DECISION-MAKING AND AGRICULTURE

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Decision-Making and Agriculture

The main theme of the Conference is "Decision-making and Agriculture" which really encompasses the decision-making processes "in" and "for" agriculture or, to put it differently, at the farm (or enterprise) levels and at higher (or policy) levels.

Economists have tried to develop concepts and tools which may help a rigorous analysis of the decision-making process in the context of supply and demand considerations and political scientists have tried to study the decision-making process in the context of the general relationship of the individual and the group with the state. But attempts made so far to study in depth the interaction of the decision making process of those who are actually engaged in agricultural operations and of others at different levels in the market, in the government and in the international spheres dealing with agricultural problems (in functional, planning or general policy formulation capacity) have been very inadequate.

1. MARKET ECONOMY AND SOCIALIST COUNTRIES

One can discern two distinct world trends in decision-making at the farm and higher levels in the agricultural sector.

In market economy countries, the basic decisions are taken by individual farmers and the market helps to coordinate them. But in practice, this co-ordination is often found to be unsatisfactory. In many instances the market fails to harmonise private and social interests, on the one hand, and short term and long term interests of the economy, on the other.

Many market economy countries have, therefore, found it necessary to circumscribe the individual decisions of farmers by advisory or regulatory actions at the local, market and national levels. The trend has, therefore, been towards a certain degree of centralisation.

In socialist countries, on the other hand, the basic decisions regarding agriculture are taken by the state acting on behalf of the society. Tasks are handed down to successive lower levels of government and individual farms do not often have much choice of their own in regard to inputs, outputs and techniques. The needed coordination is carried out not by the market but by

the planning authorities. In practice, however, it has led in many cases to unuseful rigidities and inadequate scope for initiative and innovation at the farm level. This has resulted in serious inefficiency, especially as the central planners often do not, and cannot, have adequate knowledge about specific production conditions in different regions and farms.

Several socialist countries have, therefore, found it expedient to decentralise the decision-making process to varying extents and give greater autonomy with regard to specified decision-making aspects to the local authorities an individual farms.

For market economy as well as socialist countries, therefore, a scientific study of the decision-making process regarding agriculture at the farm and higher levels has become important.

There seems to be a converging tendency in the two. The market economy countries are paying increasing attention to problems of "public choice" and the socialist countries are giving greater consideration to implications of "private choice" than hitherto. There is also a number of countries which deliberately follow a policy of "mixed economy" and pay ernest attention to both, although the relative importance of the two varies widely in regard to issues like price determination, resource allocation and asset distribution.

Further, decision-making for agriculture is no longer confined to national authorities. Compulsions of international supply and demand situations as well as of environmental considerations are making it increasingly necessary to regulate national actions regarding agriculture through some sort of international consultations and even controls.

The UNCTAD meeting which was held in this very hall a couple of months back highlighted the growing international concern in this regard.

2. ECONOMIC AND POLITICAL REASONING

Through what process decisions are made "in" and "for" agriculture (in which agri-business and agro-industry may also be included) at the farm (or enterprise) and state levels and what is the role of intermediate institutions and international organizations is a subject the study of which must draw on the analytical tools of both economic and political sciences.

Decisions based on the operation of market forces, the role of the marginal unit, at what point it will opt out and what effect that will have on submarginal units and the equi-marginal approach to the allocation of scarce resources among competing purposes, represent some of the key elements of economic reasoning.

Decisions based on non-market considerations, inter-play and balancing of opposing views of constituent units, which seek to influence decision not through actual acts of opting out but through pressure of opinion, while striving to remain within the system, represent some of the key elements of political reasoning.

The discipline of agricultural economics, which is perhaps more aptly decribed as the Political Economy of Agriculture, has always been concerned, much more than other branches of economics, with practical problems and

policy issues along with the pursuit of "pure knowledge". Therefore, it has necessarily to keep in view both economic and political reasoning in considering the decision-making process "in" and "for" agriculture.

Agricultural economics may in practice be doing a valuable service to both economic and political sciences inasmuch as it may prompt the development of new analytical tools which will be helpful in dealing with models which are much nearer the reality than the models developed so far.

3. THE INFORMATION SYSTEM

In any decision-making process the basic steps involved are (i) definition of the objective, (ii) identification of possible choices, (iii) collection of relevant information and (iv) drawing of appropriate inferences.

For the unsophisticated farmer in a subsistence type agricultural economy, who is a slave of tradition, is constrained by environment, action of neighbours and scarcity of resources and has very limited access to relevant key information, choices are very few, inferences are relatively simple and the decisions are usually un-innovative.

For sophisticated farmers in more developed economies and the public authorities in most countries, such constraints are much less, access to information is much better, choices are considerably greater, inferences are more sophisticated and the decisions are often of better quality and more innovative. But there is usually considerable scope for improvement even in the most developed economies.

A very important role that the agricultural economists can play in all these situations is to spell out carefully what kind of information needs to be looked into and developed at different levels and for different types of decisions, how it should be collected and presented, by whom and in what form, how it can be best utilised by the relevant decision-maker and what kind of research and educational facilities needs to be provided to achieve the optimum results in the kind of situation which is likely to prevail in the short run, and needs to be looked for in the long run.

Care, however, has to be taken that at each level of decision-making, the information to be considered is the most relevant and the minimum needed.

If the variety and complexity of the information are such as to be beyond the comprehension and the intellectual and material resources of the decision-maker, the result may be quite counterproductive.

There will be an advantage in quantifying and tabulating such information as can be so presented, even applying relative weights to as much of the unquantifiable information as possible and arranging the rest in some order of relevance and importance and with the utmost brevity. This will be helpful both for the comprehension of decision-makers and analysis by agricultural economists. These weights and arrangements will have largely to be based on judgement. How the quality of that judgement can be improved deserves special attention of research workers.

The information needed, the capacity for comprehension and the nature of analysis called for will naturally vary widely between the farm (or

enterprise), market and public agencies at different levels and between subsistence, commercialised and socialised agriculture.

Anything more than simple farm accounts and extension advice may be too complicated for small farmers while agricultural policy makers may be able to make good use of a large array of information ranging from farm and market data and their projections, input–output matrices, R & D (Research and Development) findings and results of econometric analyses of various kinds. But to do the job properly, the policy makers may be well advised to have the assistance of economic/technological "bridgers" (as suggested by me at our last Conference), who can help "ensure that the several groups of specialists contributing to a decision place their information on the table not only in a reasonably fair manner but in terms which convey the significance of the issues to those who have to make decisions". With appropriate orientation, agricultural economists can well perform the function of such "bridgers".

4. DECISION-MAKING AT THE FARM LEVEL

Decision-making at the farm level is basically the function of the farmer or the enterprise manager.

His task is likely to be easier and efficiency greater, if he has a simple and clear objective like, say, maximising net financial return (or growth rate or whatever) and if he does not face any risk. It is likely to be somewhat more complicated if he has to modify such a straightforward maximisation criterion by the need for minimising the adverse effect of risks and uncertanties.

If in addition he has to modify such a criterion by broader economic or social considerations, his decision-making process is likely to be much more complicated, being subject to diffusion (or confusion) of objectives and therefore inefficient.

This difficulty can possibly be reduced if the farmer or the manager can follow a simple "maximisation" criterion and decisions about broader economic and social criteria are taken at other, say, market or public authority-levels and presented to him as given parameters, comprising a package of constraints and inducements.

As a citizen he may seek to get these parameters modified but as an operator he has to consider them as given.

Within these parameters, anything that may enable and encourage the farmer or the manager to be more knowledgeable, flexible, enterprising and innovative will make for better efficiency and economy in the short as well as the long run. Freedom to take decisions at the farm level and appropriate incentives for efficient management will help foster enterprise while provision of adequate research and information facilities will help promote innovation.

5. PRIVATE AND PUBLIC CHOICE

But it is precisely in this context that decision-making "for" agriculture will start having its impact on decision-making "in" farms (or enterprises).

Decision regarding the basic parameters, e.g., the package of constraints and inducements, comprises the main substance of decision-making for agriculture. And this basically involves public choice as distinct from private choice.

Generally speaking, if private choice is exercised at the operational level in the light of private costs and benefits and public choice at the regulatory level, keeping in view social costs and benefits, it should be operationally more efficient and economic. At least, it should be easier to apply the tests of efficiency and economy to the extent that the two can be viewed as two distinct processes.

The relative importance of private and public choices, the levels at which they will be decided and the way they will interact with one another will, of course, vary widely between the market economy and socialist systems. But there will necessarily be a combination of the two in differing proportions under both the systems.

For purpose of drawing inferences, however, there may be an advantage in considering them separately inasmuch as private choices will be based largely on economic reasoning while public choices will involve, in addition, a great deal of political reasoning. The nature of public choices will also differ significantly between market economy and socialist countries.

Since decision-making in and for agriculture will involve different combinations of private and public choices under different situations, systems and time horizons, the subject is naturally of great intereat to all agricultural economists. But while reasonable progress has been made in evolving analytical techniques for decision-making in agriculture, the concepts and tools available for decision-making for agriculture are yet most inadequate.

6. DECISION-MAKING "FOR" AGRICULTURE

I propose now to take a few more minutes in noting some of the issues which need to be kept in view in this context.

As I have mentioned earlier, unlike decision-making at the farm level, which involves relatively straightforward criteria, decision-making for agriculture involves a variety of criteria, some relatively simple and others complex, some of immediate import and others of long term significance. In addition, there are policy decisions which are made with a focus on quite other matters (e.g., general economic policy measures) but have their effects on agriculture.

Some of the less difficult, although quite important decisions for agriculture, would be those relating to improvement of the information and security systems, which would help decision-making at the farm level in becoming more efficient. These are considered less difficult, not because they are technically simple (in fact some of them may be technically quite complex), but because they are less likely to raise difficult political issues.

The information system would cover, as noted earlier, not only intelligence but also extension, education and research. How best the needed intelligence may be collected, processed and disseminated will raise important questions of methodology and costs. What extension and education systems would best suit the farm operators at different levels of sophistication

would require careful study and involve quite difficult technical as well as administrative considerations. The type of research assistance needed by the farm operators will vary considerably between different farm situations and different stages of development.

Risks and uncertainties are closely associated with agriculture. These include not only natural hazards but also market fluctuations. Which of these can and should be covered, the relative efficacy and cost of security measures like insurance, price support, buffer stocks, etc., would raise rather complicated issues.

But the conflict of group interests and related political problems may not be serious in such cases.

Decisions by public authorities for agriculture aimed at ensuring appropriate supply, marketing, credit, irrigation and other infrastructure and, above all, land situations would be no less important for improving the quality of decision-making at the farm level. But they may raise relatively more difficult political issues, apart from quite complicated technical and administrative ones.

What is the appropriate economic return (as distinct from financial return which is of direct interest to the farm operator) to be aimed at, how it is to be measured, what package of constraints and inducements would help achieve it and how it can be best implemented comprise, however, really the key decisions for agriculture. Problems relating to the concept, estimation and application of accounting (or shadow) prices, wages, interests, etc. become relevant in this context. And political issues sometimes tend to become quite serious and complex in decisions of this type.

Then there is the whole series of issues related to agricultural "development" (as distinct from "growth"), role of backward and forward linkages and related structural changes. What are the criteria for considering whether the present trend and pattern of agricultural "growth" is optimum or not, in which directions changes are needed and how these changes can be most economically and efficiently brought about need consideration in this context. While agricultural economists will naturally have to focus their main attention on economic issues, they will have to take into account institutional and social factors also.

For example, in subsistence type of agriculture institutional and social factors are often more significant than economic factors. As agriculture becomes progressively commercialised, economic factors become increasingly more important.

With progressive commercialisation of agriculture, it is also increasingly influenced by international trade and finance. Supra-national considerations have to be kept in view by the national authorities in their decision-making for agriculture. They have also to consider whether the existing international arrangements are the most appropriate for objectives like "security" or "development" and, if not, what kind of change needs to be made and how.

It is obvious that as these different types of considerations are introduced in the decision-making process, it tends to become progressively more complex and difficult. Rational decision-making will be facilitated to the extent

that the issues involved can be considered separately and at the level most relevant, and then coordinated step by step at other appropriate levels.

Similarly if the purely economic considerations are applied first at each step of analysis and social and political considerations are brought in later explicitly for ascertaining what kind and degree of modification may be desirable, the scope for diffusion (or confusion) of objectives will be minimised and the decision making is likely to be more rational and useful.

Those decisions which require detailed knowledge of and close contact with field conditions are best taken at operational levels. Others, which require a broader perspective and coordinating approach, may more appropriately be taken at successively higher levels, e.g., regional and national.

At operational levels there should be usually one prime objective but at regional and national levels there may be one or more main objectives and a number of sub-objectives. Traditional economic analysis will be more easily practicable at the operational levels. It will have to be supplemented by "trade off" types of analysis comparing the optimum levels of different sub-objectives and coordinating them with the main objective in such a manner as will give the optimum result from the overall standpoint.

The decision-making levels are arranged mainly in a hierarchical series in socialist regimes. The arrangement tends to be both hierarchical and lateral in market economy countries.

Sophisticated techniques of various kinds such as interactive iteration and successive approximation, econometric and programming models, general systems science simulation approach, etc. have recently been tried for developing some guidelines for decision-making but only with limited success so far, even for decision "aiding", not to speak of decision "making". It is too early to say if new approaches like "combinatorics" can play any useful role in this context.

Judgement reached after a systematic compilation and study of relevant key information and readiness to take some calculated risks and learn from experience seem likely to be the main basis of decision-making at most levels for quite some time to come.

In considering the decision-making process for agriculture, attention will also have to be paid to the decision-making structure and feedback arrangements.

The decision-making structure will vary considerably not only between different socio-economic systems but also between different stages of economic development within the same system. What kind of structure is likely to be the most efficient under specific socio-economic and development situations or at least what kind of considerations needs to be taken into account in deciding what would be the most appropriate structure, will require an objective and careful analysis of both social and economic factors.

Efficient feedback is important for any sound decision-making but the more hierarchical a decision-making structure is, the greater attention needs to be paid to the feedback arrangements. Adequate information flow and capability for prompt adjustment to changing situations are important in all decision-making structures. But appropriate arrangements for monitoring

decision flow and interaction of decisions taken at different levels become increasingly important the more hierarchical the decision-making structure is.

7. DECISIONS REGARDING BASIC TRANSFORMATIONS

A tacit assumption of the decision-making processes contemplated so far is that the basic institutional or technological situation will not undergo a revolutionary change or basic transformation within a relatively short period. But if such a change or transformation is considered necessary or unavoidable, the criteria for decision-making will be much more ideological and political than is assumed in the foregoing observations. The process for bringing about such a basic transformation will also involve very different strategies. The difference then will be not of degree but of kind.

Basic transformation of the institutional type may be illustrated by a change over from subsistence to commercial farming in less developed countries, from labour intensive small farms to capital intensive large farms in developed countries, and from privately owned and operated farms to communes or collective farms in socialist countries. Such transformation is usually brought about by the joint operation of market and political forces in the first two and by the action of the state in the third.

Transformation through the pull and push of market forces sometimes takes the character of unbalanced but dynamic growth. Transformation through state action may also conceivably do the same but often it results in more balanced but less dynamic growth.

Basic transformation of the technological type may be illustrated by the many biological, chemical and mechanical innovations that have been introduced in the farms of both market economy and socialist countries in recent years. These innovations have been the result of R & D effort partly induced by market forces and partly promoted by the state in the former and mainly directed by the state in the latter.

The lag between R & D and extension varies widely from country to country. The lag is minimum and the progress in R & D is spectacular in the leading developed countries. In fact, R & D has become a massive self-feeding process in these countries.

The lag is the greatest and the progress in R & D is the mininum in the least developed countries. This lag is both a measure and a function of their underdevelopment.

If the innovative process, which obtains today in the developed countries, can be replicated in and the innovations, which are already known to them, can be adapted to the needs of the less developed countries, it can bring about a basic transformation in their economic situation.

The question is how can it be best done, what kind of decision making process will facilitate it, how soon can it be implemented and what kind of R & D activity needs special emphasis.

There are some who take a pessimistic view because they feel that a basic technological transformation of less developed countries is conditional on their basic institutional transformation, and serious social and political

difficulties have to be overcome before such institutional transformation can take place.

There are others who take a more optimistic view on the ground that institutional transformation is often accelerated by technological transformation. They cite the fact that technological innovation is no longer dependent on the genius of an individual or accident of history but has become a well organised self-feeding process in the developed countries. The fact that the communication gap between developed and less developed countries is progressively decreasing, thanks to modern science and technology, is also cited by the optimists in support of their case.

The real issue is not so much the feasiblity of the technological and institutional transformation needed as the decision-making structure and process involved, related political and administrative problems and the time likely to be taken for bringing about the transformation.

The pessimists point to the "consumption explosion" taking place in the rich countries and the "population explosion" going on in the poor countries, the consequent rapid depletion of the exhaustible resources of the earth and increasing strain between the rich and poor countries. They hold that a crisis situation will be reached in 50 to 100 years time. The very wasteful use of exhaustible resources that is taking place under the present market conditions adds to their concern.

The optimists consider both the "consumption explosion" and "population explosion" to be a passing phase. They point to the accelerated growth of the conservationist and family planning movements in recent years. They believe that the "inflection" point, where the "geometric" growth (along an upward rising curve) of consumption and population will get transformed into a "logistic" growth (along a "S" shaped curve) will be reached in a couple of decades time. The projections based on the experience of the "pre-inflection" period of "pre-industrial" and "industrial" economies will turn out not to be true in the "post-inflection" period when what some of them call the "super-industrial" and "post-industrial" economy will prevail.

It is, of course, obvious that our world and its economy are today in a tremendous process of flux.

Technological change has become a massive self-feeding process propelled by an unprecedented knowledge revolution, capital accumulation and world wide interplay of dynamic socio-economic forces.

Agriculture itself is well on the way to changing its character dramatically, although the nature and pace of change differ widely from country to country.

The leading developed countries which already possess conventional technologies far in advance of others, have now set their sights on new revolutionary ideas like nutrient film techniques, controlled environment agriculture, genetic innovations, synthetic food factories and exploitation of non-conventional sources of energy.

The less developed countries are gradually moving from subsistence farming through commercial farming to agriculture based on science and technology that obtains today in the developed countries. There is a progressive

spread fo the innovative spirit in these countries, which is likely to have very significant impact not only on food supply but also on population growth and consumption patterns over the next few decades, if it really catches on among the farmers and other rural people. If they become innovative about one thing, they should soon become innovative about other things as well.

Left to itself, however, this process of transformation will face serious ups and downs and be subject to considerable stresses and strains. The various hazards which the pessimists have highlighted are likely to pursue us throughout the transition period, especially during the rest of this century.

It is only through adopting the right kind of decisions in the realm of public policies that the adverse effects of these hazards and the transition period itself may be minimised and the more hopeful vistas that lie ahead may be reached.

Although there are quite a few such hazards, may I make a special mention of one? This is the hazard that is likely to result from the sharp difference in the growth of GNP, food production, population and per capita effective demand for food and other products in the developed and less developed countries during the transition period. There may be surplus of food in some of the former but there may also be acute shortage not only of food but also of purchasing power in many of the latter.

Concessional sale or donation of surplus food by the developed countries will not only have its limits but will also inhibit in the less developed countries the development of agriculture on which bulk of their growing population will continue to depend for employment and income for many years to come.

8. POPULATION AND FOOD

Here we come to the other important theme of this Conference namely, "achieving a balance between population and food supply".* The balance is urgently needed not merely from the global standpoint but also from the standpoint of specific regions in the less developed parts of the world.

Those who are forecasting the advent of a "post-inflection" era of plenty, first in the developed countries and then its spread by gradual stages to other countries, have to pay serious attention to the problems of distribution and related stresses and strains that will arise during the transition period when a large number of less developed countries will continue in the "pre-inflection" era of scarcity. Trade by itself will not be able to solve this problem as the imbalances will often be unduly large in a number of cases, giving rise to serious economic and social troubles. According to one estimate, in the next decade their import requirements may be two or three times as large as the present level. Proposed international food reserves may give some useful temporary relief in years of crop failure but will not provide a real solution.

It is mainly through a planned and massive effort at both national and

* A report on this part of the conference will appear as a separate publication by the International Association of Agricultural Economists (Edit).

international levels to bring about in the less developed countries such institutional and technological changes as would enable and encourage the masses, especially in rural areas, to (i) be informed, enterprising and innovative, (ii) modernise and improve progressively their agricultural production capability, (iii) make the most economic use of scarce factors, (iv) eliminate avoidable waste in production, storage and utilisation, (v) modify consumption patterns so as to make optimum use of not only the main products but also the bye-products some of which are wasted today, (vi) adopt effective family planning practices and (vii) improve their purchasing power, so that the serious economic and social hazards likely to be encountered, at least during the transition period, can be minimised and contained.

While the case studies and other papers prepared for this Conference throw some useful light on a few of these aspects, there is need for much more research to be done. For instance, a systematic study of the various elements mentioned above in a comparative manner for a sample of less developed areas, on the one hand, and for some sharply contrasting experiences in different patterns of production, consumption and development, on the other, could provide us with valuable insight.

One intriguing question is what would be the implications for global and regional food demand and supply situations during the next two or three decades, if the other countries followed, say, either the American or the Chinese pattern.

Another question is the likely effect of a substantial time difference in reaching the "inflection points" in regard to growth of population and per capita consumption of agricultural and non-agricultural products in developed and less developed countries and the implications for agricultural development and rural employment in the latter.

How best the possible adverse effects of the deceleration of population growth in both sets of countries, and of consumption growth in developed countries on the demand for agricultural products of the less developed countries, can be corrected by improving the per capita income of the poorer classes and the development of the secondary and tertiary sectors in the less developed countries themselves will also need careful consideration.

9. CONCLUSION

Be that as it may, there can be little doubt that if the very serious problems which the less developed countries are likely to face during the critical decades ahead are to be met, there will be urgent need for imaginative and effective public decision-making at international and national levels for the formulation and implementation of long term and short term policies and programmes for a more balanced development of the world's economy and its important sectoral and regional constituents. Intensive technological and economic research to meet the special requirements of different regions and spread of innovative education skills among the rural people will be as important elements of these policies and programmes as institutional reforms,

trade promotion and transfer of resources. What kind of forward looking research and educational programmes should be taken up will need a special kind of perspective and strategic decision-making by the public authorities concerned.

These and other public decisions to deal with the emerging problems of a secular change may be significantly different from the kind of public choices for agriculture which I have mentioned earlier, and may be considered by some to be beyond the scope of conventional agricultural economics. But, if agricultural economists have to deal with the various problems which the impending transition in the world agriculture and world economy is likely to throw up, they will have to pay serious attention to this other kind of public decision-making that will be called for.

I hope that the deliberations in this Conference will throw useful light on some of these basic issues, indicate the directions in which further research effort needs to be concentrated and help evolve arrangements which would provide the intellectual, institutional and financial support that such effort will require.