

DEVELOPMENT TRENDS IN AGRICULTURE IN INDIA*

DR. M. N. MURTHY

Director, Applied Statistics Centre, Madras

1. Introduction

Mr. President, office-bearers of the Indian Society of Agricultural Statistics and Delegates.

I wish to thank Dr. Prem Narain and through him the Society for inviting me to present this Technical Address at its forty-third session. I consider it a privilege to be able to address this august gathering of distinguished members of the Society, many of whom have taken up a leadership role and contributed to the growth of the agricultural sector in the country.

Regarding the topic of this Technical Address, it would have been simpler for me to talk on some problems of designing and conducting agricultural sample surveys in view of my long association in the field of Survey Sampling. But as I had been away from India in Tokyo during most of the period of the Green Revolution and phenomenal changes in the rural economy in the country, I was quite interested to know more about the tremendous efforts made by agronomists, statisticians, administrators, extension workers and farmers in this direction. Hence I chose this topic of Development Trends in Agriculture in India with the hope that this would give me an opportunity to familiarise myself with various aspects of agricultural development in our country. The task of getting information in this field was much easier than I had expected as the Society had invited eminent persons with wide background and extensive experience to deliver very informative and instructive talks on various

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facets of agricultural development at its regular annual sessions and special lecture programmes. What impressed me most in going through this treasure-house of knowledge and information in this field is the candid manner in which the erudite speakers had dealt with the topics chosen by them. In this context, I must mention that I am delivering this technical address with much humility and with the full realisation that my knowledge and experience in this field are very limited indeed.

I propose to deal with the following aspects of the topic of this address making it clear that most of the findings and views covered here are based on several papers published in the Society's journal and in various Commission and Committee reports :

- (a) Green Revolution;
- (b) Rural Economy;
- (c) Agricultural Statistics; and
- (d) System's Approach

Though these aspects have been considered here in the context of the agricultural sector, the points raised and discussed apply equally well to the fields of animal husbandry and fisheries.

2. Green Revolution

Supporters and detractors as well as eulogists and critics of the green revolution have to admit that there is a perceptible growth in crop production in the country as evidenced by increase in foodgrains production from about 50 million tonnes in 1951 to the expected 175 million tonnes in the current year, that the country has attained self-sufficiency in the crucial area of cereal production in spite of the phenomenal increase in our population from 431 million in 1951 to about 810 million at present and that the country has been able to tide over the few drought years we have faced in the past including the unprecedented drought of the period 1985-87 without much dependence on help from abroad. This situation of great economic and political implications has not come about in a natural course or by accident. This development is all the more interesting when we note that this has been the result of a system at work and not due to the efforts of a single charismatic leader or father figure. Needless to say a large part of the credit for this goes to the farsighted political leaders like Babu Rajendra Prasad, Jagjivan Ram, S. K. Patil, S. K. Dey and N. G. Ranga, agricultural scientists such as M. S. Swaminathan, statisticians like P. V. Sukhatme, V. G. Panse and P. C. Mahalanobis, economists such as V. K. R. V. Rao, S. R. Sen, Manmohan Singh,

Tarlok Singh, A. Vaidyanathan and Raj Krishna and countless devoted and committed scientists, extension workers and farmers.

The achievements of green revolution have been the result of work by several agencies which have devised programmes, monitored and adjusted them to suit their objectives and local conditions. Naturally in a predominantly agricultural society, there are numerous interconnections and linkages. Unless a well-thought out, farsighted and coordinated system of programmes is designed and implemented, imbalances, disparities and aberrations are bound to occur. Obviously in a tradition-bound conservative sector like agriculture, bringing about far-reaching changes is difficult and sustaining them over a long period of time is much more difficult. A number of favourable things which helped to bring about the green revolution are listed here :

1. extension of crop acreage;
2. increase in irrigation potential;
3. maintenance and utilisation of irrigation works;
4. development and identification of high-yielding varieties;
5. extensive use of statistically designed agricultural experiments;
6. determining optimum dosages and use of fertilisers;
7. water management in rainfall and irrigated areas—problems of flooding, drainage, salinisation, etc.;
8. manufacture and supply of inputs
 - quality seeds,
 - fertilisers,
 - pesticides;
9. extension of farm credit and crop insurance;
10. establishment and development of agricultural universities, colleges and experimental stations;
11. setting up and management of extension work;
12. farmers' acceptance of improved agricultural practices;
13. providing marketing opportunities;
14. better storage facilities;
15. improved transport and communication;
16. building up of buffer stock and its maintenance;
17. development and sustaining of a viable public distribution system;
18. better support for agricultural facilities;
19. price support for agricultural commodities;
20. multiple cropping;
21. crop rotation;
22. balancing invisible terms of trade between rural and urban sectors;

23. employment-generation programmes;
24. poverty alleviation programmes; and
25. nutrition intervention programmes;
26. family welfare programmes.

Thus we see that there are several facets of the agricultural sector which need attention when crop production has to be increased to meet the needs of the rapidly growing population. Since the dawn of independence in the country, and more particularly since the drought year of 1964-65, considerable efforts have been made to bring about increase in foodgrains and to improve the living conditions of the rural population.

After a few years of the commencement of the green revolution, the excitement generated by its success in increasing crop production got a jolt when the country had to face a drought year in 1972-73 requiring import of foodgrains. This led to a critical examination of the results of the green revolution, which brought out the fact that its gains have been limited mainly to wheat and to rice to some extent and that too only in some selected States, and the majority of crop area in the country had been untouched by it. Further examination revealed that the green revolution was oriented towards irrigated-area, which was only about one-fifth to one-fourth of the total cultivated area in the country. A number of other weaknesses were noticed such as under-utilisation of irrigation potential, poor water management in large areas and non-optimum use of inputs.

As early as 1967, S. R. Sen (1967) had pointed out that the agricultural growth in the country was accompanied by instability which had led to imbalances, and he suggested classification of the areas in each State in the following four categories for planning and implementing agricultural development :

- A — areas with assured water supply through rainfall or irrigation;
- B — dependent on monsoon
 - B1 — droughts relatively less frequent;
 - B2 — droughts relatively more frequent;
- C — water resource is scarce and precarious.

The entire efforts regarding developing dwarf high yielding varieties, determination of optimum levels of fertiliser, extension work, etc. had got concentrated in parts of Type A areas and that too in some States. Even in this limited area of adoption of the improved crop practices, it was found that the potential for growth was not fully utilised due to various reasons. One important aspect is that the green revolution has

not been able to free the agricultural production from the vagaries of weather, due to its orientation towards the limited irrigated area in the country.

In this context, I think we should take note of the following quotation from N. G. Ranga, (1982, p. 38) which deserves our careful consideration :

“Have we taken adequate steps to see that the ‘Green Revolution’ has spread its uplifting and profitable sun-shine, more or less uniformly over almost all the States, more especially the chronically depressed area in all States, tribal and mountainous regions? Whose fault has it been and to what extent for their continuing backwardness; the Scientists or those incharge of demonstration or financing agents or politicians or else administrators?”

In Section 3, we will see how the green revolution and the efforts by several agencies have influenced the rural economy in the country.

3. Rural Economy

The euphoria generated by the green revolution gets a little blunted when its effects on the rural economy of the country is closely examined, This is particularly so when we wish the objective of the green revolution to be not only to produce more foodgrains but also to improve the level of living in the rural sector without introducing imbalances, disparities and distortions. C. Subramanian (1971) has rightly mentioned that agriculture in India had all along been more a mode of living than a commercial enterprise.

When viewed in the context of rural development with its emphasis on improving the living conditions of the population through increasing employment opportunities, providing basic needs, and extending family welfare schemes, it appeared that the green revolution's beneficial fallout has been rather limited. It was becoming apparent that the green revolution has made rich farmers richer and poor farmers poorer leading to greater disparities in the rural economy. The coefficient of variation of per capita foodgrains production over the States has increased from 0.312 to 0.591 during 1961-79 (Vaidyanathan, 1986, p. 55). Due to steady increase in cost of inputs, in spite of subsidies and price controls, the improved practices were becoming a luxury to the small and marginal farmers. Though it is mentioned that the improved practices, when properly adopted, are neutral to size (B. Sivaraman, 1973), the fact remains that the small farmers with their limited resources cannot afford them.

Two major factors have militated against the country benefiting from the improved agricultural practices and from the agricultural growth achieved so far. They are the agricultural sector being in the hands of a large number of small and marginal farmers without resources for attaining higher growth and the population explosion which has become, according to N. G. Ranga (1982) an unmanageable and cumulative multi-pronged social cancer. Small farm factor has been the result of a deliberate policy of social reform through abolition of the zamindari system and implementing land ceiling legislation. A small farm structure can yield more employment as well as more output, but this will reduce rural savings and marketable surplus for sometime to come, (Raj Krishna, 1978). Population explosion is in fact becoming more pronounced, in spite of the limited success of the family planning programmes, due to sharp decline in mortality. Because of these two major factors, we are finding that we have to keep running faster to stay in the same place.

From Table 1, it is clear that the population growth rate shows an increasing trend upto 1971 and it has stabilised during 1971-81. Table 2 shows an increase in the availability of certain agricultural commodities in spite of the steady increase in the population except for pulses which has registered a substantial decline in its availability. Further, from Table 3, one can see that the availability of per capita protein and the calorie intake had remained practically the same during 1975-83.

The two other major components of rural economy which influence the level of living are employment opportunities and purchasing power. In case of areas with intensive agricultural growth, there has been perceptible increase in the rural employment opportunities both in the agricultural and non-agricultural sectors. However, in the larger part of the area not benefiting from the green revolution, there has been a trend towards urban migration, possibly denuding the rural sector of skilled and motivated manpower. The reported figure of 40.4% for the percentage of population below the poverty line in 1983-84 in the rural sector (CSO, 1989) shows that in spite of persistent efforts of poverty alleviation through a number of government-sponsored programmes a large part of the agricultural population in the rural sector has not been benefited much from the green revolution and overall growth in the country's economy.

To what extent mechanisms such as support prices for agricultural commodities, subsidies for farm inputs, capital expenditure on irrigation works and non-imposition of tax on agricultural income have benefited the rural agricultural population has not been studied in depth. On the one hand there are complaints that the government mechanisms have

resulted in invisible transfer of wealth from rural to urban on unequal terms of trade and that the industries and the urbanites have benefited from "slave production" (N. G. Ranga, 1982). On the other hand, economists have pointed out that for from exploitation of rural labour, the government, both at the Central and State levels, have extended non-viable subsidies and unrecoverable farm credits, most of which have not reached the target group and hence not achieved their objectives. This view is strengthened by pronouncements from highly-placed politicians that only a small part of the government expenditure on rural schemes reach their target groups.

TABLE 1—POPULATION GROWTH RATES FROM CENSUSES

Period	Average annual percentage growth rate		
	Arithmetic	Geometric	Exponential
1901-11	0.57	0.56	0.56
1911-21	-0.03	-0.03	-0.03
1921-31	1.10	1.05	1.04
1931-41	1.42	1.34	1.33
1941-51	1.33	1.26	1.25
1951-61	2.15	1.98	1.96
1961-71	2.48	2.24	2.22
1971-81	2.50	2.26	2.23

TABLE 2—PER CAPITA AVAILABILITY OF FOODGRAINS AND OTHER SELECTED COMMODITIES

Year	Net availability of foodgrains per day (gm)			Per annum availability of		
	Cereals	Pulses	Total	Edible oil and Vanas- pati (Kg)	Sugar (Kg)	Cotton cloth and man- made fibers (meter)
1950-51	334.2	60.7	394.9
1955-56	360.4	70.3	430.7	3.2	5.0	14.4
1960-61	399.7	69.0	468.7	4.0	4.7	15.0
1965-66	359.9	48.2	408.1	3.5	5.7	16.4
1970-71	417.6	51.2	468.8	4.5	7.3	15.6
1975-76	373.8	50.5	424.3	4.3	6.2	14.6
1979-80	379.5	30.9	410.4	4.7	8.0	14.7
1980-81	416.2	37.5	453.7	5.0	7.2	14.7
1981-82	414.8	39.2	454.0	6.4	8.1	14.4
1982-83	396.9	39.5	436.4	5.8	9.0	13.6
1983-84	436.1	41.8	477.9	7.0	10.3	14.8
1984-85	415.6	38.1	453.7	6.8	10.7	14.5
1985-86	434.2	41.9	476.1	6.3	10.9	14.8
1986-87	436.2	35.9	472.1	6.9	11.5	15.0
1987-88	408.2	33.2	441.4	7.2	11.7	11.7

TABLE 3—AVERAGE DAILY INTAKE OF PROTEINS AND CALORIES

<i>Year</i>	<i>Proteins (g)</i>	<i>Calories (k cal)</i>
1975	63.6	2296
1976	65.4	2396
1977	61.9	2306
1978	62.6	2341
1979	62.3	2366
1980	62.8	2404
1983	63.8	2481

Source : CSO (189) : Selected Socio-economic Indicators for India ; Ministry of Planning, Government of India, New Delhi.

A glaring situation of high cost and under-utilisation has been brought out by A. B. Joshi (1986, pp. 251-252) when he reports B. B. Vohra a stating that the investment on major and medium irrigation upto the end of the seventh plan period was about Rs. 27000 crores and that 25% of the total potential remained unutilised. Joshi quotes and I repeat the quote here :

“For, its deficiencies and failures (of the major and medium irrigation projects) have now reached such proportions that this sector is beginning to collapse under its own weight. According to a recent study, 156 major irrigation projects have undergone a cost escalation of 526 per cent. Against the original estimate of Rs. 2,156 crores they are now expected to cost Rs. 14,000 crores when completed. More money will be needed to construct distributaries, canals and to carry out other farm works.”

Attention is drawn to these obvious deficiencies in implementation to stress that unless these are eliminated or kept to a minimum, designing any number of development programmes and adopting a system's approach would not help.

The poverty situation in the rural sector, however defined, has not perceptibly improved and the disparities between rural and urban, agricultural and non-agricultural sectors and between the States have increased. P. V. Sukhatme's pioneering work in the field of nutrition has brought out the need to define poverty in more realistic terms taking into account the inter-person and intra-person variations in nutrition needs (P. V. Sukhatme, 1981, 1983). It is important to note his finding that infant mortality and not malnutrition or under-nourishment is the cause

of a large number of individuals for small physical growth.

The following are some selected points which need careful attention and remedial measures if we wish the rural economy to succeed in its efforts in increasing agricultural production and at the same time better the level of living of the population :

1. land distribution approach has been rather half-hearted;
2. non-spread of green revolution to monsoon crops and more regions in the country;
3. instability in agricultural production;
4. adverse effects of vagaries of weather;
5. under-utilisation of irrigation potential;
6. inefficient water management practices in respect of flooding, drainage, salinisation etc;
7. non-optimum application of fertilisers;
8. increasing cost of agricultural inputs;
9. inter-crop and inter-regional imbalances;
10. agricultural price support inadequate;
11. diversion of area from cash crops to cereal crops;
12. lack of quality seed consciousness;
13. multiple cropping and crop rotation practices are not satisfactory;
14. lower stalk output in high-yielding varieties;
15. farm education not widespread;
16. gap between potential and performance in rural projects and programmes;
17. demand projections of input requirements are not satisfactory;
18. rural credit and crop insurance schemes need strengthening, both in planning, organisation and implementation;
19. invisible transfer of wealth from rural to urban due to unequal terms of trade;
20. rich farmers becoming richer and poor farmers becoming poorer;
21. possibility of taxing agricultural income and wealth of large farmers to support poverty-alleviation programmes;
22. rural unemployment and under-employment, particularly in low agricultural-growth States/regions;
23. yield and growth rates of crops are still less than those in most of the South Asian countries;
24. regional disparities leading to transfer of funds from deficit States to surplus States;
25. coordination of State and Central rural development programmes; and
26. need for a system's approach.

4. Agricultural Statistics

Considerable advances have taken place in the fields of designing experiments and surveys, data collection, analysis and use of agricultural statistics and possibly India has the most developed system among the developing countries. In spite of this, we hear comments such as that our agricultural statisticians are among the best in the world but that cannot be said of our agricultural statistics. On the positive side, we have a well developed system of censuses and surveys in the fields of agriculture and livestock to provide basic information on the following :

1. land utilisation;
2. area and production of major crops;
3. land holdings by size, tenure, etc.;
4. availability and utilisation of agricultural inputs like quality seeds and fertilisers;
5. irrigation potential and the extent of its utilisation;
6. producer and market prices of major agricultural commodities;
7. cost of production information in respect of selected crops;
8. rainfall and temperature;
9. current employment, unemployment and under-development levels;
10. current consumption levels;
11. data from limited nutrition surveys; and
12. data from programme evaluation studies.

These data, when available over time at regional, State, district and lower levels, constitute a large wealth of data-base for carrying out methodological studies, planning development programmes and evaluation of results. Mere existence of data is not sufficient for us to derive full benefits from them. It is important that they are available with least delay and should be accessible. At present, the data are accessible on time only to the government agencies and with some delay to some established institutions. Unless the data are made accessible to a larger audience including the management in the industries, their utilisation will remain partial. Only wider availability of the data will lead to better analysis and use, besides bringing out any deficiencies and suggestions for improvement.

On personal note, I may mention that while I was working at the Indian Statistical Institute in Calcutta, I had no difficulty in getting any of the data published by the Government of India. But now that I am in Madras, I could get complete time series data on area and production of selected crops for the period 1964-1987 only after two of my staff

members had gone to three organisations. It is important that we not only collect and publish statistics, but should do so on time, publicise their availability and market them to ensure their accessibility to regular and potential users.

Another aspect of the published data is use of several symbols in a table with several footnotes pointing out deviations and declaring that these figures are provisional, first estimate, non-comparable etc. even when they refer to an earlier period. The users are in difficulty to use this information meaningfully in their analysis and interpretation. The data-production agencies are in a better position than the users to ensure better comparability by adopting appropriate methods of inter or extrapolation or revision, wherever possible, before publishing them. The purpose of publishing statistics should not be merely reproduction of compiled figures but also to give the data and other relevant information to facilitate their use in further analysis and interpretation. In fact some basic analysis and interpretation of the results should be carried out and published by the producers of data to avoid repeated similar analysis of the data by the common users.

One set of potential users the producers have not taken into account and confidence are the management in industry and business. My recent contacts with a few leaders in this sector of the economy have shown that there is keen interest in using the so-called official statistics, but the lack of information on their data structure, availability and accessibility hinders their wider and better utilisation.

Coming to the use of available agricultural statistics for analysis by the few institutions with access to the same, it is a fact that several useful analytical studies are being undertaken by the rural economists, agronomists, statisticians and others, as evidenced by the papers discussed in periodical symposia organised by the Society and other organisations and published in many professional journals. Here again, the point is to what extent are these findings reaching the decision-makers in government, public and private organisations and forming the basis of their decisions. This point is being mentioned because there is an increasing interest among the modern managers in using statistical information in the decision-making, particularly in view of the dynamic take-off environment the Indian industry is in at present.

If we wish that our data are used not only by sophisticated professionals familiar with statistical analytical tools, but also by managers, administrators and politicians, the ultimate decision-makers, the emphasis should shift from production of complicated tables to graphical and spatial presentation. Presentation of price data in the form of iso-price

lines on maps on the lines of weather maps was found extremely useful during the 1962 emergency in the country and it is worthwhile using this as a standard feature of presentation of not only price data but also data on selected socio-economic indicators such as yield-rate, savings-rate, intensity of cultivation, etc. The latter mode of presentation was not common mainly because of the time-consuming nature of manually preparing them, but with the availability of computers and relevant software, this task has become much simpler and feasible. For instance, Modules 2 and 6 of STATTECH Series software developed under my technical direction are aimed at generating graphs, charts and spatial distributions.

Needless to say, the statisticians, agronomists and other agricultural scientists have played a pioneering pivotal role in ushering in the green revolution for selected crops in the context of irrigated area in some States. This expertise should be extended to other crops and other areas in the country to reduce regional disparities, imbalances and instability in crop production and its growth. The agricultural universities, colleges and institutions of the ICAR have played a fruitful role in the past and they should ensure that the green revolution does not remain lop-sided but spreads to other crops and other regions thereby benefiting a larger population with its fall-out in terms of more employment opportunities, better income and higher level of living.

Without trying to be critical in the absence of intimate knowledge and extensive experience in this field, I wish to mention that there is tremendous potential for greater utilisation of our scientific man power in achieving speedier agricultural development. My limited contact with the agricultural experimental stations and colleges has shown that there is considerable under-employment among the research staff possibly because of the slow nature of the agricultural experimental process and more particularly due to lack of dynamic leadership and plans of research devised at regional level appropriate to different climatic and soil conditions, suitably coordinated at the national level. With the type of scientific manpower we have and that we can train, the output in terms of new discoveries, publishable research papers of high calibre and quality and technologies made usable on the field could and should have been much more than at present. This would, of course, need modernising of our agricultural institutions with relevant laboratory facilities and computer power.

In this context, it is heartening to note the recent assertion of C. Prasad, Deputy Director General, ICAR, reported in newspapers that the Indian agricultural scientists did not have 'exhausted' technology and that they had the capacity to double and treble the foodgrains pro-

duction. His suggestions to set up a Krishi Vigyan Kendra in each district and to allocate 10% of the budget by each agricultural institution to transfer of technology to the farmers are most welcome.

Now turning to the gap in agricultural statistics, I find distinguished statisticians such as J. S. Sarma (1971), K. C. Seal (1980), S. R. Sen (1983), P. K. Bose (1983), B. P. Adhikari (1983) and D. Singh (1986) have in their technical addresses to the Society have discussed the status of Agricultural statistics in India and pointed out a large number of gaps that exist and some of these gaps are given here with the hope that these would be examined carefully and attempts would be made to fill them ;

1. area and production data for agricultural commodities not covered in the present system, vegetables and fruits;
2. producers' and market prices for a larger basket of agricultural commodities and inputs;
3. data on irrigation potential and utilisation;
4. norms used for indirect estimation of production of some crops are based on out-dated data;
5. technical coefficients used in evolving agricultural development plans are still crude and subject to large margins of error;
6. utilisation rates and conversion ratios used for deriving contribution of livestock products are usually not based on scientific studies;
7. cost of production of livestock products;
8. availability and use of agricultural inputs;
9. yield rates used for estimation of output of meat and meat products are quite old;
10. composition of fixed capital in the crop production process;
11. data on consumption of fixed capital are quite meagre;
12. data on annual shifts in different components of factor incomes are far from satisfactory;
13. data on terms of trade between rural and urban and between agricultural and non-agricultural sectors;
14. studies on crop-weather relations;
15. methodology for quicker estimation of disaster losses;
16. conventional allowances for seed, feed and wastage are not satisfactorily estimated;
17. agricultural experiments to determine response surfaces for agricultural inputs under different climatic conditions and for different quality seeds; and
18. new approaches for planning and programming agricultural development to reduce regional and inter-crop disparities, imbalances and instability.

5. System's Approach

With increasing trends towards modernization, hi-tech orientation, automation and computerisation, particularly in the industrial sector, there is growing emphasis on a system's approach to understanding and solving problems. This method was strongly advocated as early as the sixties when Operations Research had become popular, particularly among research scholars in the country. B. P. Adhikari (1983), in his technical address to the Society, had proposed the adoption of a system's approach, particularly in the context of agricultural statistics, and suggested the following :

- (a) making a comprehensive inventory of components of the Indian agrarian system and to group them to form subsystems;
- (b) drawing up a system block diagram indicating their inter-connections; and
- (c) examining of the data needs, identifying data already available and planning to fill the data gaps.

My brief association with use of computer, through its use and directing STATECH Series, a versatile statistical software indigenously developed in modular form, has shown that it is most rewarding to adopt the system's approach in analysis and solving problems, particularly when they are complicated and have many facets and linkages. Viewing the Indian agriculture as a system by itself and its linkages with the non-agricultural system in the rural sector and the urban system with its own subsystems of industry, business, transport, etc. will go a long way in understanding the numerous and intricate interconnections and linkages and evolving development schemes and implementation strategies for growth without instability, imbalances and aberrations.

I neither have the expertise nor the intention to propose a system for the Indian agriculture in this brief technical address. I wish to go just one step further than B. P. Adhikari and list out specimen components and factors which should form components of the system. I am sure that the eminent members of the Society and the distinguished scientists, statisticians and economists directly or indirectly associated with the agricultural development in the country would be able to devise a suitable agricultural system and study its relation to other relevant systems, so that the efforts of planning for development and implementation of various schemes become more meaningful and fruitful.

I am listing in Annexe specimen components and factors which should be considered in evolving and using a system. It is to be noted that this list is only indicative and not exhaustive. No attempt is made here to list the numerous schemes of the central or State governments. But in adopting a system's approach, not only all the schemes should be listed but also their linkages between themselves and with relevant schemes outside the system should be studied. In fact the schemes themselves should be designed as a part of the system taking into account their feasibility, interaction with other schemes, cost-benefits, etc.

6. Concluding Remarks

Whatever has been said in the technical address is with the full understanding that bringing about agricultural growth without instability and imbalances is a complex task involving professionals from various disciplines and people working at grass-roots level in a highly unorganized sector. What has been achieved in the last few decades is much, but many of the earlier problems remain, some have got accentuated and more problems have arisen. Also there is the need to develop and promote technologies the ongoing and forthcoming white (milk), blue (fisheries), yellow (oil seeds) and brown (food processing) revolutions and make them beneficial avoiding the pitfalls of the green revolution and gaining from the extensive experience gained from it. It is a challenging situation and I am sure the members of the Society, who have been pioneers in the field of agricultural development in the country, will continue to contribute their very best to the process of developing new technologies and spreading them to benefit all sections of the agricultural population in the country in a just and equitable manner.

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ANNEXE—SPECIMEN COMPONENTS OF AN INDIAN AGRARIAN SYSTEM

<p><i>Agriculture</i></p> <hr/> <p>cultivation animal husbandry fisheries forestry</p> <hr/>	<p><i>Small-Scale</i></p> <hr/> <p>small holdings marginal farmers labourers</p> <hr/>
<p><i>Administration</i></p> <hr/> <p>Central Government State Government district tehil/blocks panchayat/village village/hamlet</p> <hr/>	<p><i>Large-Scale</i></p> <hr/> <p>large holdings co-operatives</p> <hr/>
<p><i>Organizations/Institutions</i></p> <hr/> <p>Central government Planning Commission Ministry of Agriculture Related Ministries CSO NSSO (Central) Agricultural Prices Commission National Seeds Corp. Food Corporation ICAR IASRI Agricultural Institutes Nationalised Banks Other relevant bodies</p> <hr/>	<p><i>Organization/Institutions (Contd.)</i></p> <hr/> <p>State Government State Planning Board Statistical Bureau NSSO (State) Food and other relevant Ministries Seeds Corporation Credit Corporation Small Scale Industry Board Housing Board SC/ST Development Department Family Welfare Department Nutrition Programme Other relevant agencies Agricultural University Agricultural Colleges Experimental Stations Fertilizer Industry</p> <hr/>

Facets to be considered

geographical
topography
soil conditions
rainfall
climatic conditions
agricultural inputs
irrigation
quality seeds
fertilisers
employment
capital
income
consumption
savings

Facets to be considered (Contd.)

farm credit
extension work
technology transfer
demo farms
market support
price support
subsidies
taxation potential
disaster warning
disaster losses
crop insurance
household industry
own account work
