agricultural products, post-harvest losses, etc); and
- build up capacity through human resource training in statistics data and information collection.

STRENGTHENING AGRICULTURAL STATISTICS FOR ALERTS AND FOR FOOD SECURITY

Mr Hem Sophal
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1. Introduction

Data from various sources are needed to achieve food security. Manufacturing, tourism and education have their own sources of basic data for official use. Agricultural and commercial data are very important for forecasting crop output and defining policy guidelines to tackle food shortages and monitor exports. The national information system concerning agriculture and food security plays a very important role in allowing the national government and international organizations to come to informed decisions.

Agricultural statistics services provided by the central statistics office and the agriculture ministry are crucial for early warning and mobilization in alert situations. They provide vital information and data to the information network on such items as wet- and dry-season rice growing area, yield, production, destroyed area, and so on. Usually, monthly, yearly and seasonal survey reports of particular crops are made for crop forecasting purposes.

An awareness of geographical features, agricultural area, cropping time and local practice is necessary to measure changing crop patterns and to make plans for the future, for instance to switch to dry-season rice in a flooded rice area, or change from late rice to midseason rice or from midseason to early rice (depending on location and rainfall) or move away from rice to vegetables, mung bean, sesame or other crops.

2. Survey of farmers' intentions

Before each planting season, farmers provide detailed information on what they intend to grow, the area they intend to use for each crop and their expectations in terms of output, compared to acreage and output achieved in the previous year. Seasonal surveys of farmers' intentions should focus on paddy, maize and a few other main crops. The data obtained over a three-to-five year period will allow for preliminary forecasting.

3. Primary agricultural statistics

Many countries in Asia conduct annual agricultural production surveys to ascertain cultivated area and production. A paddy field survey carried out over five to six months

through to harvesting time gathers data on cultivated area and production, and the final survey summary is made in the next year. The data on the paddy rice area is formulated at the preliminary stage, and the yield data received later makes it possible to estimate the production. Yield data for most crops are obtained from crop-cutting surveys at field level and dispatched to the commune agricultural office, where they are collated. Even though the data obtained are not a hundred-percent accurate, they represent useful information once analysed with the correct methodology. Such information is used at the provincial and national levels.

4. Damage data

Crop damage and loss of produce happen every year because of losses during harvesting but also, and often more drastically, through natural disasters such as droughts, floods and the ravages inflicted by pests (insects and rodents), not to mention blights. Thus, the technical staff must undertake thorough study and research in order to try to reduce or prevent damage and loss in output.

Disasters such as floods and droughts do not merely harm the agricultural sector: they destroy the national infrastructure within their spread and hinder local transportation and communication. This results in higher transportation fees and consequently higher production costs. Speedy data collection and compilation in this context is a must.

Unavoidable natural disasters do create havoc and losses, but reports from the agricultural statistics office over the past few years show that there has been an increase in cultivated area, yield and production and a decrease in destroyed area, hence in expected losses.

5. Crop forecasting

Analysis of statistics is a many-layered operation. Statistical surveys of primary crops, including paddy, allow for crop forecasting with a reasonable degree of accuracy. Three areas need to be improved for a better performance: acreage, yield and marketing. All efforts should be made to increase the cultivated area as well as crop frequency in those areas that are already under cultivation. Yield should be increased by using high-yielding varieties that are resistant to pests and blights, by combining chemical fertilizer with natural fertilizer or compost, and by changing crop species or rotating crops in areas where routine crops grow with diminishing returns. Increasing volumes of agricultural produce are needed for export, to generate foreign currency earnings and contribute to an improvement in living standards.

The analysis of the growing schedule of the various crops is an important technique for forecasting crops. It examines results in previous years in conjunction with climatic conditions and growth speed.

6. Data on food consumption

Food consumption data is very important to insure food security, which may require redistribution of foodstuffs within the country and imports from abroad. Food security is the primary goal of the current government, which intends to bring development and prosperity to the nation. Cambodia exported 110 000 tons of unhusked rice in 1999. If there is no drought or flood by the end of the rainy season, the country should be able to export 140 000 tons of rice in the year 2000.

ANIMAL HEALTH AND PRODUCTION IN CAMBODIA

Mr Siv Nhan
Deputy Director, Dept of Animal Health and Husbandry, MAFF

Animal husbandry and animal health prevention in Cambodia have yet to reach the industrial standards and level of technological sophistication of advanced countries. Nonetheless, their performance is creditable, as it satisfies the domestic demand of a country that is also able to export some of its cattle.

The good results achieved are due to several favourable factors:

- The government through its ministry of agriculture has set up appropriate policies and guidelines to encourage animal husbandry services and facilitate animal health protection works.
- The animal health and production division of the ministry supports the dissemination of animal husbandry and health protection techniques, helps in vaccination campaigns and takes the necessary measures to prevent epizootic diseases.
- International organizations and non-governmental organizations provide valuable assistance and support.
- People are aware of the need for and importance of animal health protection measures and readily help the animal health and production technical workers.
- Local authorities at all levels co-operate with the concerned ministries in the dissemination of animal husbandry and health protection techniques and methodology and in the suppression of illegal animal transportation to prevent the spread of epizootic diseases both within and outside of the country.

Before 1975, cows and buffaloes were only used for agricultural work, simply bought and sold, and fed casually.

In 1969, there were some 2 300 000 head of cattle, 900 000 buffaloes, 1 200 000 pigs and 6 200 000 poultry in Cambodia. By 1980, these figures had dwindled to over one million head of cattle and buffaloes, over 100 000 pigs and two million chickens and ducks. Eighteen years later, the bovine population numbered 3.5 million and there were 2.3 million pigs and more than 12 million chickens and ducks. Draught animals numbered more than 1.7 million.

Also in 1998, the average consumption of meat per person and per year was more than 8 kg of pork, more than 2.5 kg of red meat, and more than 2 kg of chicken or duck meat. It should be noted however that these figures are on the conservative side, as illegal slaughter of animals cannot be tabulated.

1. Cattle husbandry

Farmers usually use cattle and buffaloes as draught animals along roads and in the fields. There are two species of cattle in Cambodia, where animal feed is plentiful and farmers have a good knowledge and understanding of their domestic animals. Small cows are used in the rural areas and breed cows are available in delta areas. The Yellow China and Brahman cows, however, are not popular, because of their sturdy ungainly body. Cambodian farmers prefer the smaller Hariana cows because of their pleasing gait.

The Department of Animal Health and Production currently focuses on the distribution of cow species to farmers in some areas. Some species are in such demand, however, that all efforts should be made to increase production at the Phnom Tamao breeding station.

Cattle feed is a problem, because of insufficient grass during the dry season and the ploughing period at the start of the rainy season. To alleviate the shortage, the department collaborates with international organizations to increase feed processing wherever possible, including by mixing rice straw with urea fertilizer to increase the protein content and by making feed blocks for cows. Also, with Australian assistance, the department has undertaken to plant grass by the roadside and in school premises and encourages the farmers to pay heed to animal husbandry requirements.

2. Pig husbandry

Pig husbandry in Cambodia is under development and growing. Many pig species have been promoted – notably Landrace, Yorkshire and Duroc. Local species such as Mouse, Kampot, Elephant and Hainan are mostly bred along with imported species.

Pig husbandry services are not sufficient to respond to local needs. A study made in July 1999 notes that some 500 to 1000 pigs are imported from Viet Nam every day, and that Phnom Penh itself needs some 500 pigs a day, including pigs weighing 50-70 kg.

Thanks to the current privatization policy, there are many feed mixtures available to farmers, including raw materials imported from abroad. An appropriate legal framework has to be defined to encourage potential investors in this field.

It is noticeable that farmers who raise more than 50 pigs almost always have their own feed mills. Some farmers use rice bran mixed with banana bole and kitchen waste to make pig feed.

To help promote the husbandry sector, the department endeavours to disseminate husbandry techniques among farmers and to promote the efficient use of local natural resources such as vegetables, edible plant leaves, sweet potato leaves, cassava leaves and edible aquatic plants. The assistance of international organizations for this purpose would be welcome.

3. Chicken husbandry

The raising of domestic chickens is usually imperilled in the dry season when epidemics may inflict great losses to poultry raisers. Only a few areas have industrial production of chickens. Currently there are about 200 chicken-raising farms, with each approximately 2 000 chickens. Most of their owners have their own feed mills.

The price of chicken eggs is very low at the moment and some of the chicken eggs are exported to Viet Nam.

Chicken raising for meat has increased remarkably. Meat from chickens raised industrially fetches 4 500/5 000 riels per kilo (net weight) compared to 6 500/7 000 riels per kilo for chickens raised naturally.

4. Duck husbandry

Duck husbandry is not common. Ducks are raised in lowland areas with surface water. Farmers raise ducks for their eggs; duck meat is usually imported from Viet Nam.

Farmers who want to mix feed for pigs and chickens should consider that fish is available seasonally for the whole year, soybean and maize are available during two seasons for the whole year also, and bran is available seasonally. However, the quality of perishable raw material deteriorates with time.

FISHERY DATA COLLECTION

Mr Thor Sensereivorth
Chief of the Fishery
Statistics Section,
Department of Fisheries

I. Introduction

Statistics play an important role in the assessment of problems in fishery management and their solution. If we manage fishery statistics correctly, we can make proper plans for fishery management, which must be based on an assessment of the biological and economic effects of a change in fishery regulations or in hydrology, early warning of a species in decline and essential baseline data for environmental impact assessments. Because of the importance of fishery statistics, the Department of Fisheries is co-operating with the Mekong River Committee fishery project in Cambodia to build up a strategy for the management of freshwater capture fisheries by setting up a fishery data collection system based on a scientific methodology.

II. Fishery data collection

In the past, statistics of the Department of Fisheries were collected from the burden books and fishing licenses and through interviews with the lot owners. Those statistics did not record any species of fish in the catch composition but briefly categorized the catch into three grades of fish. These statistics were collected by the provincial fishery offices before being sent to the Department of Fisheries and were based on the annual planned figures. The use of the burden books is still the basis for catch estimation.

In contrast, the system of data collection and analysis of the Project for the Management of Freshwater Capture Fisheries of Cambodia is done with scientific methods. A stratified random sampling system is applied, based on a frame survey of fishing gear. Data collection records all species captured, catch by gear, by month, by season and by sector district. The price per kg (at the landing site) and the total value are also recorded. At present only the large and middle-sized fisheries are being monitored.

1. Statistics of freshwater capture fisheries

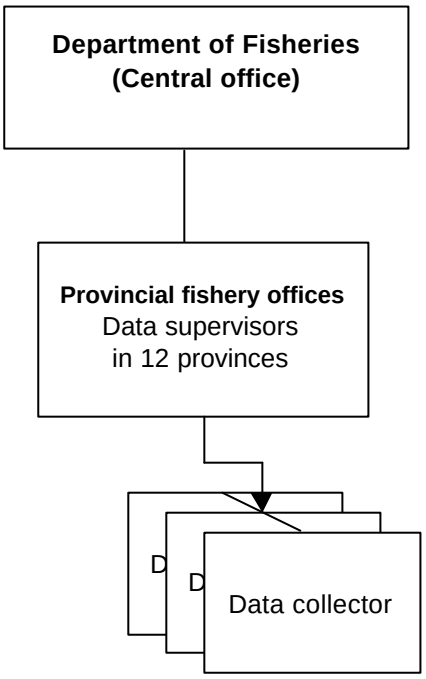
1.1 Data supervision system

During the first three years, the new system was run in seven provinces: five around the Tonle Sap (Kompong Chhnang, Pursat, Battambang, Siemreap and Kompong Thom) and two in the Phnom Penh/Kandal province.

From January 1998, it was expanded to five more provinces along the Mekong River: Stung Treng, Kratie, Kompong Cham, Preyveng and Takeo.

So far, 12 out of the country's 14 provinces have been set up for data collection by the project, which is equal to 95 percent of the freshwater fishery domain. In each of these provinces, we have one counterpart provincial data supervisor, and varying numbers of collectors who collect data from the middle-sized fisheries, fishing lots and *dai* fisheries.

Figure 14: Organization chart of the data collection system of Cambodian freshwater fisheries



The project has trained all the personnel involved in the theory and methodology of data collection and supervision. Also all the data collectors have been trained by each provincial data supervisors in sampling, length frequency sampling and fish identification in order to collect reliable data.

1.2 Analysis and data collection method

Data collection is conducted on three types of fisheries: the *dai* fisheries, fishing lots and middle-sized fisheries. The sampling method is as follows:

1.2.1 *Dai* fishery data collection

Stratification

- Stratified by catch rates on the basis of the 1996-97 census

- Stratified by low and high catch period

Data collection

- Frame survey
- Sampling at random of about 50 percent of all *dai*
- Lunar month varying sampling intensity at dark and full moon periods
- Measuring the haul frequency at least 10 times/*dai*/day, recording the catch of these hauls and sampling for species composition
- Length frequency sampling of selected species, e.g. Trey Riel

1.2.2 Fishing lot data collection methodology

Fishing lots are divided into two kinds, the riverine and lacustrine fishing lots, and bamboo-fencing trap fishing lots. There are two stages in fishing lot operations, so the sampling also refers to these stages.

- Riverine and lacrustrine fishing lot (Stage I)

In stage I, fish are caught with a U-shaped net (*Yor*) and samples are taken on the spot.

Data collection:

– Frame survey
– Sample of all fishing lots, except in Kompong Chhnang and Kandal province where four to six lots are sampled
– Lunar month (dark and full-moon period)
– Survey and record catch/drag from the sampled fishing lots
– Record the species composition in the pro forma sheet for at least five samples/lot/month (three samples in the full moon and two samples in the dark moon)
– Length frequency and length weight data are also recorded.

- Bamboo fencing trap fishing lot (Stage I)

At this stage, pens or traps are used to catch fish so that sampling is taken at the time of catch.

Data collection

– Frame survey
– Survey and record catch/pen/time
– Survey and record the number of operations per month
– Record the species composition of at least four samples/lot/month
– Conduct the length frequency and length weight

- Riverine and lacustrine and bamboo-fencing trap fishing lot (Stage II)

During this last stage the fish are in one pen waiting for the right time to be sold or transported to other places, especially to Phnom Penh. It is very difficult to estimate the catch and the result therefore is not accurate.

Data collection

- Record the catch by estimate when the fish are put into cages to be sold
- Record the species composition of at least four samples/lot/month
- Measure length frequency and length weight

1.2.3 Middle-sized fisheries data collection

Stratification

- Stratifying by province and district

Data collection

- Frame survey
- Sampling at random of about 10 percent of the gear in the frame to determine catch rates and species composition
- Conducting length frequency and length weight sampling
- Surveying the number of active days
- Surveying the number of active gear

All data collected from *dai* fisheries, fishing lots and middle-sized fisheries are put in and analysed by the ARTFISH program designed by FAO (Stamatopoulos, 1995). The result of this data analysis is the total estimated catch and value by month by species, gear and minor/stratum, as well as estimated total effort, CPUE of each gear and average price/kg for each species. The Excel program is used to combine data for all provinces by month, by season, by gear, etc.

1.3 Results of the 1997-98 fishing season

The estimated catch of some of the freshwater capture fisheries in seven provinces around the Tonle Sap and in Kandal province including Phnom Penh in 1997-98 was 62 807.

Table 1. Estimated catches by type of fishery and province

No	Type of fishery	Province						Total
		BB	PP/KD	Kg CHH	Kg TH	PS	SR	
1	Fishing lot	3 473	5 304	6 939	3 001	4 047	1 980	**24 794**
2	Medium-scale	3 222	3 852	5 010	1 828	4 802	4 628	**23 342**
3	*Dai* fishery		14 671					**14 671**
T o t a l		**6 695**	**23 827**	**11 949**	**4 829**	**8 899**	**6 608**	**62 807**

1.4 Discussion of the results

The overall result from fishing lot data analysis is at most half of the actual level, because in the second capture period of all the fishing lots when seine nets are used, we cannot sample for data analysis. The catch data are reported by the lot owners, who have a vested interest in keeping catch estimates low.

The result from the analysis of middle-sized fisheries is also too low, because our frame survey does not include all gear that exist, some gear are illegal according to the fishery law (data collection on illegal fishing gear is very difficult) and the number of legal gear in our frame survey is too low because of difficulties in counting them all. The result from the *dai* fisheries is fairly accurate because we know the number of all the gear that operate on the Tonle Sap and the samples taken are sufficient for estimation of the catch.

Using the data of the socio-economic survey carried out in 1995-97 (Ahmed et al 1998) we can estimate that the middle-sized fisheries produced 85 000-100 000 t/year in the entire country, while the family fisheries produced 115 000-140 000 t/year. Rice field fisheries produce some 25-62 kg of fish per ha, although AIT found 50-150 kg/ha in Svayrieng province. In Cambodia there are 1.8 million ha of wet-season rain-fed lowland and deep-water rice ecosystems. Thus, minimum fish production is 45 000-110 000 tons per year.

Altogether, minimum capture fishery production in Cambodia is 290 000-430 000 tons per year. The estimated value is of US$150-200 million. This result is summarized in the table below:

Table 2. Range of annual inland water catch, 1994-1997

(Deap et al 1998; Ahmed et al 1998)

Fishery	Annual catch range (tons)
• Large-sized	
- Fishing lot [1]	30 000-60 000
- *Dai* (bagnet) [2]	15 000-20 000
• Middle-sized [3]	85 000-100 000
• Family [3]	115 000-140 000
• Rice field [4]	45 000-110 000
Total	**290 000-430 000**

1. Range reflects uncertainty in actual catch levels
2. Range shows approximate minimum and maximum values in 1994-98
3. Based on socio-economic survey data extrapolated to the entire country
4. Approximately 1.8 million ha x likely range of fish yields: 25-62 kg/ha

2. Statistics of marine capture fishery

Marine statistical collection is carried out via city and province statistics on the fishing gear capacity of fishing boats and on transport licenses and through interviews with fish farmers. These statistics are submitted to the Department of Fisheries with its annual plan.

3. Statistics of aquaculture production

The aquaculture statistics data collection system in Cambodia includes cage, pond, pen, coastal and crocodile cultures. Collection of aquaculture statistics is carried out by city or province fishery offices and by the aquaculture office of the Department of Fisheries. The methods of aquaculture statistics collection carried out in fish culture investigation in places include aquaculture storage and direct estimation in culture farms.

Other statistics are collected from the non-governmental and international organizations that are assisting in aquaculture development in Cambodia. These institutions report directly to their local fishery offices. The aquaculture office of the Department of Fisheries collects the data by subtracting that from the provincial fishery office reports it receives.

AGRICULTURAL MARKET INFORMATION SERVICES IN CAMBODIA: METHODOLOGY AND RESULTS

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1. Background

In order to provide full information support to the country's rehabilitation programme and reconstruction efforts for the agricultural sector, there is a pressing need to institute major reforms in Cambodia's marketing system. Agricultural price data are needed as essential input for the identification, design and implementation of appropriate development programmes and policies. It is therefore urgent to address the existing constraints in the generation, analysis and dissemination of price data on agriculture, fishery and related fields.

The provision of agricultural marketing information to farmers and to traders involved in agribusiness is a necessity to enable them to make rational choices and add more value to agricultural products.

The Agricultural Marketing Office (AMO) of the Department of Planning, Statistics and International Co-operation, MAFF, has implemented a marketing information service (MIS) programme since February 1997. This has been done with FAO technical assistance, training, equipment, operating costs (incentive payment for price collectors, fuel, office supplies, etc), with a portion of an ADB counterpart fund used for communication charges and with the full support of ADB during the year 1999.

MIS became fully operational on 25 August 1997. Since then, the collection of market price information from the main markets and other wholesale trade centres in Phnom Penh and from 10 provincial market centres has been carried out daily by central and provincial price collectors. The information is broadcast every day by radio and television.

2. Objectives

The objective of the programme is to develop a countrywide market information service in order to improve farmer and government access to market intelligence. In the short run it enables Cambodian farmers, as well as traders and others, to make better-informed

decisions regarding where, when and at what price to sell their products. In the long run, the information generated should enable farmers to better plan their production in accordance with market demand. By ensuring more effective allocation and distribution of agricultural produce, the programme is expected to help improve farmer incomes and lower food costs for consumers. It will also contribute to the development of basic marketing knowledge among extension workers so that they are better able to advise farmers on how to take advantage of marketing information.

3. Market information services

3.1 Marketing feasibility study

The study aimed at a good overall view and understanding of the structure and working of the agricultural marketing system in Cambodia. It was by identifying the main agricultural trade flows and pinpointing the main markets and marketing channels that the most effective MIS could be designed. A secondary objective was to train the staff of the newly established AMO in the technique of market studies. Based on detailed studies of Phnom Penh, eight provinces and four markets in other provinces, the most relevant commodities and markets were selected. The coverage of MIS in most cases gives priority to provinces that produce crops, livestock or fish surplus. Phnom Penh markets play a key role in the overall national marketing system and therefore get detailed coverage. Points on the Thai border were included as large export and import flows could be observed there. Several harbours or mooring places on the main rivers were included, because of their importance for imported vegetables and fruit. Sihanoukville (Kompong Som), which has a big deficit for most food items except sea fish, was included also, as it is an important alternative terminal market for many commodities, and this is of interest to inter-provincial traders and farmers alike. The detailed information on this study is shown in the July 1997 report on agricultural marketing in Cambodia.

3.2 Consultation workshop

On completion of the feasibility study, a workshop was organized on 24 June 1997 for senior agriculture ministry staff members and representatives of other agencies, including other ministries. The purpose of the workshop was to present and generate discussion on agricultural marketing in Cambodia, with detailed specification of the proposed MIS sites and commodities as well as of logistics and communication/media arrangements.

The main activities of the workshop were:

- Presentation of the project implementation and progress made.
- Findings of the feasibility study on marketing systems.
- Description of the proposed MIS.
- Arrangements for dissemination of market information.
- General discussion on the usefulness of MIS for farmers, traders, government officials and others, on the coverage of commodities, provinces and markets and on the possibility of communication and dissemination.
- Summary of the conclusions.

3.3 Training

A training course on collection, processing and dissemination of market information for central and provincial price collectors was held from 30 June to 2 July 1997; two staff members from 10 provinces and AMO staff attended.

Three papers were presented during the course:

- *Paper 1 – General information*. This paper introduced the study of the Agricultural Marketing System in Cambodia. Explanation of MIS included purpose of MIS, coverage of provinces, markets and commodities, collection of prices and supply conditions, transmission of market information, and broadcasting of market information. The deliberations of the 24 June workshop were summarized and the purpose of the training and administration and financial arrangements were explained.
- *Paper 2 – Introduction to basic concepts of economics*. This included planned or command economy versus market economy, relation between supply, demand and prices, and various other economic concepts. Marketing concepts such as marketing channel and physical market were introduced to the price collectors.
- *Paper 3* dealt with the methodology of price data collection, transmission, processing and dissemination.

The operation of MIS and other related activities still need to be improved. In order to achieve this, one of the training activities of the project was to organize a study tour to two countries in Asia. Malaysia and Sri Lanka were selected as the host countries. The study tour took place from 16 to 29 November 1997. The main objective was to observe food marketing and the operation of the local marketing information systems. Four staff members from the Agriculture Marketing Office of MAFF and one from FAO Cambodia participated.

3.4 Equipment installation

Telecommunication equipment – 10 fax machines and two radio transceivers (connecting Sisophon and Poipet) – was procured and installed in the Agricultural Marketing Office in Phnom Penh, as well as in nine provinces (Kompong Cham, Takeo, Kampot, Sihanoukville, Battambang, Banteay Meanchey, Siemreap, Kompong Chhnang and

Preyveng). In order to access the international prices, a full-access Internet connection for the whole AMO was installed in January 1998.

Each price collector in Phnom Penh and the provinces received a motorbike for travelling to markets, collecting points and other observation areas. Fuel and incentive payment are provided to price collectors for their operations.

3.5 Marketing surveys

3.5.1 Survey of agricultural producing areas and marketing infrastructure

This study was done on the main national roads as well as some secondary roads. The collecting points, markets, harbours, processing plants, producing areas and processing areas were recorded and checked by observation and by interviewing local traders and farmers. A final report was produced.

The basic approach taken during this survey was to simply travel by car along all main and several secondary roads within the 11 provinces under study. At every road crossing and T-junction local people were interviewed concerning periodic markets, collection points for produce collection and crop production in areas served by those roads. A complete inventory was made of all marketing and transport facilities, including markets, collection points, harbours, railway stations and processing points. This labour-intensive approach was found to be necessary as the previous study had focused on provincial markets and it was clear that the most important flows of agricultural produce were those from producing areas straight to the main urban markets.

3.5.2 Study of agricultural marketing costs and margins

This survey covered a more detailed study of market costs and margins. Representative commodities were selected and questionnaires for different market operators designed. Work started with the testing of the questionnaires in Phnom Penh markets. Later the provinces of Kompong Cham, Battambang and Banteay Meanchey were visited to focus on the selected commodities.

The coverage of this study was as follows:

- Phnom Penh: Rice shops near the railway station, Dumkor, Orussey market, fish wholesale markets at Kms 9 and 11.
- Preyveng: Nhak Loeung market.
- Kandal: Takhmao market and harbour.
- Takeo: Ang Ta Som, Takeo market and harbour.
- Kompong Cham : banana, soybean areas in Bos Knor, Chamkar Leu district.
- Kompong Chhnang: Phsa Krom market and harbour.
- Battambang: rice mills and wholesale shops.

- Banteay Meanchey: Poipet market and exporters.

The study covered six commodities: rice, banana, live chicken, fresh fish, imported cabbage and exported soybean.

The detailed results of the study are shown in the final report on agricultural marketing costs and margins.

3.6 How MIS operates

3.6.1 Coverage

The coverage of MIS in most cases gives priority to provinces that produce crops, livestock or fish surplus. Phnom Penh markets play a key role in the overall national marketing system and therefore get detailed coverage. Poipet on the Thai border is included as large export and import flows can be observed there. Several harbours or mooring places on the main river are included, because of their importance for imported vegetables and fruit. Sihanoukville, which has a big deficit for most food items except sea fish, was included also, as it is an important alternative terminal market for many commodities, which is of interest to farmers and inter-provincial traders alike. Based on the feasibility study, the coverage of MIS is as follows:

- Phnom Penh: Dumkor, Orussey, Chba Ampov market, fish wholesale market at Km 9, rice shops near the railway station, pig abattoir at Km 7 and Boeung Salang
- Kandal: Takhmao market, mills and harbour
- Kompong Cham: Bengkok market, Bosknor market (Chamkar Leu district)
- Takeo: Takeo market, harbour, mill and pig collection point
- Kampot: Samaky market, Andong Khmer harbour
- Sihanoukville: Phsa Leu market, Tumnop Rolork harbour
- Battambang: Romchek mill, Phsa Leu market
- Banteay Meanchey: Poipet market
- Kompong Chhnang: Phsa Krom market, harbour and pulse shops near harbour
- Siemreap: Phsa Leu market, Chong Kneas harbour
- Preyveng: Nhak Loeung market and harbour, rice mills

3.6.2 Commodities collected

The collected commodities are:

Paddy	Mung bean	Soybean	
Cabbage	Other vegetable	Banana Orange	
Pineapple	Other fruit	Fresh fish	Dried fish
Smoked fish	Sea fish	Shrimp Prawn	

Crab	Squid	Other seafood	Chicken (live)
Duck (live)	Pig (live)	Carcass	Agricultural inputs

Several commodities, especially certain vegetables and fruit, are highly seasonal and are covered only for a few months. The price collectors have the important task to observe and report immediately on any new products that appear in large quantity on the market.

3.6.3 Price collection, processing and analysis

Staff members within AMO collect prices and supply conditions for Phnom Penh and Kandal every day. Price data are transmitted each morning by fax or phone from the other 10 provinces. All data are processed in computers for daily radio programmes and analysed for monthly bulletins. The retailing price reports from nine provinces are sent to AMO every month for yearly bulletins.

Four price collectors of AMO collect price information in Phnom Penh in places such as Dumkor, Orussey, Chba Ampov market, rice wholesale shops near the railway station, the fish wholesale centre at Km 9, pig abattoirs at Km 6 and Boeung Salang. These activities are carried out in the early morning every working day, except on public holidays. One price collector of AMO also collects price information in Kandal (Takhmao market, harbour and mill). One price collector in each of another nine provinces (Takeo, Kampot, Sihanoukville, Kompong Chhnang, Battambang, Banteay Meanchey, Siemreap, Preyveng and Kompong Cham) collects price information in locations as decided in the detailed specifications of MIS sites and commodities proposed in the feasibility study report.

The price data transmitted from these provinces are processed by AMO staff in the same day. The daily programme of wholesale prices in Phnom Penh and in the provinces is prepared for radio broadcasting and sent to the National Radio of Cambodia and Battambang National Radio (faxed around 10:30-11 a.m.). The daily programme of Phnom Penh wholesale prices is also prepared for broadcasting by Bayon radio and TV (faxed around 10-10:30 a.m.).

Exchange of national price information against the printout of international prices from Reuters Commodity 2000 Service to IMIC, a private company, has been arranged. This company provides free of charge up-to-date international prices in exporting and neighbouring importing countries. These prices are selected for daily broadcast on the National Radio of Cambodia.

3.6.4 Dissemination of price information

Price and supply information is keyed immediately in spreadsheets designed for each location. A daily radio broadcast programme is prepared in its standard

format, two pages for local prices and one page for export market price information. The National Radio of Cambodia is the main vehicle for MIS. As reception of the Phnom Penh broadcast is not good in the Northwest, the Battambang National Radio has been used for relaying the price information.

After discussions with the Ministry of Information over the National Radio of Cambodia broadcasting agricultural prices, the following arrangement was made: commencement of broadcast: 25 August 1997; duration of the daily broadcast: 5 to 10 minutes; frequency: Monday to Friday (local and international prices), Saturday and Sunday (international prices); broadcasting time: 6:05 p.m., after the news.

Another arrangement between the Department of Agriculture in Battambang and the Battambang National Radio was made for broadcasting agricultural prices transmitted by fax every day from AMO in Phnom Penh: commencement of broadcast: 22 December 1997; duration of the daily broadcast: 5 to 10 minutes; frequency: Monday to Friday; broadcasting time: 7.10 p.m.

Private media such as FM radio stations, television stations, newspapers and other relevant users were informed that market price information was available from the agriculture ministry for further dissemination and use. Bayon FM 95, and Bayon TV Canal UHF 27, showed an interest in broadcasting price information for Phnom Penh. Radio FM 95 started broadcasting on 9 February 1998 for 5 minutes at 11:05 a.m. and 6:05 p.m. every day. Bayon TV started on 16 February 1998 at 5:45 p.m. every day, though the schedule changes on occasion.

Monthly bulletins of wholesale prices have been produced since August 1997 for distribution to users in MAFF and other relevant institutions as well as international and non-governmental organizations. An English-language weekly, *Business News*, also carries the wholesale price information. Another private radio, FM 99, reports live on retail prices in some of the main Phnom Penh markets every day, using mobile phone from market to the station. The programme is sponsored by a mobile phone company.

3.6.5 Project organization and staffing

The executing agency for the Agricultural Marketing Information Programme is the Marketing Information Team within the Agricultural Marketing Office of the Department of Planning, Statistics and International Co-operation.

Table 1. Personnel involved in the programme

Function	No. of staff
1) AMO chairman	1
2) Data processing, analysis, publication and reporting team	1
3) Price collectors, Phnom Penh	4
4) Provincial price collectors	11

Table 2. MIS activities and office holders

Duration	Activity	Office holder
Jan 1997- Dec 1998	• **Administration** Work co-ordination	 Srey Vuthy
	• **Information collection**	
	1. Dumkor, Chba Ampov markets	Kong Chanthan
	2. Orussey market	Chan Sipana
	3. Muk Ra, Km 6, 9, 11 fish markets	Ou Manirong
	4. IMIC, commodities news	Lach Sovath
	5. Takhmao market and harbour	Nong Sotheavy
	6. Kg Chhnang market and harbour	Sok Sinath
	7. Bos Knor and Kg Cham markets	Mean Kunthea
	8. Chong Kneas and Phsa Leu markets	Prom Sopheap
	9. Poipet market and Banteay Meanchey	Sar Halim & Heak
	10. Mill and Boeung Chhouk markets	Tol Sareth
	11. Takeo market, mill and harbour	Cheung Ath
	12. Kampot market and harbour	Chin Kim Seng
	13. Tomnup Rolork	Neang Ngeth
	14. Nhak Loeung market & harbour, rice mills	Kim Saran
	• **Data entry** a) For Phnom Penh, Battambang, Kampot, Kg Chhnang and Sihanouk-ville	
	b) For Kandal, Takeo, Siemreap, Kg Cham, Banteay Meanchey and Poipet	Kong Chanthan
	c) For Phnom Penh	
	d) For IMIC, international prices, Phnom Penh and Preyveng	Nong Sotheavy Chan Sipana
	• **Information processing and analysis**	
	• **Bulletin publication**	Lach Sovath
	• **Dissemination of price information**	Lim Saody
	[a] For NRC, TV Bayon, Radio FM 95	Lim Saody
	[a] For Radio Battambang	
	• **MIS field monitoring**	Lim Saody Ou Manirong Tol Sareth AMO staff

4. Market information use

4.1 By farmers

It is believed that MIS has assisted farmers in the short run to obtain better prices for their produce, and in the long run to direct their production plans to match market demand more closely.

The results of the MIS user survey carried out by the AMO staff in early 1998 confirmed that the market information service was very important to the farmers. A large proportion of the farmers expressed the need for more price information, the closest provincial market being their main interest. Farmers often know the farm-gate prices in their areas, the buying prices of collectors at the nearest collection points and the buying prices of market retailers at the nearest district markets.

About 70 percent of the farmers interviewed were aware of and listened to the price broadcasts on the radio, and a few of them watched television. Farmers use price information broadcast by radio as a basic check to negotiate with collectors or traders purchasing their produce and also to compare them with the prices they were given on the previous day. It is reported that farmers who knew the prices broadcast on the radio always complained of wholesalers or collectors in their producing areas quoting lower prices.

4.2 By traders and collectors

Most wholesalers and millers are keenly interested in getting market information concerning both the provincial markets and Phnom Penh. As the supply conditions and prices tend to change fast for most commodities (less for rice), the information should be collected daily to keep it up-to-date.

It is believed that farmers and traders are, in many respects, partners in the process of supplying consumers with food and other agricultural products and that reliable market information will benefit both parties. For instance, if a certain remote production area has a large crop surplus causing very low farm-gate prices, then highlighting this fact on the national radio would alert more traders to send their vehicles there, the increased competition would raise farmers' prices and the increased flows to the terminal markets would reduce the retail price of that commodity to the advantage of the consumers.

On the other hand, price information from the border posts, especially Poipet, on commodities that are potential export opportunities for Cambodia clearly benefits the traders. For example, traders cum exporters in Kompong Cham normally collect soybean from farmers or collectors and keep it waiting to export it to Thailand via the Poipet border post until the radio alerts them to high prices on the border.

4.3 By extension workers

The use of market information by farmers can be enhanced if extension workers are in a position to advise them on how to interpret the prices and seasonal price trends. On the other hand, extension workers can plot prices over several years and advise farmers when to plant and harvest to take advantage of high-price periods.

In order to carry out such activities, a workshop on the Agricultural Market Information System was organized to introduce agricultural extension workers in six provinces to data collection, analysis and presentation of data, time and frequency of radio broadcasts, bulletin availability, interpretation of data, etc.

AMO agreed to provide a set of daily price information as well as monthly and yearly bulletins to the extension workers to undertake the activity, but this has yet to be done.

4.4 By MAFF and other ministries

The Ministry of Agriculture, Forestry and Fisheries has used price data to calculate the gross domestic product of the agricultural sector and the estimates for growth in agricultural GDP, as a key planning study to define its strategy.

Copies of the price bulletins are distributed to the officials of the relevant technical and provincial departments of the ministry, as basic data for research and study activities.

The National Institute of Statistics under the Ministry of Planning uses the yearly bulletins to compile the national accounts. The other ministries also use price data as indicators for their planning and forecasts.

4.5 By the private sector and various organizations

It is believed that price information from Asian (especially neighbouring) countries on commodities that are potential exports for Cambodia will really benefit both farmers and private companies.

At present, very few companies involved in agribusiness use export market prices, as collected from Reuters Commodity 2000 service. However, SELA Co Ltd has used this information as a basic indicator to draw its export plan.

Many international and non-governmental organizations, too, use price information (the yearly bulletins, especially) for their research and projects.

5. Assessment of MIS impact

A survey was carried out to evaluate the impact of MIS on the target users of the system, especially farmers and traders, but also government policymakers, research institutions and international and non-governmental organizations.

In practical terms, the survey provided information about the proportion of farmers and traders who listen regularly to the radio broadcasts, their opinions on the accuracy and usefulness of such broadcasts and their suggestions concerning any changes in the coverage of commodities, types of information provided and presentation.

The survey consisted of interviews with farmers, traders and other potential users of MIS in Phnom Penh and in four provinces (both provincial capitals and rural areas). Farmers and collectors were interviewed on the farm or at collection points or when visiting the market in the provincial capital or even in Phnom Penh. Wholesalers and retailers were interviewed in the main markets. The same questionnaire was used for all purposes.

There were two stages to the collection of data. The first stage targeted the respondents who were most active in the market and had their own radio or television sets. The second stage addressed a random sampling of farmers, wholesalers and retailers.

The provinces covered were Kandal, Kompong Cham, Battambang and Siemreap. The categories of persons interviewed were farmers, collectors, wholesalers, retailers, millers, government employees, international- and non-governmental-organisation employees, and housewives. The total number of questionnaires was 268.

Generally, farmers listened to and appreciated price broadcasts and they mostly needed to know prices in the provincial and urban markets. This, in itself, would appear sufficient to justify continuation of MIS. The inter-provincial as well as Phnom Penh traders mostly needed price information in the producing areas and urban markets. Farmers were strongly of the opinion that knowledge of the prices enabled them to negotiate with collectors or traders from a position of some strength.

Many respondents, especially farmers, reported that the prices broadcast on the radio were not just an aid to negotiation but also helped them to review the prices received the previous day. Thus, they could seek out other traders and try to negotiate more forcefully or else improve the quality of their produce, if the prices previously received were lower than the

market prices. The survey showed that approximately 70 percent of the respondents were aware of price broadcasts on the radio and most of them were interested in price information. The detailed results of this survey are included in the final report on the user survey of the market information system.

6. Conclusion

MIS is widely recognized as an important service, as confirmed by the results of the interviews of a number of farmers, collectors, wholesalers, retailers, millers and also government and international- and non-governmental-organization employees.

Regular and strict monitoring of MIS operations is necessary to ensure that the collected data are accurate and timely. (It was found that some respondents to the survey had given inaccurate prices, higher or lower than actual prices.) The Market Information Service, including prices as well as supply-and-demand conditions, is recognized as an important and necessary function, used to good advantage by producers, traders, consumers and relevant government institutions.

The collection and dissemination of accurate marketing information have to be our main concerns and all problems to reach these goals need to be overcome. Field monitoring of MIS activities in the provinces is especially important. It is necessary to supervise the work of the provincial collectors regularly, to check on the accuracy of their prices and also to introduce improvement in MIS.

As FAO support ended in December 1998, the ADB counterpart fund was made available to support MIS activities from January to December 1999. From January 2000 on, the agriculture ministry should support MIS to make sure that further operations will be maintained once outside assistance is no longer available. But given that the national budget is limited, the ministry of agriculture should seek external financial and technical assistance from the international community.

Extension workers in six provinces have been introduced to MIS operations, regarding coverage in terms of markets and commodities, the main objectives of the programme, data collection methods, processing, dissemination of information, and discussion on how field extension workers should offer and interpret the daily radio broadcasts for the benefit of the farmers. Therefore, field activities can begin promptly. AMO will provide extension workers with all the necessary information.

MIS, whose prime function is indeed to provide up-to-date information, will generate much information that will subsequently be of use to policymakers, planners and researchers. Attention needs to be paid to the presentation of analytical reports. A training programme in data analysis for AMO staff is required to improve the quality of such reports. As neither policymakers nor planners have time to carry out their own analyses of the data presented, MIS should assist them by preparing publications which provide authoritative analysis of market information.

METHODOLOGY AND RESULTS OF A COST OF PRODUCTION SURVEY IN CAMBODIA

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1. Introduction

In 1998 the Department of Statistics, Planning and International Co-operation of the Cambodian Ministry of Agriculture, Forestry and Fisheries (MAFF) carried out a cost-of-production survey on paddy and maize with financial assistance from FAO RAP and the Asian Development Bank.

The main objective of the survey was to define the current structure of cost incurred in the production of paddy and maize in the country. Specifically, the survey aimed to estimate the current cost of producing paddy and maize at the national and provincial levels, determine the level of input use in paddy and maize farms, and estimate various measures of profitability in paddy and maize farming.

The survey was divided into three phases, one for 1997/78 wet-season rice, one for 1998 dry-season rice, and the third for maize (yellow and white) over 1997/98. The wet-season rice survey covered eight provinces, namely Preyveng, Takeo, Svayrieng, Kompong Cham, Kompong Thom, Battambang, Kampot and Kompong Speu. The dry-season rice survey covered only five (Preyveng, Takeo, Svayrieng, Kompong Cham and Kandal), and the survey of maize four – Preyveng, Kompong Cham, Kandal and Kratie. The data were collected by the staff of the various provincial agricultural offices from samples of households.

2. Rationale of the survey

One of the important data sets that should be periodically generated by Cambodia's statistical system is information on the cost of production of agricultural commodities. This type of information has lately been gaining attention in many countries, as increasing commercialization of agricultural activities call for greater efficiency in the use of resources. The various users of this information are:

- government planners – to design appropriate development programmes and projects for the agricultural sector;
- policymakers – to formulate and implement appropriate market intervention schemes and promote inter-regional specialization in agricultural production;
- farmers – to plan their production and marketing activities;

- financial institutions – to assess the financial feasibility of alternative agricultural ventures; and
- statisticians – to estimate gross value added in agriculture.

The information generated by the cost-of-production survey is expected to have a wide range of applications in Cambodia. The first important use will be for the identification, design and implementation of appropriate development programmes and policies for the rehabilitation of agriculture. As Cambodia's economy is basically agrarian, economic recovery will largely depend on the pace of development of the agricultural sector. In turn, the development of agriculture will require the enhancement of efficiency in the use of its resources. Thus, the data of the cost-of-production survey should be integrated into the key information base that serves as input for rehabilitation programmes and post-1993 reconstruction efforts of the sector.

Cost-of-production information will also play a vital role in the country's transition from a centrally planned to a market-driven economy. In order for the farmers to share the benefits of such a transformation, the government should create the policy environment required to help them become market-oriented producers. Farmers aware of market requirements will grow produce that will have high profit potential if its specific qualities meet demand. Thanks to timely information on the cost of production, farmers will be able to select the crops that have emerging market potential and are thus likely to provide them with the highest possible income. The data can also assist them in determining the appropriate price level of their produce.

3. Detailed analysis of the 1998 survey

3.1 Objectives

The general objective of the survey was to generate the current structure of cost incurred in producing paddy and maize in Cambodia. Specifically it aimed to:
- provide an estimate of the current cost of producing at national and provincial levels;
- determine the level of input use in farms;
- estimate various measures of profitability in farming; and
- provide inter-regional comparison of production costs.

3.2 Scope and coverage

Although the original aim was to cover all provinces of Cambodia, the scope of the survey had to be restricted because of logistical and cost considerations.

The survey was carried out in three stages:
- a survey of 1997-98 wet-season rice in eight provinces: Takeo, Svayrieng, Kompong Cham, Kompong Speu, Kampot, Preyveng, Kompong Thom and Battambang.
- a survey of 1998 dry-season rice in five provinces: Kandal, Takeo, Preyveng, Kompong Cham and Svayrieng.

- a survey of yellow and white maize over the 1998 wet season in four provinces: Preyveng, Kandal, Kompong Cham and Kratie.

The survey covered both urban and rural areas. It covered all households with cropland, defined as households with land outside the village area that are usually used for growing agricultural crops at some time during the year.

3.3 Frame

Location	**Wet season**		**Dry season**		**Total**	
	Village	Household	Village	Household	Village	Household
Preyveng	5	30	5	30	10	60
Svayrieng	5	30	5	30	10	60
Takeo	5	30	5	30	10	60
Kompong Cham	5	30	5	30	10	60
Kompong Thom	5	30	-	-	5	30
Kompong Speu	5	30	-	-	5	30
Kampot	5	30	-	-	5	30
Battambang	5	30	-	-	5	30
Kandal	-	-	5	30	5	30
Total	**40**	**240**	**25**	**150**	**65**	**390**

Location	Maize (white)		Maize (yellow)		Total	
	Village	Household	Village	Household	Village	Household
Kompong Cham	5	30	5	30	10	60
Kandal	5	30	5	30	10	60
Preyveng	5	30	5	30	10	60
Kratie	5	30	5	30	10	60
Total	**20**	**120**	**20**	**120**	**40**	**240**

3.4 Outline of data collection

The survey was undertaken using the sample survey method. Data were collected from a sample of households.

3.5 Interview phase

During the interview component of the survey, information was collected from each selected household on the following:

1. Identification: name, sex, village, commune, district, province.
2. General information for sample crop field.
3. Materials used and other costs in producing crop.
4. Wage rate, capability and labour used by the farmer for crop planting.
5. Tools and durable equipment used in crop production.
6. Other costs.

To these were added the observations of the enumerator on problems encountered during field operations.

3.6 Cost item description

The cost items included in the cost-of-production study were divided into two main categories: variable cost and fixed cost. Each category was further broken down into cash (paid) cost and imputed (unpaid) cost. The description of each main item is as follows:

3.6.1 Variable cost

- **Labour:** This cost item covers human, machinery and animal force. In animal and machine force, human labour is implicitly included, since animals and machines cannot be used by themselves. The activities involved are land preparation and taking care of crop from planting until harvesting. The actual local wage rate is used in estimating the cost of family and exchange labour.
- **Materials:** This item includes seeds, fertilizer, insecticide, herbicide, other planting materials, equipment and fuel. If own material is used, the imputed cost is equal to the market price.
- **Other:** Maintenance and repair of equipment, interest charged on short-term loans, and opportunity cost for own working capital are included under this category. The interest rate applied for the opportunity cost is the rate of short-term (6-month) deposit at a commercial bank.

3.6.2 Fixed cost

- **Land-use cost:** If the farmer owns the land, the total cost for this item is equal to the local rent rate and is filed in the imputed (unpaid) column; the actual cost is filed in the paid column.
- **Depreciation cost:** The straight-line method is used in calculating the depreciation cost for equipment and building – i.e. the annual depreciation cost is equal to the difference between the initial cost and the salvage cost divided by the number of expected years in operation.
- **Opportunity cost of tool and equipment:** The opportunity cost for own fixed capital used in the cost of production study is equal to the interest charged on the cost of machinery and other heavy equipment, excluding own tractor, since the latter is already charged in the cost of preparation. The interest rate applied is equal to the rate of a short-term deposit at a commercial bank.

3.7 Sample selection procedure

3.7.1 For rice (wet and dry season)

1. The central statistics office prepares the list of rice villages (about two weeks before the training date).
2. The statistics personnel randomly select five sample villages plus two more reserved villages and mail the list of the sample villages to the provincial office.
3. The provincial offices list all rice growers in each sample village and take the list to the central office during the training session.
4. The statistics staff randomly select six rice growers plus three more reserved growers in each sample village and give the names of the selected rice growers to the provincial staff at the end of the training session.
5. The provincial personnel visit the sample villages and interview the sample rice growers. If the sample households have more than one parcel of land, the biggest parcel is selected.

The list and the sample selection were done separately for the wet-season rice (1997-98 crop year) and dry-season rice (1998 crop year).

3.7.2 For maize (yellow and white maize for wet season 1998)

The sample selection was the same as for the rice survey, except that the lists of the yellow-maize villages and white-maize villages had to be prepared by the provincial staff, as the information was not available in the central office. The yellow-maize and white-maize village lists were done separately as well.

3.8 Schedule and activities

3.8.1 For wet-season and dry-season rice

• Reproduction of questionnaire	27 Feb-6 March
• List of villages	23-27 February
• Selection of sample villages	23-27 February
• List of growers	12-13 March
• Selection of sample growers	16-18 March
• Enumerator training	16-18 March
• Fieldwork	23-30 March for wet season 20-24 April for dry season
• Supervision	24-31 March for wet season 21-31 April for dry season
• Editing	2-30 April for wet season 2-31 for dry season

- Computer program training 4-9 May
- Input data 5-31 May
- Estimation and analysis 7 May- 30 June
- Drafting of the report 1-31 July
- Final report end of December

3.8.2 For maize (1998 wet season)

- Reproduction of questionnaire 27 February-6 March
- List of villages 3-15 August
- Selection of sample villages 3-15 August
- List of growers 17-29 August
- Selection of sample growers 1-15 September
- Enumerator training 16-18 March (rice and maize joint training)
- Fieldwork 21-25 September
- Supervision 22-30 September
- Editing 5-3 October
- Computer program training 4-9 May (rice and maize joint training)
- Input data 6-31 October
- Estimation and analysis 1-15 November
- Drafting of the report 16-30 November
- Final report end of December

3.9 Estimation method

The sampling design for the cost-of-production survey of rice and maize in each province was a two-stage sampling, in which the crop-growing villages under study were the first-stage or primary sampling units and the growers of each crop were the second-stage or secondary sampling units. The simple random sampling, using random number table, was used in the selection of the samples at both stages. The survey was carried out independently for each crop (wet-season rice, dry-season rice, yellow maize and white maize). The estimation method for each characteristic under study was as follows:

$$\hat{Y} = \frac{N}{n} \sum_{h=1}^{n} \frac{M_h}{m_h} \sum_{i=1}^{mh} y_{hi}$$

in which

Yhi = characteristic under study
Mh = number of crop growers in the h-th village
Mh = number of sample growers in the h-th village (equal to 6 for this survey)
N = number of crop-growing villages under study
n = number of sample villages (equal to 5 for this survey)
$\hat{Y}$ = estimated total for the characteristic under study (each cost item)

The estimated average of characteristic under study per household (grower) was obtained from the formula:

$$\overline{Y} = \frac{Y}{M}$$

in which

$$\hat{M} = \frac{N}{n} \sum_{i=1}^{n} Mh$$

The estimated average cost per unit area (hectare) was obtained from the ratio estimate of the total cost (for each item) and the estimated total of the planted area:

$$\overline{yr} = \frac{\hat{Yc}}{\hat{Ya}}$$

in which

$\hat{Yc}$ = estimated total cost (for each cost item)

$\hat{Ya}$ = estimated total planted area (hectares)

$\overline{yr}$ = estimated average cost per hectare

The average total cost per unit area for all cost items is equal to the sum of each cost item.

For the overall estimate of the average cost per hectare (for all provinces under study), the weighted average method (using the planted area in each province as weight) was used as follows:

$$\overline{y}_k = \sum_{i=1}^{p} w_i \quad y_{ri}$$

in which

$\overline{y}_k$ = average (aggregate) cost per unit area for the kingdom (for all provinces under study)

y_{ri} = average cost per unit area for the i-th province

w_i = weight for the i-th province

$$= \frac{A_i}{\sum_{i=1}^{p} A_i}$$

The provincial staff carried out the field survey using the interview method, whereas the supervision was carried out by the central staff of the Statistics Office of the Department of Planning, Statistics and International Co-operation of the ministry of agriculture.

3.10 Survey output tables for the cost of production

3.10.1 For rice

- Possible classification for cost-of-production results for rice in each province (15 forms)
- Average wage rate and capability of labour used by activity (1 form)
- Seedling information for rice (1 form)
- Percentage of main cost components in total cost (1 form)
- Yield per hectare, farm price, cost of production and net return (1 form)
- Average area per parcel, percentage of water supplied, method of planting, varieties of rice seeds, 1997-98 crop year (1 form)

3.10.2 For maize

- Possible classification for cost-of-production results for maize in each province (3 forms)

- Average wage rate and capability of labour by activity (1 form)
- Percentage of main cost components in total cost (1 form)
- Yield per hectare, farm price, cost of production and net return (1 form)
- Average area per parcel, percentage of improved and local varieties of maize seeds (1 form)

4. Conclusion

The 1998 cost-of-production survey of rice and maize in Cambodia covered a random selection of farmers in representative provinces to obtain data on their cost of production as a sure way of establishing a list of production requisites in use. No important requisites were omitted. Properly designed, the survey will yield information on specifications of the requisites, the locations at which price data of such items are to be obtained and their relative weight in the overall basket of production costs. It is important that the requisites of agricultural production whose prices are collected at any time fully represent the actual conditions under which production activities are being carried out. The cost-of-production survey would therefore need to be repeated as soon as sustained changes in farming practices are seen to have occurred.

NATIONAL ACCOUNTS FOR AGRICULTURE

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I. INTRODUCTION

1. The system of national accounts

The System of National Accounts (SNA) consists of a coherent, consistent and integrated set of macroeconomic accounts, balance sheets and tables based on a cohort of internationally agreed concepts, definitions, classifications and accounting rules. It provides a comprehensive and detailed record of the complex economic activities taking place within an economy and the interaction between the different economic agents and groups of agents that takes place on markets or elsewhere. It measures the value of what has been produced, the institutions that produced the products, the kind of consumers who used them, the purposes for which the products are used, and the value of what has been accumulated as wealth.

2. Use of the national accounts

The national accounts provide a conceptual and analytical framework for evaluating the performance of the economy. They are used for the following purposes:

- monitoring the behaviour of the economy;
- macroeconomic analysis;
- planning;
- basis for policymaking and decision-taking;
- international comparisons;
- basis for improving economic statistics; and
- framework for co-ordination of statistics.

II. THE NATIONAL ACCOUNTS FOR AGRICULTURE

1. Institutional sectors

For the compilation of the national accounts, the basic statistical units are institutional units which are capable of owning assets, incurring liabilities and engaging in economic activities and in transactions with other units in their own right. SNA distinguishes four main kinds of institutional units: households, corporate and quasi-corporate enterprises, government units, and non-profit institutions. Sectors and sub-sectors in SNA are groups

of resident institutional units. SNA recommends the compilation of a complete set of accounts for each sector. The National Accounts for Agriculture proposes to identify a sector of the economy consisting of institutional units whose principal activity is agricultural production. The agricultural sector consists of three sub-sectors, namely agricultural households, agricultural corporate and quasi-corporate enterprises and government-owned non-profit institutions whose principal activity is agricultural production or research.

2. Sequence of accounts for the agricultural household sub-sector

Within the agricultural sector, a primary sub-sector is agricultural households. The purpose of this section is to provide a brief description of each of the accounts to be compiled for the agricultural household sub-sector. In the SNA for agriculture, it is proposed to calculate three current accounts for agricultural households, namely the production account, the generation of income account, and the allocation of income account.

It is, of course, possible to calculate the full sequence of accounts for agricultural households, if desired, but the three accounts just listed should be the first priority.

2.1 Production account

The production account shows the level of output produced in the domestic economy by resident producers and the value of the inputs used in the process of production. The balancing item in the production account is value added.

Table 2.1. Production account for agricultural households

Use	**Resource**
Intermediate consumption, of which Seed Feed Chemical fertilizers Organic fertilizers Pesticides, etc Power, heat and light Repairs and maintenance Other	Output, of which: Market output Output for own final use
Value added, gross	
(less) Consumption of fixed capital	
Value added, net	
Total use	**Total resource**

2.1.1 Output

Output consists of those goods and services that are produced by an establishment within a given accounting period. Output is normally measured at the basic prices, which do not include net product taxes (taxes less subsidies) paid by either producers or consumers.

The value of output equals the value of total sales or other uses of goods or services produced as outputs *plus* the value of changes in the inventories of goods produced as outputs.

2.1.2 Intermediate consumption

Intermediate consumption consists of the value of goods and services that are consumed as inputs by a process of production, excluding fixed assets whose consumption is recorded as consumption of fixed capital. It is valued at the purchase prices.

2.1.3 Consumption of fixed capital

Consumption of fixed capital may be defined as the decline, during the course of the accounting period, in current value of the stock of fixed assets owned and used by a producer as a result of physical deterioration,
fixed assets destroyed by acts of war or other exceptional events unconnected with production, such as major natural disasters, which occur very infrequently.

2.1.4 Gross and net value added

Value added measures the value created by production and may be calculated either before or after deducting the consumption of fixed capital on the fixed assets used. Thus, it is defined as follows:

- Gross value added (GVA) is the value of output *less* the value of intermediate consumption.
- Net value added is the value of output *less* the value of both intermediate consumption and consumption of fixed capital.

Generally, GVA measured at the prices of the accounting year in which the production takes place is known as gross value added at current prices. When GVA is calculated using fixed prices of the base year, it is described as being gross value added at constant prices of that base year.

2.2 Generation of income account

The generation of income account shows the income generated in the course of production carried out by agricultural households. The balancing item in this account is operating surplus or mixed income.

Table 2.2. Generation of income account for agricultural households

Use	**Resource**
Compensation of employees Taxes on production and imports (less) Subsidies	Value added, gross
Mixed income, gross	
Operating surplus, gross	
Total use	**Total resource**

2.2.1 Compensation of employees

Compensation of employees is defined as the total remuneration in cash or kind payable by an enterprise to an employee in return for work done by the latter during the accounting period. Compensation of employees has two main components: wages and salaries payable in cash or kind, and the actual or imputed social contributions payable by employers to social security schemes.

2.2.2 Taxes on production and on imports

Taxes are compulsory, unrequited payments, in cash or kind, made by institutional units to government units. Taxes on production and imports consist of:

- taxes on products payable on goods and services when they are produced, delivered, sold, transferred, used or otherwise disposed of by their producers;
- other taxes on production such as taxes on the ownership or use of land, buildings or other assets used in production or taxes on the labour employed or on the compensation of employees paid; and
- taxes and duties on imports that become payable when goods enter the economic territory by crossing the actual frontier or the customs frontier or when services are delivered to resident units by non-resident units.

2.2.3 Subsidies

Subsidies are current unrequited payments that government units make to enterprises on the basis of the level of their production activities. Subsidies are receivable by resident producers or importers. They do not include grants that governments may offer enterprises in order to generate capital formation or to compensate them for damage to capital assets. Such grants are treated as capital transfers.

2.2.4 Operating surplus and mixed income

Operating surplus and mixed income are alternative names for the same balancing item used for different types of enterprises. Operating surplus or mixed income is a measure of the surplus accruing from the process of production.

Operating surplus or mixed income equals value added *minus* employee compensation payable, *minus* taxes on production payable, *plus* subsidies receivable.

2.3 Allocation of primary income account

The allocation of primary income account shows the primary incomes receivable and the property incomes payable by agricultural households. The balancing item in this account is the balance of primary income.

Table 2.3. Allocation of primary income account for agricultural households

Use	**Resource**
Property income, of which: Interest Rent	Mixed income, gross Operating surplus, gross Compensation of employees Property income, of which: Interest Rent Other
Balance of primary income, gross	
Total use	**Total resource**

2.3.1 Property income

The property income may therefore be defined as the income receivable by the owner of a financial asset or a tangible non-produced asset in return for providing funds to, or putting the tangible non-produced asset at the disposal of, another institutional unit. Property incomes are classified in the following way in the system:

- **Interest** is a form of property income that is received by owners of certain kinds of financial assets, namely deposits, securities other than shares, loans and other accounts receivable.
- **Rent** is a form of property income that is received by owners of land and subsoil assets who put them at the disposal of other parties by arranging contracts or leases under which the tenants or users of the assets agree to pay. Rent on land may also include the rent payable to the owners of inland waters and rivers for the right to exploit them for various purposes, including fishing.

- **Other** is in the form of distributed income of corporations: dividends, withdrawals from income of quasi-corporations, reinvested earnings on direct foreign investment, property income attributed to insurance policyholders.

III. COMPILATION OF AGRICULTURE VALUE ADDED IN CAMBODIA

1. Data sources

The development of the national accounts database is a continuous process. The national accounts database is a compilation of information used in the estimation of national accounts. It relies heavily on administrative data despite their limitations and shortcomings.

For the agricultural sector, the following are the main data sources used in the estimation:

1.1 Administrative data

- Production data on agricultural crops, livestock and poultry, fishery and forestry from the Ministry of Agriculture, Forestry and Fisheries (MAFF)
- Rubber production from the Directorate of Rubber Plantation
- Balance of payments from the National Bank of Cambodia
- Exports and imports from the Customs Department, MEF

1.2 Survey data

- Pilot livestock sample survey, FAO/MAFF
- 1995 rice crop pilot survey, FAO/MAFF
- Price survey data, MAFF
- Socio-economic survey of Cambodia 1993-1994, ADB/UNDP/NIS
- Cambodia socio-economic survey 1997, WB
- Consumer price index for Phnom Penh, NIS

1.3 Special studies, reports and publications

- Nutritional status and food practices in rural areas, UNICEF
- Quarterly bulletin of statistics and studies, MAFF

2. Methodology of estimation

GVA was estimated by the production approach, starting with the monitoring of the output of the various sectors. Output for most of the sectors in agriculture was calculated by multiplying quantity of production with prices. Volume of production for agricultural crops was from the production data compiled by MAFF through its provincial and district offices. For some commodities such as paddy, adjustments were made. Production from MAFF was adjusted based on the per-capita consumption of rice, calculated from the Socio-economic Survey of Cambodia (SESC) 1993-94. The

underestimation of production of paddy was also confirmed by the results of the Rice Crop Pilot Survey conducted by FAO and MAFF in 1995.

Output (O) = Quantity (Q) x Price (P)

Prices used in the estimation are mainly from Phnom Penh markets, since they are the only available prices for most agricultural crops. For some items like paddy and fish, prices in Phnom Penh markets were adjusted with a price differential rate between Phnom Penh and the whole of the country. The price differential was estimated from the unit values of rice and fish by province, which were calculated from SESC 1993-94. The adjusted Phnom Penh prices were assumed to be the producers' prices for paddy and fish, respectively.

GVA can be arrived at by deducting intermediate consumption from output.

GVA = Output – Intermediate Input

In instances where the data required for the estimation of GVA are not available, the use of the Gross Value Added Ratio (GVAR) is resorted to. GVAR is the ratio of gross value added to gross output. The GVARs are estimated from SESC 1993-94 and referred to the production structure of household-operated activities. For the agricultural sector, which is mainly household-operated activities, these GVAR are good enough.

GVAR = GVA /Output

GVA = Output x GVAR

GVA at constant prices was also estimated. The general methodology adopted in this series is the single deflation technique. Current price estimates were deflated using price indices. Price indices for national accounts should be current-weighted (Paasce indices). However, for the estimation, relevant consumer price indices for Cambodia, which are base-weighted (Laspeyres index), were used. The consumer price index for Cambodia was prepared with the expenditure for all Cambodia as weights. Weights were calculated from the expenditure data of SESC 1993-94.

$$\text{GVA at constant 1993 pieces (GVA}_{93=100}\text{)} = \frac{\text{GVA at current prices}}{\text{(Price index}_{93=100}\text{ / 100)}}$$

Other price indices used in the estimation were mostly output indices, constructed using prices collected for the compilation of consumer price indices, agricultural prices collected by MAFF and the unit values calculated from export and import data.

$$\text{Price Index}_{93=100} = S\left(p_n / p_{93} \times \left(p_{93} q_{93} / P_{93} Q_{93} \right) \right) \times 100$$

in which

p_n	= current price
p_{93}	= 1993 price for individual items
$(p_{93}q_{93} / P_{93}Q_{93})$	= base weights (1993)

IV. PROBLEMS IN CURRENT DATA SOURCES AND RECOMMENDATIONS

1. Data gaps

The important data gaps in national accounts statistics for agriculture that need to be corrected are as follows:

1.1 Agriculture

Data on area, yield and production of crops are available for paddy, maize, cassava, sweet potato, mung bean, soybean, groundnut, sesame, vegetables, sugarcane, black pepper, tobacco, cotton, jute and rubber. Fruit crops are quite important to the economy and their output needs to be estimated separately. The coverage of the vegetables also does not seem to be complete. A new proportion for uncovered crops may be estimated from consumption data for use in the agriculture gross value added estimates. Data on by-products of various crops such as paddy straw and maize straw are not estimated, as no data on their output are available. Data on area, yield and production of fodder crops, such as green and dry fodder, are also unavailable. The reporting system of the ministry of agriculture may be extended to these crops as well. No annual estimates of inputs in agriculture other than fertilizers and insecticides are available.

1.2. Livestock

Data on slaughter of animals in the registered abattoirs are not available. They can be used as indicators for moving the output of livestock. Natural fertilizer from manure and other agricultural wastes is taken as input in agricultural crops on the basis of some norms. However, the output of natural fertilizer is not accounted in the output of livestock or agricultural crops.

1.3. Forestry

The coverage of reported data on firewood is very inadequate and cannot be used to estimate output. This is true for most developing countries of the world. Data on consumption of firewood available from the consumption surveys are used instead.

1.4. Fishing

In the case of fish, the estimates of marine and inland fish output do not seem to be adequate, as reflected by the consumption data on fish from the socio-economic survey.

2. Recommendations

To maintain, expand and improve the national accounts data base, the following activities and courses of action are recommended:

- Prepare an inventory of existing agricultural statistics, so that data gaps, conflicts and duplications can be identified.
- Improve the quality of the agriculture's administrative data used for national accounts estimates.
- Provide a quarterly compilation of agricultural data and the latest survey results. This will ensure a regular updating of the national accounts database.
- Conduct small-scale quarterly surveys that would provide the benchmark data and the minimum data required for the calculation of indicators used in updating the accounts.
- Improve the collection and compilation of administrative data such as production data on agriculture, forestry and fisheries, through provision of training on statistics.

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