

## PROBLEMS OF ESTIMATION OF NATIONAL INCOME FROM AGRICULTURE\*

DR. S. G. TIWARI, Central Statistical Organisation, New Delhi, initiated the discussion by drawing the attention of the members to some of the problems both theoretical and practical that arise in the sectoral estimates of national income with special reference to national income from agriculture. While estimating this type of income it becomes necessary, first of all, to clearly define a sector and the activities constituting the sector so that the estimation of national income may not pose difficulties. After having done this, next problem arises as to what method should be adopted for the preparation of the estimates. The choice of method is mostly determined by the purpose in view. For example, if the purpose is to judge the contribution of a sector to total national income then the income originating approach may be quite fruitful; if the purpose is to know the income of the people with certain activities as their principal means of livelihood, then the income approach may be more appropriate while if the purpose is to determine the level of living of a particular class of people, then the consumer expenditure method may seem to be the best.

After having decided on the purpose in view and the method to be adopted for estimation, several problems arise in the actual computation, *e.g.*, should the non-monetised activities be treated differently from the monetised activities for estimation of national income? The U.N. Statistical Commission has advocated for non-inclusion of most of such activities although it has decided to value the agricultural produce retained by the cultivator. This type of differentiation is found to underestimate the national income of countries having subsistence economy with the result that such estimates cannot prove useful indicators of the total economic activities. Further for judging the progress of an underdeveloped economy, it is necessary to have a clear idea of the related contribution of monetised and non-monetised sectors separately year after year as the increase of monetised and decrease of non-monetised sector is generally considered to be healthy

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for the economy. No one in these underdeveloped countries would like to ignore a large number of activities of the rural population which produce such goods and services which are not sold for money. It is, therefore, essential to estimate the value of all goods and services in the estimate of national income which are the result of economic activities. There does not seem to be any justification for their exclusion unless these activities are considered to be non-economic.

While defining agriculture the International Standard Industrial Classification of Economic Activities treats related activities like cotton ginning under agriculture proper. It may be added here that income from such activities rightly belongs to some other sector and hence if included under agriculture is bound to overestimate the income originating in agriculture proper. One need have no objection to their inclusion in agriculture for the purpose of estimation but if their contribution can be separated, it should rightly be put under the appropriate industry. Further, construction of farm houses is considered under agriculture. It may be added that construction is a separate activity without reference to the use to which the building is to be put and hence the construction of farm houses on own account should rightly go to 'construction' industry. Thus it seems desirable to have a satisfactory industrial origin table which should be able to indicate right contribution of each industry both for monetised and non-monetised sectors separately.

Perhaps the definition adopted in the U.N. Document is based more on the entrepreneurial approach which cuts across both the income originating and income received approach and hence cannot satisfactorily help in the preparation of such estimates which are expected of the latter two approaches. It can also be said that the U.N. document does not strictly aim at the preparation of a truly industrial origin table but helps in the adoption of value added approach for the total economy and not for the various sectors separately.

An important theoretical problem is the choice for price to be used for evaluation of agricultural output. In this connection, we may consider the total produce consisting of:

- (a) Part sold by the cultivator within a specified period as soon as a crop is harvested;
- (b) Part sold in the period other than that referred to in (a);
- (c) Part retained for seed and for live-stock feed;
- (d) Part used as payment for labour and for exchange of goods;
- (e) Part retained for self-consumption.

From the standpoint of industrial origin table the total produce ought to be evaluated at the price received by the cultivator for the marketed portion as well as the value added to the retained portion till it is consumed. But the total contribution will not be treated as due to agriculture only but also due to other activities relating to processing of produce, holding of stock, etc., up to the time of consumption. Of this, the portion equal to the total output evaluated at the average wholesale price prevailing at the village site during the specified period after the crops are harvested should be treated as contribution of agriculture and the remaining as the contribution due to processing and stock holding activities of the cultivator.

Coming to the practical aspect of estimation of national income from agriculture in India on the lines recommended by the National Income Committee, one is confronted with certain difficulties relating to (a) area, (b) yield, (c) prices, (d) disposal and utilization of product, and (e) cost of cultivation. With respect to *area*, there is a need for complete coverage in respect of land utilisation which may render the year to year comparability of geographical area with its various details possible. This may entail the presentation of details by various broad categories separately for (i) comparable areas for a given year and the previous year, and (ii) areas newly reported during the year. As regards *yield*, there is a need for data in yield rates of various minor crops and bye-products. The *problem of prices* has already been posed in the context of theoretical discussion and hence nothing more need to be added here. Data on disposal of marketed produce collected for the regulated markets is being examined. Similarly, the data on cost of cultivation collected by N.S.S. and Farm Management Studies is being scrutinised. However, it may be added that such data relating to input and output will be really useful provided they give the physical quantities together with the appropriate prices for their valuation.

Coming to the *live-stock products* we find that milk is the most important of all items. Milk production is estimated by the produce of the average milk yield per animal multiplied by the number of animals in milk and average milk yield is estimated on the basis of lactation milk yield. The matter needs examination whether right results can be obtained if we change the reference period by about a month or so. Further, there is need for data on milk products, meat, etc., their utilisation and cost of production, based on detailed studies.

For the forestry sector, it would be appropriate to have the value of forest product at factor cost as the revenue figures do not serve useful purpose. This of course may necessitate certain *ad hoc* surveys.

The estimates of production in the fishery sector can be improved if data on the fish catch for the freshwater (both for self-consumption and sale) are also available.

It is needless to add that what is needed is not only the detailed data on the various types of product, input and appropriate prices but also better quality of data to be available with minimum possible time lag.

The estimates of income on the income received basis necessitate detailed data on the income from principal and secondary means of livelihood. There is no doubt that these estimates are more important for policy purposes (as also the persons in each class in different income groups). But the collection of data needs greater care.

In the case of expenditure approach, special care is to be taken to see that the consumption of people who mostly subsist on agriculture is properly recorded. In the rural areas where a large percentage of population do not get two square meals a day, many in winter hardly get one meal and supplement their diet by consuming sweet potatoes, potatoes and stalks of various plants in the fields, etc., and in summer when possibly food is there the quantity consumed is less due to consumption of mangoes and other fruits in the village. It is perhaps on the basis of studies on receipt and disbursement in detail that a satisfactory assessment of consumption of cereals in rural areas is possible.

It may not be out of place to mention the topic of Capital Formation. Estimation of capital formation in agriculture has limitation of inadequacy of data. In the rural areas where we have a very large non-monetised sector in which the cultivator uses his own family labour and uses his own material in the construction of physical assets the problem of their evaluation becomes very important. However, the capital formation in agriculture should be able to take care of items (i) construction of farm houses, cattle sheds, etc., (ii) reclamation of land, (iii) bunding and other land improvements, (iv) digging of wells, (v) development of other irrigation resources, (vi) laying of new orchards and plantations, (vii) purchase of implements, machinery and transport equipment, and (viii) miscellaneous capital expenditure in agriculture not included above, both in the private and public sectors. There is no doubt that a part of the rural houses is used for farm purposes or as cattle sheds and this has to be estimated arbitrarily on the basis of certain type studies. However, it is necessary to be fully aware of the various types of activities under various items referred to earlier.

so that no item is left unaccounted in connection with the estimates of gross capital formation.

It may also be desirable to have an idea of increase in stocks of foodgrains with the cultivator and of live-stocks from year to year as they are very important in all the studies.

For the purpose of arriving at net capital formation it is necessary that estimates of depreciation of capital assets should be prepared. Although the task is not very easy, still it may be worthwhile to undertake such studies.

Finally, it may be indicated here that all the items which are being included in the capital formation should be taken care of in the estimate of national income also.

Shri J. K. Pande, Bureau of Economics and Statistics, Lucknow, began by pointing out that there appeared to be some confusion between concept and practicability. He emphasised that, for systematic thinking, it was necessary to have a clear idea, in the first instance, about concepts and then to consider how far those concepts could be followed in practice or what would be the nearest practical approach to them. In that context, he was of the opinion that sectors such as live-stock and marketing were conceptually different from Agriculture and should not be confused with it. Agricultural marketing is only a part, though an important part, of marketing, which itself falls under the broad sector 'Trade' as against 'Agriculture'. He appreciated that there may be many instances in which an arbitrary line may have to be drawn, but there was no harm in doing so as such arbitrary lines are recognised even at the International level. He gave the instance of a house-wife whose activity does not enter into national income, but would enter it as soon as payment is made for it, even though there would be no real increase in national income thereby. Therefore he was of the opinion that the transport and trade sectors should be kept conceptually separate from agriculture.

The question of arriving at contribution to national income raised several difficult points. For instance, there was the question of seed-rate at 10% of gross production. As a result of certain type-studies conducted by the Department of Economics and Statistics of U.P., this seed-rate was reduced to 8% of gross production for purposes of estimation of State income of U.P. Recently, however, specially as a result of *Rabi* and *Kharif* campaigns, certain new agricultural practices are rapidly coming into vogue and, in accordance with those

practices, the quantity of seed required was very much less than according to the old agricultural methods. Besides, there was also the question whether it would be better to allow for seed by making calculations per acre sown than as a percentage of gross production. Similarly, the allowance which has to be made on account of manure presents a problem, as, in this respect also, new agricultural practices which were being adopted in the fast increasing development blocks, necessitated a much larger quantity of manures than was used previously. Sri. Pande emphasised the need of type-studies to determine ratios or factors which would be helpful in making allowances for such deduction items. He also referred to the problem of 'bhusa' and expressed the opinion that, instead of ignoring its contribution, a conceptually better method, which was also being followed in U.P., would be to evaluate the bhusa produce and credit it to the agricultural sector and, at the same time, on the assumption that all the bhusa was consumed by live-stock and there was no appreciable export or import and make a corresponding debit entry in the animal husbandry sector. To the extent live-stock was found to be a factor of cost of production in agriculture, a proportion of such debit should be transferred from animal husbandry to agriculture.

Sri. Pande drew pointed attention to the important problem of comparability of estimates from year to year. Every new year probably brought some more information to light and necessitated some changes in methodology of computation. Requirements of comparability dictated that any changes made as a result of such developments in a year should also be reflected correspondingly in the estimates made for the preceding years. This involved the difficulty of obtaining similar information in respect of past years. There was also another complex question, namely, whether if as a result of certain changes in methodology or some new data having come to light, estimates for preceding years had also to be modified the data of national income or State income published from year to year should continue to include revised figures for preceding years. While theoretically this appeared to be logical, it meant that all figures of national income or State income published in a year would have to be termed as 'provisional' and subject to change later. This was actually the practice followed in U.P. with regard to State income, but it sometimes led to complications as those not aware of this aspect of the question found it difficult to see why estimates for a number of past years had still to be called provisional. Sri. Pande finally supported the suggestion that every year, whenever estimates for a fresh year were published, they should be accompanied

by a memorandum detailing the departure in methodology and any other changes made.

The next speaker Sri. V. M. Dandekar, Gokhale Institute of Politics and Economics, Poona, pointed out some of the conceptual difficulties of estimating national income from agricultural sector that arise mainly from the difficulties of defining the agricultural sector. Certain difficulties of estimation also arise out of the fact that considerable parts of the agricultural sector are not yet monetised and that a large part of the products of the agricultural sector do not at all appear on the market. Nevertheless, it would appear that considering the present stage of national income statistics in India, much of the discussion regarding these conceptual difficulties is disproportionate.

A practical way of defining the agricultural sector would be by means of a list of commodities which may be regarded to be products of agriculture. In such a list, the physical specification of the commodities, particularly in respect of the stage of processing at which they are supposed to leave the agricultural sector, must be complete. For instance cotton may be unginned or ginned. Groundnut may be groundnut in shell, groundnut decorticated or groundnut oil and residual cake in that form. Also the specifications must be complete in respect of the locations at which the agricultural sector is supposed to deliver its products. Such locations may be farms or appropriate processing plants or the producers' markets or the consumers' markets. If some kind of market is made the location at which the products are supposed to leave the agricultural sector, all products will have to be evaluated at appropriate market prices whether or not the products wholly appear on the market.

Beginning with such a definition of the agricultural sector, it will be seen that the greatest real difficulty of estimating national income from the agricultural sector in India lies in the fact that as yet no satisfactory procedures have been established of estimating even quantities of what are clearly products of agriculture. A great deal of expert thinking has gone into this question. Nevertheless, no clear picture is available as to the manner in which the annual production estimates are built up. It will be useful if the Directorate of Economics and Statistics in the Ministry of Food and Agriculture or any other appropriate statistical authority will put forward a comprehensive and detailed memorandum, along with the annual estimates of agricultural production, giving all the raw data that go into the final estimates and the computational procedures by which the final estimates are built up.

Dr. Daniel Thorner, Indian Statistical Institute, Bombay Branch, discussed the long-term aspects of the Estimation of National Income from Agriculture. In the broadest terms, the economy of India from the 1880's to the 1930's may be considered to have stood still. The developments of cities, ports, textile mills, railways and railway workshops had limited impact on the vast mass of villages and village dwellers. According to the official agricultural statistics, from the 1890's to the 1940's agricultural output as a whole increased by only 10%. An increase by only 10% in more than half a century is less than one-fifth of 1% per year. According to the successive censuses of India, from the 1880's to the 1930's the industrial distribution (the distribution by branches or sectors of the economy) of the working force remained practically unchanged. That is to say, the percentage of workers in agriculture to all workers showed little variation.

The two series of data (agricultural statistics and population censuses) are entirely distinct, collected by different agencies for different purposes. The question then may be put: since *each* of these bodies of data points unmistakably to economic stagnation, to what extent may we infer that each body of data tends to confirm, to corroborate or lend credence to the other? May both series be taken as forms in which the same economic process manifests itself? What are the long-term implications for estimation of national income from agriculture?

The overall level of national income from agriculture for the half-century from the 1890's to the 1940's would appear to have remained roughly the same throughout. In this half-century the working force in agriculture in absolute terms increased substantially. This would suggest that *per capita* output of the agricultural working force must have been falling.

Nowadays we are told that to get an *increase* in agricultural output we should draw the 'excess' population out of agriculture and reorganize and rationalize agricultural production. I wonder whether we can say that the period from the 1880's to the 1940's witnessed the reverse of this process: more people went into agriculture and output stagnated.

Dr. K. Krishen, Department of Agriculture, U.P., said that the National Sample Survey (N.S.S.) was originally started for filling in the gaps in economic information specially with regard to national income estimation, although its scope was subsequently broadened to include the information on all the different socio-economic aspects of the country useful for purposes of planning and the administrative

needs of the Central Government. The impression left on him by the remarks of the previous speakers was that so far it had not been possible to make much use of the data collected under the N.S.S. for estimation of national income from agriculture. This view was in consonance with that expressed in the Final Report of the National Income Committee which stated: "So far it has not been possible to make any significant use of the material thrown up by the survey for national income estimation purposes". It was also doubtful whether the data had been of much utility in meeting the needs of planning and administration.

The speaker said that the most serious defect of the N.S.S. as at present conceived and executed was that except for items like land utilization, crop-cutting experiments, etc., data on most of the other items under the survey were collected by the interview or opinion method and were consequently, inevitably subject to large non-sampling errors. That, in fact, was one of the reasons indicated by Prof. Mahalanobis, the eminent statistician, under whose overall guidance the N.S.S. is being operated right from its inception, in the course of discussion on the subject for not publishing any standard errors of the estimates in the various N.S.S. reports. Even in respect of crop-cutting experiments conducted by the N.S.S., the measurement technique adopted involved large non-sampling errors. It was noticeable that the same small circular cuts were being employed by the N.S.S. without taking into account the differing nature and characteristics of the various crops experimented on, or whether they were sown pure or mixed; or even whether it was at all practicable to accurately demarcate in the field the small circular cuts when, for instance, the crop experimented on was a mixed crop like *juar-arhar* or *bajra-arhar*. This, combined with the defective method of location of these micro-plots, the procedure laid down regarding inclusion of half the border plants and unsuitability of the equipment provided for accurate weighing of the small produce obtained separately for the border plants and those falling inside the border, had led to the development by the N.S.S. of an impracticable and highly biased crop-cutting technique, resulting in their giving unreliable, erroneous and misleading estimates of production of agricultural crops which could be of little utility in connection with the estimation of national income from agriculture.

The speaker concluded by saying that there was imperative need for the adoption by the N.S.S. of sound measurement techniques based wherever possible on the method of physical observations, in order to ensure that reliable statistical data were collected under the

survey and the estimates framed were free from bias. He was firmly convinced that it was highly inadvisable for the N.S.S. to collect data on crop-cutting experiments by their seriously defective technique when sound crop-cutting techniques had already been developed for the purpose, which were actually under adoption by another wing of the N.S.S. and had become a permanent departmental routine in the various States of the Indian Union, besides being extensively used in many outside countries, notably Ceylon, Burma and Egypt.

Sri. R. Giri, Department of Land Records, Madhya Pradesh, started by pointing out that much of the data used for estimating national income from agriculture is based on conjectures and there is an urgent need for taking steps to eliminate these conjectures. He cited as examples that there is no objective method of estimation of stray trees outside orchards, crops grown in isolated forest villages and in residential holdings. The estimates of yield of some crops are still based on condition factor and standard outturn. No such standard outturn again is not available for some minor crops. For all crops farm harvest prices also are not collected. No cost of production enquiry has been conducted and the several deductions from the gross produce to estimate the net produce are made on surmises. Allowance for area occupied by field embankments and for wastage of grains in the field and in the course of storage and consumption is made on *ad hoc* basis. Seed requirement has been fixed at a certain percentage of the gross produce. It is common knowledge that the seed requirement is not a function of gross produce, but it depends upon quality of soil and method of cultivation. A correct procedure to estimate the area covered by fieldbunds and the seed requirement will be to base them on the ancillary data collected in these respects in the course of crop-cutting surveys. Similarly the quantum of debt incurred for current needs of agriculture and for improvements made in the past and the rate of interest are based on rough and ready figures. Operational cost of materials required for cultivation and cost of repairs and depreciation of agricultural implements are estimated from rudimentary data. There is considerable amount of conjecture in estimating the cost of agricultural production which is placed at about one-fourth of the value of gross produce. An enquiry into the profits of agriculture conducted recently in Madhya Pradesh by the executive officers in connection with the imposition of ceilings on land holdings revealed that the cost of production was 45 to 50% of the gross produce if the farmers' family labour was not included and 60 to 65% if the family labour was included. These figures and the figures of the

National Income Committee are widely divergent and the accuracy of both is questionable, as they are not based on scientific enquiries. Similarly reliable estimates of marketable supplies and trade margins are not available.

Reliable figures of live-stock and poultry population are available, but no reliable estimates of milk and milk products, meat, fat, edible offals, bones, horns, hoofs, hides, skins, wool, bristle, dung, manurial services by sheep and goats, value added due to increase of live-stock, egg production, number of eggs produced, etc., have been obtained. The cost of these products is also not known definitely.

The forest statistics mostly pertain to Government forests. They do not cover all forests belonging to corporate bodies and private individuals. The unauthorised collection of forest products is also not included in the estimate of income from forest. The forest products are further valued at the price at which they are sold to contractors, and the forest income is thus underestimated. The statistics of fishery products are still worse and are the statistics of income from hunting which is taken at a certain percentage of the income from fishing on an *ad hoc* basis.

Attempts have, no doubt, been made to improve the accuracy of existing estimates and to fill the lacunæ. But there is lack of co-ordination and a number of different official agencies have been employed, giving divergent figures and making confusion worse confounded. More correct and complete statistics would be available if they are obtained directly from the individuals and enterprise who are the active economic agents and have knowledge of facts by virtue of their participation in economic activities. At the outset, such voluntary reporting may not give encouraging results in India where most of the people are uneducated and agriculture is not organised on business lines. A beginning should, however, be made with the progressive cultivators particularly in the national extension and community project areas. Maintenance of such records will also be useful to the farmers in planning and executing their farm business. Professor Gadgil in his technical address in this session also emphasised the importance of collection of such local data from source other than official, *i.e.*, from the progressive cultivators and co-operative organisations who get connected with the activities of official experts.

If cultivators maintain prescribed records, they will provide data which can be utilised for estimation of national income from agriculture by what is termed as 'method of social accounting' by Professor J. R. N. Stone. This method provides a study of classification

of accounting entities; the types of accounts they maintain and the transactions they enter into. All transacting entities are classified into productive enterprise, financial intermediaries and final consumers. Separate entries for each economically distinct category of transaction are made. The economic activities are represented by money-flows and related book-keeping transactions. The need for estimation of National Income by the method of social accounting is more urgent when the planning, executing and financing of development projects in the country require answers to such questions as what part of total income is devoted to consumption, what part of it is available for capital formation, how far the national economy is dependent on foreign trade, what part is played by foreign aid in producing goods and services absorbed by the economy, to what extent and in what manner the different sectors make savings available for capital development, etc. It is the social accounting method of estimation of National Income that provides answers to these questions, and this method can be resorted to if primary producers and manufacturers are required and trained to maintain records of their business activities.

Sri. A. V. K. Sastry presented a paper prepared by Dr. P. K. Mukherjee, Directorate of Economics and Statistics, New Delhi. He first discussed the need of statistics of acreage, output and prices of all the crops grown for the estimation of the value of agricultural output. The method that is followed in estimating agricultural output is the 'census of product' method. Many attempts have been made to improve the statistics of acreage, output and prices, but the gaps, both in coverage and accuracy of the statistics, are quite a few even now. The difficulties and the problems associated with these gaps are also widely discussed. For instance, there is the problem of geographical coverage. The coverage is improving day by day, and that makes the comparability of the agricultural output data over years difficult. Further, there are a number of other crops for which statistics of neither yields nor prices are available. Even with regard to the major important agricultural commodities, the estimate of production has yet to be perfected. These are important problems no doubt; but, are fairly simple also so that they can be solved gradually as and when the knowledge of statistics and the methods of collecting them become more and more perfect. It should be noted that agriculture presents its own peculiar features in the context of the national economy whether that economy is a developed or an underdeveloped one. For instance, in a developed economy, one has to take a decision whether some items should be included in the gamut of agricultural output or

not. Similarly, one has to consider also the problem of what type of price data to be used for the purpose of evaluating the physical output. Finally, since the household activity is inextricably mixed up with the farming activity, one finds it extremely difficult to utilise the factor payments' approach in estimating the sectorial income in agriculture and also attempting an analysis of distribution of agricultural income into different factors of production. The obvious instances, in the context, relate to (a) farmers' consumption of their own produce, (b) payments in kind in the form of cloth, etc., received by the domestic servants and agricultural workers, etc., and (c) the annual value of the service of houses occupied by the owners, etc. In the case of an underdeveloped economy, such as in India, the economy is distinguished by the comparative lack of differentiation in economic functioning. Indian agricultural sector consists of households, simultaneously and without differentiation, performing functions which would normally fall under different industrial categories. That is why, the First Report of the National Income Committee says, "There arises a genuine question as to whether a substantial revision of the industrial classification and a much greater emphasis than is customary in the West upon social groupings connected with the character of the enterprise rather than with industry would not be more useful for India".

The most important problems in the present discussion are: (1) the nature of prices data to evaluate the physical output, (2) problems in 'netting' the value of the gross output and (3) the problem of making the estimation of agricultural income from the end of factor payments. It is the usual practice to evaluate the entire agricultural produce at harvest prices. The underlying assumption is that the producers sell a major part of their produce just after the harvest. Apart from the fact that harvest prices for different commodities are defined in different ways in different parts of the country, one can legitimately ask the validity of using even the correct harvest prices for all the commodities. By evaluating the entire produce at harvest time (wholesale prices at harvest time), the problem of disposal of produce over time gets ignored. Conceptually, valuation ought to proceed on the basis of sales by the producers at different periods of the year. As prices during harvest time are likely to be lower than at other times, there may be a definite bias towards understatement. Very little is known about time distribution of sales. He suggested that some experimental studies on a representative basis might be undertaken in this connection.

The problems of 'netting' relates to the availability of appropriate and correct data on the following items: (1) cost of seed, (2) wastage,

(3) cost of manure, (4) irrigation dues, (5) market charges, (6) repairs and depreciation of farm implements and (7) cost of feeding farm animals, plough bullocks, etc. Till very recently, no firm data were available on the above items. Since 1954-55, the Ministry of Food and Agriculture have initiated a number of studies on farm management practices in the different parts of the country. Earlier I.C.A.R. studies could not be used, as they give the data only in terms of money value. Physical units are necessary and, perhaps, these data, being thrown up by the farm management studies, may be of some use in this particular problem of 'netting'. Everyone is aware of many complications of allocation of costs, even if they are available, to the various purposes for which these costs are incurred. What is done in these cases is to make a fair compromise and establish certain conventions regarding allocations of the costs over different heads.

He then stressed on the difficulties in making a 'factor payments approach' to the problem of estimation of agricultural income. It is now well recognized that the utility of national income data lies, to use a very broad expression, in highlighting the structure and functioning of the different constituent parts of the economy. It is felt that the distribution of the national income and the interflow of income between different sectors and between parts within a sector are much more important than merely arriving at an aggregate estimate of the national figure. If it is so, then it is quite legitimate to expect from the detailed agricultural income data an insight into the structure and functioning of the different constituent parts of the agricultural economy. The most important difficulty, was according to him the lack of differentiation in economic functioning of the different units in the economy. The occupational distribution of the working population in the rural economy cannot be carried on to its logical end. A family can combine so many types of activities within itself that it is well nigh impossible to separate out the payments or the receipts that it gives or gets on account of one or the other. In the village studies that are being carried on by the Agro-Economic Research Centres in the different parts of the country, some attempts are being made to estimate the factor payments in agriculture. But even then the sort of classification that is used in differentiating one factor from another is based on compromises and convention rather than purely on scientific principles. On a previous occasion, he had made attempts to prepare a statistical model of the structure and functioning of the different parts of the rural economy. He divided the whole economy into the following categories: (1) Family productive enterprise, (2) Agricultural labourers,

(3) Trade and transport agencies, (4) Professional and personal service, (5) Financial intermediaries. Further, under the family productive enterprise, farmers, artisans and the mixed categories of families were included. In this model, he attempted to estimate the incomings and outgoings of the above "enterprises" within and between themselves.

He concluded by saying that he has very briefly raised a few problems in this field. Obviously, they need to be thoroughly discussed in all detail. But what is more important is to arrive at an agreement regarding the purpose that may be served by such estimated figure of agricultural output, both on the aggregate level and in its detailed breakdowns and agreeing also on the meanings of the various concepts used in the various stages of estimation process. Probably, detailed studies may have to be undertaken to fill up the gaps in the data to make the aggregate agricultural output data or its breakdowns more meaningful and purposive.

The Chairman Dr. N. S. R. Sastri said that the various speakers have gone thoroughly into the different aspects of the subject. In his concluding remarks he pointed out that for estimating the contribution of agriculture to National Income two factors have to be taken into consideration, namely, (1) the physical products and (2) their prices. We have estimates of quantities of production for major crops only; the precision of these estimates has been gradually improving with the crop-cutting experiments and other improved statistical programmes carried out by the Central Ministry and State Departments of Agriculture. However, the data on production of a large number of minor crops, horticultural products as also of live-stock products have to be improved considerably to make the estimate of agricultural production more accurate. It is desirable to countercheck figures of production by data relating to consumption and marketing of these products. However, in a subsistence economy with a large number of cultivators raising crops on very small holdings and where the proportion of goods going into markets is very low, such counterchecks are difficult. Even in the case of some commercial crops, the large bulk of which are grown in compact regions, it is found that the estimates of production and distribution widely differ.

The problem relating to prices is even more complicated. If the evaluation of production is to be made in every small region, the question of collection of data becomes difficult; if it is made for larger regions, the appropriate statistical techniques for aggregating different

qualities of the same crop harvested and sold at different times have to be taken care of.

Not only in the estimation of the agricultural product and its evaluation but also in estimating the value of inputs which should be subtracted from the gross production to get the net value contributed to national income, uniform procedures have to be followed. For example, deductions are to be made for the cost of seed, fertilisers, maintenance of water resources, depreciation and replacement of farm machineries, etc. We often find, if not contradictory reports, at least significant differences between estimates made by different agencies. In many of these matters, inter-regional differences are possible; however, the concepts used must be uniform for all the regions. Hence it is desirable to discuss these matters at periodical conferences of State and Union Government representatives and a manual should be drawn up for the information of all those who are engaged in this work either as producers of the data or consumers.