

**A
REVIEW
OF
SECTORAL
RESEARCH**

INDIAN INSTITUTE OF MANAGEMENT
BANGALORE

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PREFACE

Management is taught in developing countries based on concepts and techniques evolved in the market economies, arising out of their experiences in economic and industrial development. Most of the research and teaching is largely confined to the business and industry sector, from where most of the management know-how has been developed.

In developing countries like India, the large and medium business and industry sector contributes only about 10% of the GNP. Performance of this sector is heavily dependent on the efficiency and effectiveness of the infra-structural utilities and services such as Irrigation and Power, Transport and Communication, Banking and Insurance, Education and Health Services, Human Settlement and Environment etc. Most of these sectors are largely part of the public sector system.

The professional management content of these sectors is not high in view of their being part of the Government apparatus. Therefore, the IIM-B has taken special interest in the application of management concepts and techniques to these sectors, hitherto neglected from the management application and research point of view, but yet, equally vital for economic and social development.

The other part of the public sector in India is public administration and the various developmental institutions created by the Government to foster development. Even here the professional management content is not adequate.

The organised sector in India employs only 40 million people, as against a work force of 240 million. This means that about 200 million people are in the un-organised sector mainly engaged in agricultural and allied activities, non-agricultural activities in rural areas, self-employed people, petty

traders and so on. Agricultural and allied activities themselves add about 40% of the GNP and the rest may be responsible for an additional 10 to 15%. These un-organised and informal sectors can be developed only when they are modernised through organised systems and application of managerial know-how to organise them.

In the planned economies, the un-organised sector is managed directly by institutions such as communes and collectives. Our counterpart organisation for this is our co-operative which also have not been a success except in the case of certain commodities and regions.

Thus, it can be seen that the larger part of the economic and social activities in the country—outside the business and industry sector—is not receiving proper management input. There is an urgent need for taking management to these sectors. Unfortunately, there is not enough information or research work done in these sectors from the management point of view. Therefore, IIM-B has embarked on these areas hoping to make a humble contribution to the management of Indian Economy.

The task is so huge and complex, and further ours is a young Institution—hardly 10 Years Old. Therefore, our attempts can at best be considered to be a starting point. Far more scholarly and rigorous research work has to be carried out by the education institutions and scholars in the country. In order to evoke interest on the need for such research work by specialists and educational institutions, we are bringing forth in this booklet a selected sample of research work done in the Institute. This is by no means comprehensive. These are meant to indicate the kinds of problems and issues, which have been researched in IIM-B.

Bangalore
November 1, 1982

N. S. RAMASWAMY
Director

ACKNOWLEDGEMENT

A review of the research undertaken in various Sectors and Areas of the Institute was carried out with a view to take stock of existing achievements and to draw plans for future research activities.

There are six sectoral review papers such as Centre for Agriculture & Rural Development (CARD), Transport, Habitat and Environment, Health, Energy and Power and Education and five from other areas including Public Enterprises and Un-organised Sector. These review papers were prepared by our Research Staff.

I would like to thank the Faculty, Research Fellows/ Research Assistants who have taken pains in completing the report and thereby enabling the publication of the achievements of the respective Sectors/Areas which were so far not widely known. However, I would like to especially thank the following persons who have finalised the reports :

Dr. Malathi Somaiah	Shri S. T. Somashekara Reddy
Smt. Nira Ramachandran	Shri Y. Kasi Viswanadham
Shri Narendra Pani	Shri T. V. Ramesh
Shri Mahesh Chand	Smt. K. Rajalakshmi
Shri S. Vaidyanathan	Smt. Subha Venkataraman
Smt. Malathi V. Gopal	Smt. Kumudini Shetty (Alias Kumudini Baxi)

I would also like to thank Shri Ramesh and Shri Krishnan in editing the reviews, library staff for preparing the bibliography, administrative staff and administrative officers in particular who have helped in this venture. My thanks are also due to the Printers, M/s. Sree Bhagavan Industries, who have been able to bring this in a book form in a short time.

I will be failing in my duty, if I do not mention the key role played by the Co-ordinator, Research & Consultancy, Prof. S. Shivaramu in organising and giving adequate leadership to this maiden venture, to bring out the publication of research activities of the Sectors/Areas of the Institute. Co-ordinator, Research & Consultancy had full institutional support of the Director and Deans.

I would however like to reiterate that the review papers reflect only the views of the authors concerned and not the views of the Institute as such.

I would also like to mention that this is the first time to bring out a publication containing review of the research activities of the Institute. Any drawbacks or deficiencies in this publication will be taken note of to improve further publications in future.

Bangalore
November 1, 1982

N. KRISHNASWAMY
DEAN (Research)

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HABITAT AND ENVIRONMENT

NIRA RAMACHANDRAN

The seventies brought with it the beginnings of an awakening. People began to realize that development had its own costs. The effects of overfast industrialisation were apparent in polluted atmospheres, industrial slums, masses of solid wastes to be disposed of. Urbanisation had brought with it overcrowding and the attendant evils of polluted air and water, dirt, squalor, crime, traffic congestion, lack of basic amenities like housing, power, water and sanitation. Salt encrusted soils, raised water tables, waterlogged lands and other long term by-products of irrigation had begun to rear their heads. Development programmes on a gigantic scale like massive hydel projects had resulted in widespread de-forestation, soil erosion, large scale uprooting of local populations, problems of rehabilitation, etc. Impoverished villages where all efforts at improving the lifestyle of the people seemed to have been unable to spark off progress seemed symbolic of the thoughtless rush for development.

Together with this arose an increasing concern for the quality of life. That every human being is entitled to a certain minimum of necessities, amenities and services, and the awareness that development apart from economic growth also implies an improvement in the standard of living began to redirect academic and professional thinking along these lines.

With this heightened interest in the impact of the development process and distribution of its benefits, it was apparent that the need of the day was efficient

management—management skills applied to planning efforts, to development programmes, to rebuilding and improving the human habitat and environment. Both preventive and curative measures were called for.

The Indian economy was at a stage where the negative impacts of rapid economic growth were beginning to show; but there was still time to stop the country backsliding down the path other developed countries had taken.

As such, the Centre for Human Settlements and Environmental Studies* was created at the Indian Institute of Management, Bangalore, to bring management expertise to an entirely new area that of development planning and programmes, the organisation of human habitat and settlements, and environmental improvement and regeneration programmes together with the problem of resource conservation.

The sector draws on the expertise and technical skills of a faculty selected from a varied set of disciplines like economics, geography, urban and regional planning, architecture, agriculture and transportation.**

With the above mentioned objectives in mind and with so diverse a faculty, research in the area tends to be fairly varied. It can, however, be broadly classified under four major heads:

I Development

The efficient management or the reorientation of developmental plans and programmes must of necessity be

* This Centre was initially called the Centre for Habitat and Environmental Studies.

** The review deals with research on topics of relevance to the sector carried out by the faculty of the Institute. It includes work done by members of the faculty who are not members of the sector.

preceded by an understanding of the development process. The social, political and economic implications of the development strategy can be instrumental in making or breaking any plan. The Latin American theories of development have been seen by many scholars as a breakthrough in explaining the anomalies in the Indian experience. A series of papers reviewing the Latin American School of Thought (Vyasulu 1974 a, b, Singhal and Vyasulu 1978) present a critical assessment of these theories with suggestions for the application of these ideas in attempting a more effective explanation of the Indian situation. A call is given for research to define a new perspective towards the theory of underdevelopment which takes a more realistic view of the present day world and builds in the parameter of class conflicts and distinctions which underlie all situations today.

A set of two volumes prepared with a view to orienting the student towards an understanding of the theories of development and their application to the Indian situation (Jhunjhunwala and Vyasulu ed. 1974) gives body to the work in this area. An excellent collection of papers by eminent politicians, economists and historians, vol. I deals with the Capitalist and Socialist systems, modern economic growth, development policy, etc., while vol. II handles the Indian experience in sections devoted to history, planning, problems and constraints with special reference to agriculture and industry.

II Technology

In the race for rapid economic development, large scale importation of capital and techniques took place from the developed world to the developing countries in terms of foreign collaborations, joint ventures, direct ventures, direct private foreign investment, etc. The realisation that this transfer of technology has not always been wholly appropriate to the adoptive country and that the long term

effects have resulted in a continuous and self-perpetuating dependency on the part of the developing world has led to a heated debate on choice of technology. Appropriate technology implying a technology suited to the socio-cultural milieu of the country has been mooted. Other answers to this problem involve intermediate technology which considers small scale units of production requiring lower investments, less energy inputs and resulting in a reduced negative environmental impact. Alternative technology which implies the application of scientific techniques to specific situations in terms of the existing social, economic and political conditions forms yet another alternative.

Research in the sector on the issue of technology takes two directions—one focuses on conceptual issues in the choice of technology, the other on prescribing appropriate technological choice for specific purposes or regions.

The first group of books and papers brings out the fact that modern technology reinforces dependency, that intermediate technology only serves by reducing the scale of the impact and that only alternative technology can provide a long term solution to the problems faced by developing countries (Vyasulu 1976, 1976 ed). Discussions on the impact of modern technology on underdeveloped societies, the role of multinationals and foreign investment and suggestions on monitoring the import of technology into the country have been dealt with in detail.

The second group (Vyasulu and Padaki, 1977, Padaki and Vyasulu 1978, Vyasulu ed. 1980 a) brings together the experience of seminars and workshops on the choice of technology in the Indian environment and in particular the rural Indian environment. Conclusion reached by the participants and their recommendations stress that technological choice must be made with the objectives of satisfaction of basic human needs, self-reliance based on

social participation and control and a life style in harmony with the environment.

A sub-section of this group (Vyasulu 1981, Ribeiro 1978) involves empirical studies dealing with the prescription of technology and technology transfer appropriate to specific regional needs. The studies deal with widely divergent rural backgrounds from Orissa and Karnataka to Brazil but put forth similar conclusions emphasizing the role of positive individual attitudes, planning with a view to providing quick benefits to the neediest group, keeping financial and human resource requirements to a minimum and encouraging self-reliant development.

III Habitat & Settlement

The major thrust of research in the sector has been directed at the study of human habitat and settlements. As this subject covers an extensive field and research efforts deal with a variety of aspects, an attempt is made here to classify this group of studies into a number of sub-groups:

1. Urbanisation
2. Habitat Management and Urban Planning
3. Housing
4. Rural Development/Village Studies
5. Migration / Resettlement
6. Population Trends
7. Regional Development and Planning

Developing countries throughout the world are experiencing an unprecedented spurt in urbanisation. Overlarge metropolises tottering precariously on a flimsy hierarchical superstructure of insufficiently developed medium and small towns have become the centre of all economic and socio-cultural activity. These initial advantages act as a magnet attracting streams of rural migrants to the city and ultimately to unemployment, slums,

squalor and crime. The metropolises themselves thrive as parasites on the hinterland siphoning off its primary produce and sending little, if any, of industrial goods in return (Ramachandran 1980). This poorly integrated spatial organisation is further worsened by the fact that the larger cities in the country seem to be growing at a much faster rate than the medium and small towns, thereby further increasing regional imbalance (Bhaskara Rao 1977, Bhaskara Rao and Anantharamaiah 1978). These empirical studies further reveal that both in terms of investment and political/administrative purpose the dominant city in each region/state is favoured above others. The heightening imbalances in terms of population growth are aggravating the situation where the provision of infrastructural facilities and basic amenities and services is concerned. The concept of a minimum threshold size to provide the economic support necessary for the provision of an amenity makes the situation in small and medium towns even more discouraging. Perhaps welfare programmes aimed at specific target groups and target areas and the more equitable distribution of basic amenities may provide the solution (Prakasa Rao and Ramachandran 1981). Encouraging the growth of medium towns is suggested as a panacea for the problems of rural-urban migration and overcrowding and for stimulating rural development (Bijoor, undated).

The ecological structure of selected Indian cities together with theoretical constructs on urban ecology form the focus of a collaborative research effort (Tewari et al 1982).

The condition of the habitat is a direct consequence of decisions taken by people on the living environment. Thus effective habitat management calls for collaborative effort at various levels of national and international agencies. An attempt to view management problems in the Indian context and identify the areas where planning and management inputs are needed also suggests priorities for planning

and management as well as for research and training efforts. (Bhaskara Rao and Prasanna 1980).

The section on urban planning begins with theoretical papers on an integrated systems approach to metropolitan development and planning (Subramaniam and Balasubramaniam 1974, Bhaskara Rao and Narayanmurthy 1977, Bhaskara Rao 1978). The need for co-ordination between various developmental agencies such as the state planning board, the municipality, housing board, police, etc. has been stressed, the lack of co-ordination between the decision-making zone and the action-oriented zone being pinpointed as the cause of the failure of most master plans.

Studies on housing form a major contribution to this section (Bhaskara Rao 1979). The objective of these studies is to draw the attention of the public and private sectors to prevailing housing conditions, to focus on growing housing needs, to forecast estimates of building materials, land and man-power requirements and to identify critical areas where policy changes are needed to meet the housing needs. Suggestions on housing subsidies, indigenous building materials and changes in land use policy have been made. A special development strategy for slums is outlined.

Turning to rural development and village studies a lacuna in research is glaringly evident. The sole study of a village (adopted by the Institute) based on the participant observation method provides a strong data base dealing with all aspects of rural life and highlights the problems of rural development and social interaction. (Narayan Reddy 1978).

The movement of people from rural to urban areas is a long continuing phenomenon—a result of the push factors such as lack of employment, poverty and hardship in the place of origin and the pull factors comprising of the glittering image of cities as a haven providing jobs, quick money and a comfortable existence. Research in this area

is based on detailed empirical analysis of different types of migration—inter-urban, rural-urban and urban-rural as well as the characteristics of migrants and the impact of rural development programmes like the green revolution with a view to formulating policies for more effective migration channelised along desired lines and resettlement (Bhaskara Rao et al 1980 a, b). Findings at the national level reveal that total migration is on the decrease, inter-urban migration has begun to increase, while classic rural urban migration shows a slight decline. In terms of characteristics, migrants appear to be more skilled than residents. Emphasis is laid on consideration of the environmental and economic background of the migrant when planning for resettlement. Reports on migration trends in selected Asian countries are presented as part of the proceedings of a Consultative Group Review Meeting on Migration and Resettlement.

The basic parameter, in any studies of habitat and settlements is the human population—its size, distribution patterns, densities, rate of growth, and behavioural characteristics. Any effort at regional, urban-rural planning, formulating development policies or theories must be built on the existing structure of the population and forecasts of population trends. In this area again, a vast gap in research efforts is evident. A simulation model for long term forecasting of population trends by short grouping of age and sex is the sole contribution to this group (Lingaraj and Runte 1975).

The last section in this group deals with regional development and planning. A critical analysis of present planning policies (Nair and George 1974, Nair et al 1976) which appear to be accentuating regional disparities and imbalances despite their objective of balanced economic growth is followed by the suggestion of an alternative development strategy which proposes growth poles of two types—one centred on an urban core with high capital

intensity and high physical and social infrastructure, the other focused on a rural core with low capital intensity aimed at creating an economic complex in the rural hinterland. Emphasis is laid on the importance of technological linkages between the growth centre and the region in which it is located.

Regional analysis as a field involves a high level of quantification with sophisticated model - building, input-output analysis, simulation techniques and soft-ware generation. While highly sophisticated technique-oriented research is largely absent, a few papers may be placed in this sub-group (Krishna Kumar 1981, Lingaraj and Runte 1975). A theoretical model for regional analysis is proposed which unifies the dynamics of inter-regional, inter-sectoral dependencies and inter-temporal changes. The paper also claims multipurpose application of this model to make locational decisions, to study the inter-regional, inter-sectoral and inter-temporal impact of a proposed new project on the regional economic structure and serve as a building block for industrial location.

IV Ecology and Environment

Public awareness of the rapidly deteriorating environment and the urgency of instituting environmental conservation measures has reached an all time high. The tendency to attack and oppose any developmental project as a potential threat to the environment is, however, a regrettable offshoot of this interest and is proving an obstacle to economic growth and development.

Research efforts in the area take two different paths—the one dealing with conceptual issues, the other focussed on impact studies—both with a view to creating a more balanced outlook towards environmental issues.

The recurring theme in the papers dealing with conceptual issues (Arokiaswamy 1980, Vyasulu 1980 b

Shivaramu 1979) is that the preservation of the environment is not incompatible with economic growth. What is necessary is a reorientation in planning policies. Industrial development must be self-reliant development which is compatible with minimum disturbance of the environment. The effective utilisation of renewable resources such as hydel power can serve a twofold purpose, that of conserving exhaustible energy resources together with maximum utilisation of renewable resources through micro projects requiring minimum investment and having minimal negative impact. Any development strategy must take into account the interaction between the physical and biotic system and the human sub-system which process in itself provides several developmental options for balanced eco-development.

The thesis that a specific environment produces a specific set of human responses in terms of land use patterns, occupational structure, population distributions and densities is brought out through an empirical analysis of a relatively isolated habitat where man-environment relationships can be presumed to exist in their purest form (Ramachandran 1981).

Impact studies in this area concentrate upon the rapid de-forestation taking place in the country today and its effect on both the physical environment and the social and economic life of the populace (Shiva and Bandyopadhyay 1980 a, b, Shiva et al 1981). Large scale and irreversible ecological damage is being caused by unscientific forestry practices, proof of which is visible in the frequent floods, silted river beds and dried up natural springs of the Himalayan region. As an extension of this, common man has lost his source of water, fuel and fodder. Planned forestry emphasising the importance of forests for maintaining stable physical conditions in a country where agriculture provides a livelihood to the majority of the people rather than forestry as a supply source for industry is recommended. In this context the impact of 'social forestry' which has been introduced as an alternative to conventional forestry is

reviewed. Findings, however, reveal that despite its noble objective of 'forestry for the people', social forestry has resulted in creating a market-dominated afforestation of land at the cost of food crops, as well as traditional fuel and fodder supply trees.

A set of papers seeking to highlight the importance of environmental considerations in conventional benefit/cost analysis bring out the hitherto ignored environmental costs of two proposed public sector undertakings—an alumina complex in Orissa and a hydel power project in the Western Ghats (Srinivasan et al 1981, Futehally et al 1981).

An unconventional approach to the impact of irrigation projects views the distribution of benefits both economic and non-economic, from these projects to various sections of society as a measure of social justice (Krishnakumar, et al 1979).

A strategy to control the negative impact of irrigation projects (Sunder and Balaraman 1977) proposes the building up of a data base during the investigation period of a project and preparing a predictive information system which presents a series of least-cost choices to the decision maker. Periodical updating of the data base will help avoid pitfalls and permit remedial measures to be carried out at the appropriate time.

Conclusion

The foregoing review of research in the sector provides a synoptic view point of the directions in which sectoral research activities are heading.

What strikes one is the multi-dimensional nature of research and the lack of a co-ordinated pattern. While all the research studies may be woven into one master pattern, each study independently appears to be divorced from any central theme.

Again, a criticism applicable to a large number of papers is their light journalistic approach-the lack of serious, indepth research input.

1. Rural Development

With over 70% of the country's population living in villages, there is urgent need for research in the rural sector. Studies on rural population growth, quality of life in villages, concentrated programmes for rural uplift and development and the impact of existing programmes form areas of research interest.

2. Population Studies

As population forms the basic parameter of all studies in the Sector, research efforts aimed at understanding population distribution patterns and densities, occupational structure, age-sex ratios and growth rates with special reference to regional variations leading to forecasts of job requirements, availability of labour, need for housing, demand for basic amenities, etc. would form the basis for formulating development plans.

3. Resource Conservation

A major element of environmental studies which has been largely neglected in the research activities of the Sector is the area of resource conservation. With steadily dwindling resources and evergrowing population the conservation of exhaustible resources, the effective utilisation of renewable resources and the search for new resources should form a major thrust of research.

4. Data Base

As social science research today requires a vast input of data, attention must be focussed on the efficient and comperhensive collection of relevant data. The need for a data bank has been stressed in several studies and must

be reiterated here. Both field surveys and secondary sources may be utilised for this purposes.

5. Analytical Techniques

The lack of quantitative analysis in most of the research studies forms a constraint on the research theme. The construction of suitable techniques or the modification of available techniques would provide a set of tools to facilitate further research in all areas.

References

1. Adnur P, Method Approach for Preparing a Master Plan for Tourism Development, *Tourism Recreation Research*. December 1980.
2. Adnur P, Tourism in a Small Historic Town in Canada—A Case Study of Kingston, IIM-B, 1981.
3. Adnur P, Integrated Tourism Development Plan for Mysore City, IIM-B, 1981.
4. Adnur P, Rural Banking, IIM-B, 1981.
5. Arokiaswamy N. S. S., Ecology and Hydel Power Development, *URJA, Indian Journal of Energy*, October 1980.
6. Bhaskara Rao B. and S. Prasanna, Habitat Management: Report on Conditions and Prospects in India, *Nagarlok*, Vol. XII, No. 1, January-March 1980.
7. Bhaskara Rao B, V. L. S. Prakasa Rao and N. Naganna Migration and Integrated Rural Development: Resettlement Problems and Policies in India, (Group Review Meeting, 11-16 February 1980, SWADCAP, UNDP, IIM-B).
8. Bhaskara Rao B, B. Ghosh, N. Naganna and J.F.X. Paiba, Migration and Resettlement in Selected Asian Countries: An Overview, SWADCAP, October 1980.

9. Bhaskara Rao B, *Housing and Habitat in Developing Countries*, Newman, Delhi, 1979b.
 10. Bhaskara Rao B, and K. M. Anantharamaiah, Growth of Class I Cities : High Imbalance in 5 States, *Economic Times*, Jan 1, 1978b.
 11. Bhaskara Rao B, Systems Approach to Habitat Management, *Nagarlok* Vol X, No 1, January-March 1978a.
 12. Bhaskara Rao B, Imbalance In Growth of Class I Cities, *Economic Times*, December 1977a.
 13. Bhaskara Rao B, Research and Planning Inputs to Metropolitan Development System, *Long Range Planning* Vol 10, October 1977b.
 14. Bijoor S.R., Urban Development IIM-B (undated)
 15. Bijoor S. R., Approach to Hospet and its Environment, IIM-B (undated).
 16. Jhunjhunwalla B and V. Vyasulu, ed., Readings on Development Vol 1 : Theoretical Issues, Vol 2 : Indian Experience, IIM-B, 1974.
 17. Futehally Z., V. Vyasulu and others, The Bedthi Debate, in Sharma L J and R. Sharama (ed.) *Major Dams - A Second Look, Development without Destruction*, Environment Cell, Gandhi Peace Foundation, New Delhi 1981
 18. Krishna Kumar T, Theoretical Models for Regional Impact Analysis, (Presented at a Symposium on Economic Theory and Planning at the Indian Statistical Institute, Bangalore, December 3-5, 1981).
 19. Krishna Kumar T. S., Shivaramu and A. Sundar, Water Resources Projects as Instruments for Socio-Economic Justice. (Seminar on Water Management for Food Production Nov 3-4, 1979 Organised by IIM-B and the Institute of Engineers, Bangalore).
 20. Lingaraj B. P. and R. A. Runte, Simulation of Regional Population Trends, *Computer and Urban Society*, Vol 1, 1975.
-

21. Narayana Reddy G, Interaction Process in Development Aspects of life in Konchenkuppa, IIM-B, 1978.
22. Nair M. N. V, V. Srinivasan and S P Kumar, Need for New Policy Perspectives on Regional Development, *Lok Udyog*, August 1976.
23. Nair MNV and PV George, Some Aspects of Regional Development in India, (1st Asian Symposium on Regional Planning and National Development) Institute of Development Studies, University of Mysore, July 1974.
24. Padaki V and V. Vyasulu, A Report on the workshop on Rural Socio-Technical Systems (Sponsored by ICSSR December 13-23 1978).
25. Prakasa Rao VLS and N. Ramachandran, Social Infrastructure Development and Urban Population Thresholds, IIM-B, 1981.
26. Ramachandran N, The Metropolis and the Region-A study of the Suction Process, IIM-B 1981.
27. Ramachandran N, Environment and Human Response-A Study of a Hill-Forest Region, IIM-B, 1980.
28. Riberio M.A., Habitat and Technology Transfer Progress Report (Sponsored by CNQP-Conselho Nacional de Besenvolviment Cientifice Technologico) October 1978.
29. Shiva V, J. Bandyopadhyay and H.C. Sharatchandra Social, Economic and Ecological Impact of Social Forestry in Kolar, IIM-B, 1981.
30. Shiva V and J. Bandhopadhyay, Neglect of Ecological Factors in Development : The Case of Tehri Garhwal (AIIMB National Seminar, February 6-9, 1980 a)
31. Shiva V and J. Bandyopadhyay, Socio-Ecological Impact of Development Project, Tehri Garhwal, *Himalayan Man and Nature*, Vol 3, No II, April (1980 b).
32. Shivaramu S, Ecology and Eco-System-Drought and Development Strategies in India. (International

- Symposium on Hydrological Aspects of Drought) December 3-7, 1979.
33. Singhal K and V. Vyasulu, More on Planning for Freedom, *Management Science*, Vol 24, No. 5, January 1978.
 34. Srinivasan K, V. Vyasulu and S. Rajagopalan, The Orissa Aluminium Complex-Points Toward Debate, *Economic and Political Weekly*, December 5, 1981.
 35. Subramaniam S and R Balasubramaniam, Urban Planning in India-A case study, *Long Range Planning*, April 74.
 36. Sundar A and VTD Balaraman Information Systems for Controlling Environmental Impacts during Implementation and Operation of Irrigation Projects. (Seminar on Environmental Activities and Adoption of Suitable Guidelines for Project Control, Hyderabad, December 1977).
 37. Tewari V. K., J. A. Weinstein and VLS Prakasa Rao, Ecological Structure of Indian Cities, Indian Institute of Management, Bangalore and George Institute of Technology, Atlanta, USA, May 1982.
 38. Vyasulu V, Alternative Development Strategies for Koraput, *International Foundation for Development Alternatives* Dossier 26, Geneva, November-December 1981.
 39. Vyasulu V and V. Padaki, Employment, Rural Development and Social Change. Some Issues, in Radhakrishna S. (Ed),. *Science and Technology for Rural Development*, Madras : Costed, 1977.
 40. Vyasulu V, ed *Technological choice in the Indian Environment*, Sterling, New Delhi, 1980a.
 41. Vyasulu V, Industrial Aspects of Eco-Development, *Abhipraya* Vol 1, No 3, December 80b.
 42. Vyasulu V., ed Technology and change in Under Developed Societies, *Economic and Political Weekly*, Vol 2, No 35, August 28, 1976.
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Habitat and Environment

43. Vyasulu V. **IMPACT**

ed Technology and Underdeveloped Countries. A set of Readings Prepared for Classroom Use, IIM-~~20~~, 1976.

and Underdeveloped Countries. A set of Readings Prepared for Classroom Use, IIM-~~20~~, 1976.

44. Vyasulu V. **IMPACT**

Towards A Paradigm of Underdevelopment or A Challenge for Future Research, *Indian Economic Journal*, Vol 22, No 1, July-September 1974a.

Towards A Paradigm of Underdevelopment or A Challenge for Future Research, *Indian Economic Journal*, Vol 22, No 1, July-September 1974a.

45. Vyasulu V. **IMPACT**

on the Latin American View of Under-Development, *Economic and Political weekly*, Vol IX, No 15, April 13, 1974b.

on the Latin American View of Under-Development, *Economic and Political weekly*, Vol IX, No 15, April 13, 1974b.

ПАТТЕРН

1. Urbanisation
 2. Habitat Management and Urban Planning
 3. Housing
 4. Rural Development
 5. Migration and Resettlement
 6. Population

HABITAT AND SETTLEMENTS

CAUSE

1. Choice of Technology
 2. Prescribing Appropriate Technology

TECHNOLOGY

EXPLANATION

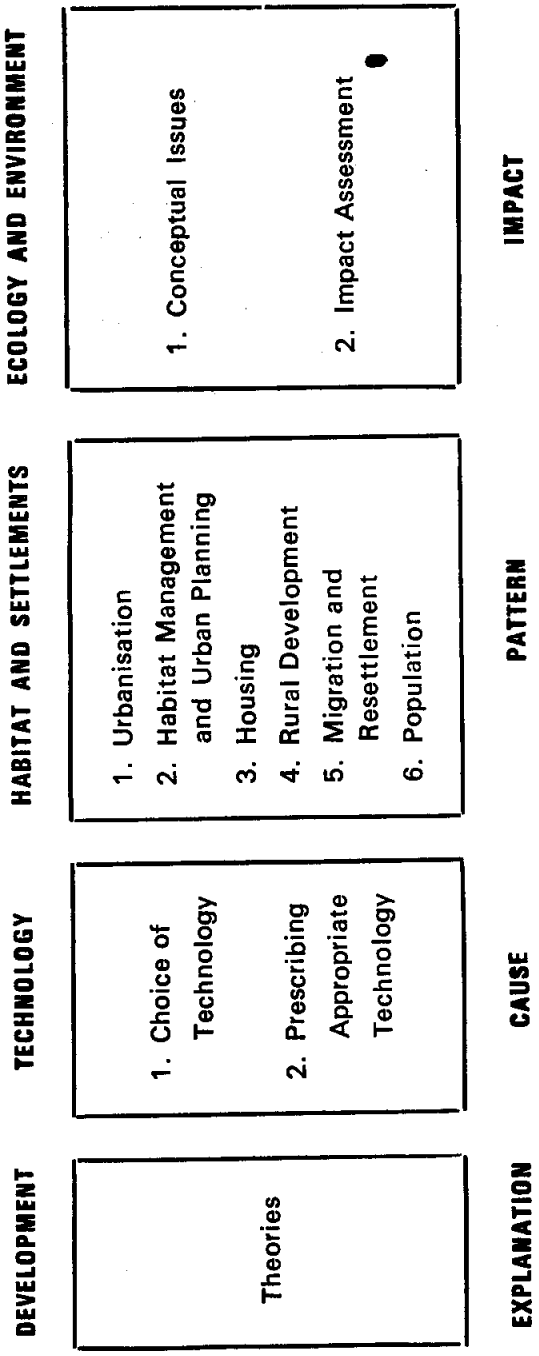
Theories

DEVELOPMENT

НАВИТАТ И ПАТТЕРНИ

СХЕМАТИЧЕСКАЯ ПРЕДСТАВЛЕНИЕ ПОЛИТИКИ ИССЛЕДОВАНИЙ

**SCHEMATIC REPRESENTATION OF RESEARCH IN
HABITAT AND ENVIRONMENT**



ONGOING RESEARCH

On going research in the sector is concentrated in three areas—rural development, urbanisation and urban planning, and impact studies.

Rural Development

The area of rural development where a glaring lacuna was evident in the research output of the sector, has become the focus of concerted research efforts.

An attempt to develop and test methods and procedures for making locational decisions with special reference to health, agricultural and educational services in rural areas, to evaluate the efficiency of existing services and delivery systems and to develop computer software for use by other researchers in this field is being made with reference to locales in Southern India and Western Nigeria (Rushton et al).

Rural industrialisation forms the focus of two consultancy projects currently in progress. A study of rural credit for industrial development seeks to analyse target formulations for the industrial component in district credit plans, policy and procedural framework achieving these targets and causes of variations between targets and achievements as well as to make recommendations for more efficient co-ordination between various agencies in the field of industry at the district level. The area of study is rural Karnataka (Tewari).

An action research project (Vyasulu) which uses the participant observation method and intervention strategies to identify income generating projects for the tribals of Koraput District, Orissa, seeks to prepare feasibility reports and suitable organisational structure which ensures the channelling of profits to the target group.

Urbanisation and Urban Planning

In the field of urbanisation, an Institute sponsored research project attempts to trace the historical growth of Bangalore with its resultant patterns and structure, the impact of city planning on the basic structure and the effectiveness of the existing institutional framework in containing the problems of a growing city. The project also attempts inter-city comparisons in order to determine the efficiency of Bangalore vis-a-vis other rapidly growing million cities (Bawa).

A study of the demand for housing in Bangalore City is based on an analysis of underlying behaviour parameters, choice patterns for housing attributes and the impact of rent control on the demand for housing (Tewari et al).

Impact Studies

Impact studies form yet another focus of current research in the sector. The socio-economic and environmental impact of the proposed Ganga-Brahmaputra Link Canal is being assessed through the project of 'with canal' and 'without canal' scenarios based on a household survey in the region. An attempt at quantification in terms of benefit cost ratios is also being made.

1

Title : Origin and Growth of Bangalore and Some Problems of City Planning and Management

Project Leader : Bawa V. K.

Sponsors : Indian Institute of Management, Bangalore

Objectives :

1. To determine the main patterns of the growth of area and population of the city. The stress will be on the
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features that contributed to the character of Bangalore.

2. To examine the growth of local Government and to consider the factors that gave rise to the growth of the civil and military stations, the cantonment municipality, the city municipality, the CITB etc.
3. To examine the process of city planning and the extent to which it altered the basic structure of the above institutional set up and its effectiveness in containing the problems of a growing city.
4. To consider the main generators of economic activity since the II World War, changes in employment pattern and migration into the city.
5. To try and establish comparisons with the cities of Pune and Hyderabad in order to determine the extent to which Bangalore has been more successful in handling the problems of maintenance and growth : a) in the period upto 1945, b) in the period since 1945.
6. To examine the institutional framework now existing for the provision of civic amenities and urban development and to recommend the framework for the future metropolitan planning and development machinery.

Methodology :

1. Survey of historical and other published material including gazetteers, maps, local histories, etc. to determine the main pattern of urban growth from 1800 to the present and identify the political and administrative changes involved.
2. To study the master plan, zonal plans, building bye-laws and other documents necessary for understanding the city's growth.
3. To obtain newspaper cuttings, Government publications, unpublished material and hold interviews with officials of the Municipal Corporation, B.D.A. and other civic

bodies, as well as with State and Central agencies concerned with city development.

4. To obtain comparative data on the cities of Pune and Hyderabad-Secunderabad which have a similar pattern of a cantonment and a capital city (a summer capital in the case of Pune) existing side by side, and have subsequently developed into major cities of around 2 million population.

2

Title : Ganga-Brahmaputra Link Canal

Project Leaders : Krishna Kumar T. and Prasanna S.

Sponsors : Central Water Commission subcontracted from Agricultural University, Jorhat, Assam

Objectives :

To make a Socio-Economic and Environmental Impact Assessment of the proposed Ganga-Brahmaputra Link Canal using Secondary Data and a Primary Bench-Mark / Socio-Economic Survey.

Methodology :

A random sample survey, using stratified two-stage random sampling scheme, was conducted with nearly 1,400 households. A base line Socio-Economic Profile is prepared using the primary and secondary data sources. Future scenarios for population are prepared. Based on these scenarios and certain assumptions regarding the possible irrigation and other socio-economic impacts of the project regional profiles with and without the project are developed. Some of the differences attributable to the project are quantified using the Social Benefit-Cost Methodology.

Articles Generated :

“Theoretical Models for Regional Impact Analysis” (By Krishnakumar T.), paper presented at a Symposium on Economic Theory and Planning, Indian Statistical Institute, Bangalore Centre, December 3–5, 1981.

3

Title : Locational Efficiency of Rural Service Delivery Systems in India and Nigeria

Project Leaders : Rushton G. (Univ. of Iowa)
McNulty M. (Univ. of Iowa)
Tewari V.K. and Ayeni B. (Univ. of Ibadan)

Sponsors : National Science Foundation, U.S.A.

Objectives :

To develop and test methods and procedures for taking locational decisions for rural service delivery systems in the field of health, education and agriculture in India and Nigeria.

4

Title : Housing Demand in Bangalore City

Project Leaders : Tewari V.K. and Krishna Kumar T.

Sponsors : The World Bank, Washington, U.S.A.

Objectives :

To analyse the underlying behaviour parameters of housing demand, parameters underlying the demand for housing attributes and the impact of rent control on housing demand in Bangalore.

5

Title : Study of Rural Credit for Industrial Development in District Credit Plan

Project Leader : Tewari V. K.

Sponsors : Industrial Development Bank of India

Objectives :

1. To study how the industrial component of DCP's was being formulated, what were the data gaps and how the targets were arrived at.
2. To study what policy and procedural framework were created to see that the targets were achieved.
3. To analyse causes of variations between the targets and achievements.
4. To examine how the efforts of various agencies working in the field of industry at district level were co-ordinated and to make recommendations as to how this co-ordination could be made more efficient with a view to improve the contents of the plan and its implementation.

6

Title : Experiments in Rural Industrialisation in Koraput District.

Project Leader : Vyasulu V

Sponsors : ICSSR.

Objectives :

To identify income generating projects for the tribals, prepare suitable feasibility reports, along with suitable organisational structures to ensure that benefits flow to

the tribals, and to assist local profile in implementing such projects. An academic objective is to learn from the problems faced in the process of implementation.

Methodology :

Fieldwork, using participant observation and intervention strategies. The usual methods of project formulation and approval. To use NPSA data for resource analysis. This is a project of action research.

Articles Generated :

"The Orissa Aluminium Complex : Points Towards a Debate" with Kannan Srinivasan and Rajagopalan S. in EPW, December 5, 1981. Project Reports on Charnocite & Sisal.

7

Title : Social Audit of Selected Public Sector Units -ITI and HMT

Project Leaders : Vyasulu V. and Krishna Kumar T.

Sponsors : Indian Institute of Management, Bangalore

Objectives :

To develop a suitable theoretical basis for social audit, using Bangalore based public sector units as a starting point.

Methodology :

Academic Study and Data Allocation and Analysis.

Output :

1. Proposal for MDP.
2. Memorandum to Bedthi Dam Committee along with Gadgil M., Subramanian D. K., Futehally Z., Paranjpe V. and Krishnamurthy B. V.

8

Title : Impact of Environment on Rural Land Use

Project Leader : Nira Ramachandran

Sponsors : Indian Institute of Management, Bangalore

Objectives :

1. To underline the influence of environmental factors in the choice of village locations.
 2. To study the relationship between rural land use patterns and micro environmental differences.
 3. To evaluate the efficiency of the land use pattern within selected villages.
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AGRICULTURE AND RURAL DEVELOPMENT

Y. K. VISWANADHAM

Introduction

The research so far done in the agriculture and rural development sector can be classified under the following headings :

1. Agrarian reforms, 2. Resource development, 3. Crop production, 4. Animal husbandry, 5. Fisheries, 6. Forestry, 7. Inputs (seeds, fertilizers, implements and machinery), 8. Supporting services (credit, marketing, storage, processing and agro-industries), 9. Social development, and 10. Supply and demand studies.

This review of the research studies covers all the reports, (both Sponsored and Institute-funded) papers presented in seminars, conferences and workshops and articles published in various journals.

Review

There is a vast scope for research on many aspects in the sector. The present research efforts of the CARD sector touch on some of the important agricultural management problems.

In this review, the research papers and reports have been put in eight categories : 1. agrarian reforms, 2. food policy, 3. land use management, 4. water management, 5. studies on developing drought prone areas and risk management. 6. modernisation of agricultural implements and machinery. 7. studies on supporting services (marketing,

credit, extension, etc.) and 8. studies on social development.

The central theme of the studies, along with the methodology and the major findings, is presented in a summary form. In a few cases the presentation is based on the summaries provided in the studies. Wherever abstracts and synopses of technical papers are available, they have been used in the review. The main objective of this review is to pool all the research papers and reports, and present them at one place in a compact and classified form.

A bibliography of the research studies is given at the end of the review report.

1 Agrarian Reforms

A study on agrarian reforms in Karnataka (1), juxtaposing the success versions of land reforms with the rates of implementation, examines whether land reforms as a change process help accelerate further change in agrarian relations. The study makes some constructive suggestions to reduce the control of the dominant class to effect a change in the agrarian structure in rural Karnataka.

2 Land Use Management

The paper entitled "An Approach to Land Use Management" (6) gives a comprehensive account of the research pursued on land use management in the Institute. The report on "Land Use Pattern and Agricultural Policy" (41) is a pilot study to explore the data availability and to develop a methodology to optimise the cropping patterns in a set of homogeneous agro-climatic zones in Southern Karnataka. The technical model and the follow-up of this study are available in reports (43, 42). Research papers 7, 8 and 9 discuss the resource constraints and human problems in rural development and the information gaps for efficient land use management at the micro region or watershed. The land use policy research is pursued through

research reports and presentation of ideas in conferences and seminars.

3 Food Policy

Subjecting the present production-oriented food strategy to a critical analysis, the paper (79) on "Food Strategies for Developing Countries" brings out the shortcomings of such a policy and suggests a new food strategy which will be consistent with the ongoing rural development programmes. Imports and their impact on Indian market prices are analysed with reference to wheat and coconut oil. The paper suggests various means to be adopted to accelerate the supply position of coconut production in India. (78, 80).

4 Water Management

The paper on 'Water Resources Planning and Management' (16) advocates an inter-disciplinary approach to the development and efficient management of water resources. Appropriate organisations to handle the irrigation projects are essential for efficient and timely completion of the works in water management. A few reports (11,21) have taken up this issue.

The systems approach to water management for efficient irrigation is discussed in papers 22 and 36. The application of networks as an operational research technique in the command area development projects are shown in papers 10, 13, 18, 26 and 27. The paper on 'Current Estimation Practice - A Hindrance to Network Usage in Irrigation Projects' demonstrates the necessary data base to be built for the application of advanced management techniques.

Paper 28 establishes water resources development as an instrument for socio-economic justice and along with the paper (15) on the impact of irrigation projects on the environment, brings out the need of information systems and data base on the irrigation projects.

Papers on 'Irrigation Project Evaluation—Deficiencies and Suggested Remedies', 'Performance Evaluation of Irrigation Projects', 'Evaluation of Pumped Storage Schemes' and 'Integrated Rural Development—Upper Krishna Experiences' have dealt with the importance of evaluation in irrigation projects with specific case studies (20, 24, 25 and 40).

Various methods for conservation and judicious use of water resources have been suggested through the studies on 'Efficiency in Water Use through Control of Uncertainties', 'When water is Scarce, Lift and Sprinkle', 'Economical Investment of Lining Project' and 'Effective Conjunctive Use of Canal and Tank Systems' (14, 17, 23 and 35).

Issues like the choices of technology in irrigation construction and Sixth Plan irrigation development programmes and their techno-economic implications are discussed in the papers 38 and 39.

The workshop report on 'Farmers' Organisations for 'Efficient Water Use in Irrigated Agriculture' (12) gets a cross-section opinions of personnel dealing with the irrigation systems on the role of farmers' organisations and the problems of research towards efficient water use. Very useful recommendations have emerged from the workshop. Paper 34 gives an overview of this problem and paper 37 recounts the circumstances that necessitated the emergence of such organisations in Kerala, taking a quick survey of some Command Areas.

The existing farmers' organisations and co-operation with the tank command areas have been investigated through the studies (29, 30) to suggest means for establishing viable and effective participation of users in operation and maintenance of the new projects in Karnataka.

Three bibliographies on (1) Synthetic Generation of Streamflows, (2) Precipitation and Streamflow Networks and (3) Floods, are appended to papers 31, 32 and 33.

Thus, research in water management covers various aspects viz., organisation development, project formulation, implementation, monitoring and evaluation in irrigation, minor irrigation, problems and participation of farmers in irrigation projects for efficient water use.

5 Studies on Development of Drought-Prone Areas

A good number of studies relating to the drought-prone areas programme have been attempted in the Institute. The organisational structure study in Kolar and Chittoor for better management of DPAP (3), the evaluation study of the DPAP in the V Plan in Dharmapuri District (5), the feasibility study of animal husbandry development in Dharmapuri District (46), the diagnostic study of the dairy development project in Bijapur (47), the study on the socio-economic and ecological impact of social forestry in Kolar (51) cover most of the planning and management aspects of the programme for the development of drought-prone areas. The recommendations that emerged at the end of these studies are within the frame of the objectives of DPA programmes: 1. restoration of the ecological balance in drought-prone areas, 2. integrated area development, 3. equitable distribution of development benefits and 4. employment generation—both direct and indirect.

The research report on the identification of water sheds and planning for agricultural development in rural areas (4) combines the data from soil survey, hydrological survey and contour survey to demarcate the micro regions or watersheds. A case study on a DPAP block brings out all the aspects of the methodology for watersheds management. The various recommendations for soil survey and land capability classification, revenue records and land reforms, watershed planning and management are very useful to strengthen land use management in the context of a decentralised planning process.

The methods to measure and combat risk in agriculture and a methodology for assessing the economic feasibility of adoption of technology at farm level are presented in papers 44 and 45.

6 Modernisation of Agricultural Implements and Machinery

The modernisation of bullock carts and agricultural implements has been pursued vigorously through various research and evaluation studies in the Institute. The research papers on improvement of implements (52, 53, 54) bring out the role of agricultural engineering technology in the IRD programmes, the importance of result oriented research on agricultural machinery and the active participation of the State Agricultural Departments and the State Agro-Industries Corporations in these ventures.

Three improved designs for bullock carts for different purposes are given in the research paper (55) along with the technical aspects for the benefit of manufacturers. The socio-economic survey on the bullock cart (56) evaluates the place of the bullock cart in our transport system and documents the significant role of the cart in rural traffic, the pattern of its ownership and usage and related aspects.

The demand and supply situation of fertilizers in South India is presented in paper 57.

The appropriateness of providing credit to small and marginal farmers for their farming activities is established by the study (64) on the relative economic efficiency of these categories using a regression model.

7 Supporting Services

Allocative efficiencies of market mechanism under control (60) the impact of area under HYV on marketable surplus of paddy (59) and the marketing strategies for food grains in the Eighties (58) are some of the papers in agricultural marketing. The co-operatives and their organisational

deficiencies are presented in a paper (61). A diagnostic study (48) of the market aspects of sheep products in Ranebennur Taluk, using the sectoral model, highlights the problems of the sheep-rearing community. It suggests the improvement of the quality of sheep and gives two alternative development strategies.

8 Social Development

The research report on management and organisation of social development programmes in rural areas (66) establishes the links between social development programmes at district level and agricultural development. The indepth study of the programmes in three blocks has brought out the deficiencies in the present organisation. The study makes a series of recommendations for efficient management of the social development programmes with an adequate organisational set up.

The socio-economic status of artisans and institutional support for their development is the theme of the report (67). Seven Block Development Plans (68-74) for full employment in Karnataka State aim to pursue decentralised planning at block level. These studies suggest an appropriate and feasible set of programmes to yield maximum employment in these blocks. Though the approaches differ marginally in these reports, all of them have framed their plan strategies based on the available local resources and the diversified agricultural pursuits of small and marginal farmers. People's participation as an essential component in rural development programmes for eradicating rural poverty is the theme of the paper (75). It suggests a strategy to actively involve the people in developmental programmes.

The full employment model of the regional economy of India (77) is an attempt with the objective of evolving a model applicable at district level planning for generation of full employment.

A critical review of rural development in India (76) yields an alternate model. A rural civilisation deriving from an autonomous and self reliant ideology consisting of six essential features is postulated in the study.

I Agrarian Reforms

1 "Reforms to Preempt Change—Land Legislation in Karnataka", 1981—Narendrapani.

Most of the studies on agrarian reforms have contended with the nature of legislation, the implementation of reforms and the socio-economic benefits accruing to the beneficiaries of the reforms. The above study, deviating from these aspects, examines whether land reforms as a change process help accelerate further change in agrarian relations. Taking Karnataka as a case, the author concludes that with the exception of the Malnad Region consisting of three small Districts, there is no evidence of such phenomenon in Karnataka.

The approaches of two school of thought on land reform—the Liberal School and the Marxian School are explained. The former envisages land redistribution to solve the problem of any agrarian structure and the latter adds stress on the qualitative changes (the political and other aspects of reform) in the agrarian structure.

Methodology

Dividing Karnataka into three homogeneous regions on the basis of agrarian relations the Southern Region consisting of the entire Old Mysore Kingdom with the exception of Shimoga and Bellary, the Northern Region : Belgaum, Dharwar, Bidar, Bijapur, Gulberga and Raichur (the Bombay Presidency), and the Malnad Region : North Kanara, South Kanara and Shimoga, the study utilises secondary data, village studies and historical information to explain the nature of agrarian relations in Karnataka.

Using the census of agricultural holding, 1971, and the records of the office of the Land Reforms Adviser, Government of Karnataka, the study evaluates the implementation of Land Reforms in the State.

The paper makes a comparative study of agrarian systems, tenancy relations, agricultural labour systems, credit systems, land distribution and agricultural investment in the regions of the State. Due to the historical origins of land systems, the prevalence of tenancy is low in the Southern Region, whereas a high level of tenancy exists in the Northern and Malnad Regions. The transformation of a large number of cultivators into agricultural labourers is evident in the Malnad Region but not in the South and North Regions. The credit system is mostly controlled by landlords or other agriculturist money lenders and a large number of both cultivators and agricultural labourers are heavily indebted to the above classes in all the regions of the state.

An analysis of the operational holdings in 1970-71 indicates fairly distinct patterns of land distribution especially between the Southern and Malnad Regions on the one hand and the Northern Region on the other. The Southern Region consists of a large number of small holdings and a large proportion of small operation holdings due to large number of small tenants occur in the Malnad Region. The magnitude of investment on irrigation and agriculture inputs is relatively high.

The Northern Region consists of generally dry and large holdings, Investment on irrigation is minimal.

These differences together with the information on the major classes of farmers and their inter-relationships have led the author to the conclusion that the three Regions of Karnataka have very diverse agrarian systems. In the light of the agrarian systems existing in the State, the ceiling legislation appears to protect the status quo rather than reducing the inequal distribution of land resources.

The critical analysis of land legislation and implementation indicates that either a big landlord leases in and controls the land of a small landholder or a single landlord controls several hundred acres of land thus frustrating the land reform movement registered under the names of various members of his family.

Noting the gap between the implementation of tenancy legislation and ceiling legislation, the author concludes that only those portions of land reform legislation which serve the interest of the dominant class are implemented. The success version of land reform in Karnataka in terms of the impressive rates of implementation in all districts appears to be superficial.

Tracing the genesis of the two agricultural movements—the Kagodu Satyagraha and the Farmers' Agitation of 1980, the study opines that the control exerted by the dominant classes over the other sections in the system has to be broken to bring about a meaningful change in the agrarian structure in Karnataka.

Reform from below brings about a more complete change in the agrarian systems—as evident in Malnad Region whereas reform from above only brings about those changes which suit an entrepreneurial farmer landlord—as evident in Southern and Northern Regions according to the author's observation.

The ceiling on operational holdings rather than on ownership holdings, non-eligibility of tenants owning more than two units of land to claim further land, continuance of the old exemption for small land owners from tenancy legislation, interest free and small consumption loans to this class and enhancement of the minimum wage and its enforcement are the ways suggested in the study to reduce the control of the dominant class and thereby to effect a change in the agrarian structure in rural Karnataka.

**2 'Tenancy and Relative Economic Efficiency', 1975
— Nagadevara V.**

The paper examines the question whether owner operated farms are relatively more efficient, using a statistical model. Recognising the fact that the tenant does not have the incentive to invest on the land he does not own, the model nevertheless shows that economic efficiency does not suffer under the conditions of tenancy. However, this question has to be examined in depth with reference to the agro-climatic regions and the extent of land reforms implementation.

II (a) Land Resources**3 'Management of Rural Development : A Study on Organisational Structure for Management of Drought Prone Areas Programme, 1976
— Ratnam N.V. and Das P.**

The Drought Prone Areas Programme (DPAP) is centrally funded and administered through the district development departments, having an area approach for the development of 54 selected districts classified as fully or partly drought prone with rainfall ranging between 350 mm and 1,250 mm per annum. The land productivity is very low due to erratic and scanty rainfall. Essentially a rural works plan in the initial stages, the programme took the name of DPAP in the Fourth Five Year Plan with these redefined objectives : 1. restoration of the ecological balance in drought prone areas, 2. integrated area development, 3. equitable distribution of development benefits and 4. employment generation—both direct and indirect.

To achieve these objectives, the above study seeks to outline an organisational strategy for the management of drought prone areas in a district. The organisational aspects of rural development at the district level and below, in a systems context are brought out in the report.

Kolar in Karnataka and Chittoor in Andhra Pradesh, both DPAP Districts, are chosen by the authors to investigate the organisational problems that hinder the programme at present. The study has formed three objectives in this connection.

Methodology : An inter-disciplinary approach is adopted to critically analyse the systems and procedures of the government and to identify the strengths and weaknesses of the district development administration. Discussions with the district development officers, file analysis, data on ongoing DPAP activities of the district departments and inter-district comparisons etc., are used to develop an effective organisational model that best satisfies the first year of the Fifth Plan.

Findings : Deficiencies in planning and implementation are found in certain cases to arise from the incompatibility of organisational structure with management functions necessary to achieve programme objectives.

Lack of proper project planning, absence of purposiveness in the allotment of funds, in the assignment of priorities to match the availability of funds and in delegation of authority to local managerial and implementation levels are observed.

Lack of proper appreciation of the ecological objectives of the DPAP is evident in the programme. The purpose of supplementary investment under DPAP (viewing it as one of the routine programmes) has been defeated.

The concept of integrated planning for the development of agriculture on a watershed basis is not clearly understood at district level planning. The principle of the separation of line and staff function is not observed in the programme planning and implementation.

The study gives an appraisal of the district development administration, management functions and district

development administration and functional areas in agricultural development.

The role of the DDA has been confined to the finance sanctioning authority and only half-hearted attention is paid by the taluk level functionaries to the programmes. Having identified the problems, the study makes the following recommendations to strengthen the organisation.

1. The role of the district as focus of the district development administration must be conceded.

2. An autonomous authority on the lines of the DDA in Chittoor is essential to give the agricultural administration an integrated programme orientation. This functionary should integrate all the agricultural development programmes in the district. A responsible senior official is suggested to assist the DDA as its executive director.

3. A technical unit to monitor and graduate the programmes in relation to their objectives and a project management cell with suitable staff to integrate the agricultural development programmes of the district departments and to generate an information system and procedures for monitoring and evaluation.

An organisation chart is prepared to present the dynamics of the different management functions and the decision making process involved from the level of the heads of State Government departments to the taluk and village in the proposed organisation model.

4 'Methodology for Watershed Management : A Study on the Identification of Watershed and Planning for Agricultural Development in Rural Areas', 1980 —Ratnam N. V.

Decentralisation of the management process in India began with the creation of various autonomous rural development societies to implement some specific area oriented programmes in the rural areas. Many economic,

social and political problems that arise at the watershed level in the planning process have to be sorted out while transmitting the national objectives to the beneficiary group on an individual basis. In that context, the need was felt for a planning methodology for watersheds to guide the district officials in the implementation of the programmes.

The report studies the available technologies to suggest the relevant packages for the agricultural development of a micro-region or watershed. This methodology developed in the study is applied to a case study in a micro-region, Mulbagal Taluk in Kolar, a DPAP District in Karnataka.

The detailed soil survey, hydrological survey and contour survey results are used to develop the planning methodology in the watershed incorporating the long term twin objectives of DPAP, i.e., generation of employment and promotion of ecological stabilisation. The study together with the two studies by the same author viz., a perspective plan at the district level based on the resource analysis and the organisations study of a DPAP district, would immensely help to solve the whole range of problems identified by the task force of the planning commission.

The objectives of the study as listed reveal the steps involved in the report. 1) The identification of the methodology for watershed demarcation. 2) The analysis of land and water resources and matching their utilisation with socio-economic needs of the micro-region. 3) Identification of the different sectoral programmes relevant for the watershed. 4) Identification of project priorities and 5) The feasibility study of the methodology in the identified watersheds.

Bringing out the conceptual issues in watershed planning, the study makes a brief review of the literature on this subject. Then, the conceptual issues in terms of the

methodological implications for promoting watershed planning are elaborated and the steps involved in watershed management are outlined. The three stages involved in watershed management are : 1) watershed demarcation 2) watershed planning and 3) implementation and evaluation of watershed plan.

A case study of one block applying the watershed methodology developed in the report is presented. The case study includes the socio-economic aspects of the block, the demarcation of watershed, resource analysis of the block based on a detailed soil survey for the watershed, the development of a watershed plan for the different land use categories and the analysis of environmental impact and employment and income aspects of the watershed planning.

The various recommendations made under the headings soil survey and land capability classification, revenue records and land reforms, watershed planning and watershed management help to strengthen land use management in the context of decentralisation of the management process.

The type of data required for the wide application of this methodology is mostly not available at present. The recommendations of the author pertaining to data generation have to be immediately attended to for wide application of this methodology.

5 'District Planning and Management of DPAP in Dharmapuri District : Study of Evaluation of V Plan Achievement and Agricultural Development Planning for VI Plan in the District', 1978—Ratnam N. V.

The author observes that unless certain conceptual reorientation takes place in the States, the objective of area development is bound to suffer when the programmes percolate to the district level for formulation and implementation. The lack of proper organisation for planning and

implementation of an area development programme on a long term basis in the districts appears to be a root cause.

The Mid-Term Appraisal of the programme, as conducted by the centre revealed the inability of the programmes to absorb the funds as envisaged. The study is required to investigate the reasons for non-utilisation of funds under various sectoral programmes in the districts according to the plan of action approved by the State and Central Governments. The exercise is aimed at enabling the monitoring process to concentrate on lagging sectors in the DPAP and suggests ways to modify the sectoral programmes for the VI Plan Period.

The study makes a review of selected sectoral programmes under DPAP (irrigation, soil conservation, forest development, animal husbandry, calf-rearing scheme) in the last 3 years, in terms of their organisation, physical and financial achievements.

A critical appraisal of the sectoral performance during the V Plan period brings out the fact that the schemes are oriented towards employment rather than a planned infrastructure, building long term development activity. Mostly repair and renovation type of works for the neglected tanks under irrigation, and social forestry under forestry, are taken up.

The achievement of financial targets has become the goal for the departments. Absence of adequate infrastructure support to promote viable agriculture and animal husbandry projects, lack of inter-departmental co-ordination and direction are evident in the programmes.

The lack of area orientation in planning the DPA programmes and excessive departmental orientation are found to be responsible for the poor performance of the programmes in the district. The study points out that the district administration should be made accountable not only for financial expenditure but also for the benefits flowing to the people. Dharmapuri District Development

Corporation Ltd., (DDDC), with the Collector as the Chairman, is found to be not helpful for participative management by the other district officers in the district.

Past performance indicates that the independent schemes such as soil conservation, afforestation and minor irrigation projects undertaken are employment oriented schemes rather than infrastructure creating or designed to promote area development. The achievement of financial targets at the end of the 4th year of the Plan under the sectors agriculture, animal husbandry and horticulture have overtaken the achievements of physical targets.

The study repeatedly recalls the objectives of the DPAP and points out that the programme planning should ensure their realisation by promoting both equity and economic growth in these areas. The five pre-conditions for such programmes to achieve are given.

Taking the objectives and the plan of action to achieve them, the study lists the following steps for area development planning at district level. The inventory of soil and water resources, malady-remedy analysis of the resource position in the soil series, identification of priority sectors, identification of inter-sectoral project packages, delineation of financial outlays for different sectors including on-farm and off-farm investments and selection of appropriate organisation for implementation.

Identifying 14 soil series in the district, the sectoral programmes indicated in the study relate to 1) economic forestry 2) Soil forestry 3) medium irrigation and command area development approach 4) dairy products manufacturing plants and 5) backyard poultry and medium and small size poultry units as subsidiary occupations for weaker sections.

The financial implications for the sectoral programmes are worked out. The physical and financial targets sector-wise are given in Appendix-5. An outlay of Rs. 3,194 lakhs

will be distributed over irrigation (37.99 percent), animal husbandry (21.03%), agricultural engineering (22.75%) and social forestry and command area development (11.25%). The merit of this outlay over the sectoral outlay for the VI Plan IRD is evident in the objective approach to the programme priorities in the former. In the absence of programme packages under Plan IRD, the sectoral programmes would be implemented without adequate sequencing and area orientation among the complementary activities from beneficiary point of view. The study recommends the creation of an autonomous development agency on the lines of the one in Chittoor District. Such an agency should be responsible for watershed planning, financing, monitoring and evaluation of projects in the District. A project management cell to bring the development departments to work as an inter-disciplinary group is suggested.

6 'An Approach to Land Use Management' 1979 **—Ratnam N. V.**

The paper analyses the conceptual issues in land use and develops a management approach to identify the policy parameters of the macro level and the socio-political and organisational implications of the implementation of such a policy at the micro region level or watershed.

Identifying land use management as a multi-disciplinary task involving policy makers, planners and development personnel, the study gives few guidelines to initiate land use management in the states.

The author concludes that once the operational data base is established on productivity and social feasibility through watershed plans at least on a pilot basis in different agro-climatic zones, the different policy options available at the macro-level can be examined through simulation models.

7 'Management Aspects of Land Use with Special Reference to Disaster Preparedness in Agriculture', 1980—Ratnam N. V.

The theme of the paper is that land use management should also be implemented in the district/block and micro watershed levels to make the approach consistently effective at all levels. Since the relevant methodologies are available, the paper envisages a 'land and water use board' to serve as an organisation for land use management.

8 'Soil Census for Agricultural Planning and Land Use Management', 1981—Ratnam N. V.

Soil surveys are important to develop watershed planning. Since soil fertility is one of the major determinants of crop productivity, land resources have to be examined to determine the nature of the soil for purposes of crop and planning and agricultural development. It is found that the available soil information is highly aggregative in nature and deficient for micro level agricultural development. The paper examines the availability of information on soils and their productivity from the users' point of view. Stressing the need of such soil surveys, the author poses some broad problem for the consideration of soil scientists.

9 'Management of Rural Development : An Integrated Approach to Resource Constraints and Human Problem', 1978—Ratnam N.V.

The paper attempts to define rural development in an ecological setting. Giving a fine account of ecology and development, the paper explains the development process of agriculture to increase employment for social development. The author pleads that the awareness of environmental constraints on development and the treatment of human resources should form the basis for an integrated rural development.

II (b) Water Resources

10 Networks for Upper Krishna Project—Vol. I to VI —Balaraman V.T.D. and Nagadevara V. (edt)

The six volumes consists of different networks developed by a team. They are : master network, monitoring system, dams, narayanpur left bank canal and tunnels, Shahapur branch canal and command area development.

The major aim of this report is to develop the network to portray the work involved in completing the first five year of the Upper Krishna Project with World Bank assistance in Karnataka. As the benefits of networks are well known, this report initiates the use of networks in the major irrigation project.

11 Organisation for Narmada Control Authority', 1981 —Warriar R.N., Sundar A. and Rao P.S.

An organisation for Narmada Control Authority developed by a team is reported in the study.

12 'Workshop Report : Farmers' Organisations for Efficient Water Use in Irrigated Agriculture, 1980 —Sundar A. and Rao P.S.

In the words of the editors, 'the workshop was held with the objective of bringing together engineers, administrators and academicians dealing with irrigation systems and to facilitate exchange of information and ideas on the problems, issues and approaches for greater and more organised participation of farmers in irrigation management and on the topics that need to be researched'. This was jointly sponsored by the Ford Foundation and the Indian Institute of Management, Bangalore.

The report consists of number of papers highlighting water management problems in respective regions. Venkatesan M.N. in his paper the 'Sociology of Irrigation, observes the need to educate the farmer in soil characteris-

tics, soil moisture, crop patterns, crop water requirements and the harmful effects of over watering for achieving efficient water use. He advocates training in water management and inter-disciplinary research for improving irrigation water use efficiency and effectiveness on farms.

Rightly, the workshop makes a few recommendations for efficient water management. They are:

1. Organisation and promotion of research on farmers' organisation for efficient water use in irrigation ;
2. Rotational distribution of water for equitable distribution of irrigation supplies ;
3. Remodelling of the canal system to meet the above distribution and maintenance of the system. Funds allotted for operation and maintenance of the canal system being limited should not be diverted.
4. Further, education and training of technical personnel and of farmers in order to achieve equity and to develop farmers' organisations for effective use of irrigation supplies.

13 'Command Area Development : Use of Network Techniques and Related Problems', 1977

—Sundar A., Nagadevara V. and Balaraman V.T.D.

Through this paper, the authors demonstrate the relevance of network techniques in command area development projects. The five district but interdependent components of the CAD Projects. 1) Systematic land development 2) Extension 3) Credit—both long term and short term 4) Communication and 5) Marketing facilities are conducive to develop appropriate networks for efficient execution of the projects on scientific lines. The advantages of the network for execution of the projects are explained in detail in the paper.

14 'Efficiency in Water Use through Control of Uncertainties', 1977—Sundar A.

Uncertainties of various types arise in the planning and utilisation of water resources. Control of these uncertainties could lead to increased benefit. The paper discusses the various kinds of uncertainties faced by the engineer planner and discusses possible ways of minimising the effects of uncertainties in water use.

**15 'Information System for Controlling Environmental Impacts During Implementation and Operation of Irrigation Projects', 1977
—Sundar A. and Balaraman V.T.D.**

The environmental impacts during implementation and operation of irrigation projects are clearly presented in the paper. Along with the benefits and costs of the projects, the paper argues that certain environmental costs should be taken into account. The information system and data base needed to link the environmental impacts in terms of its costs to assess the overall benefits of the projects at different points of time are explained.

This paper highlights the importance of creating a sound statistical system in project planning, execution and maintenance, for assessing the overall benefits of the project.

**16 'Water Resources Planning and Management', 1977
—Sundar A.**

The paper deals with the importance of water resource development and the theoretical aspects of the systems approach to water resource and planning. Then the paper traces the potential of water resources in India and the irrigation projects along with their deficiencies in terms of optimal water use through the network of canal systems. The author concludes that development and efficient management of water resources needs an inter disciplinary

approach taking counsel from the disciplines of engineering, social and environmental sciences, agriculture, law and the realities of politics.

The paper explains in precise terms how the potential of available water resources could be harnessed with proper water management techniques to increase the productivity of the land resources and the utility of the limited water resources.

**17 'When Water is Scarce, Lift and Sprinkle', 1978
—Sundar A.**

The author advocates the sprinkler irrigation method under the following conditions. 1. water supply is limited and valuable. 2. Terrain is undulating requiring expensive development for surface irrigation and 3. The soil's water holding capacity is unsuited for surface application. He cites the case of Israel where extensive areas are covered by sprinkler and drip irrigation. The economics of sprinkler irrigation are demonstrated with the help of two cases in Kurnool District (AP) and Hunsur Taluk, Mysore District. In view of the economic advantages, the author pleads for the extensive use of this technique wherever suitable condition prevail in our country.

18 'Materials Management for Economic and Efficient Implementation of Projects', 1978—Sundar A.

The paper discusses the importance and utility of network techniques in the execution of power generating projects and materials management for the economic and efficient completion of these projects.

19 'Optimal Expansion of Existing Urban Water Supply System', 1978—Sundar A.

It is essential to study the existing urban water supply systems from the viewpoint of equitable supply as well as distribution before considering an extension or

enlargement. The methodology followed should provide for checking whether extension or enlargement of the existing distribution system is actually needed and if needed the best way to do so. The basis for such a methodology is described in this paper.

20 'Irrigation Project Evaluation': Deficiencies and Suggested Remedies'—Sundar A.

Considerable amount of money has been spent on irrigation projects since independence. In the proposed VI Five Year Plan also the funds needed will be enormous in view of the target of 17 million hectares of irrigation.

The project stages of conception, definition, implementation and operation are intimately interlinked. Inadequate appreciation of these interdependencies have led to the failure of many projects.

This paper discusses the totality of integrated irrigation projects and presents the inferences drawn from discussions held with eminent irrigation engineers and administrators. Deficiencies are identified and remedies are suggested.

21 'Organisation Structure for Better Management of Irrigation Systems', 1979—Sundar A.

An effective organisation is essential to achieve optimal water use in agriculture production. Analysing the existing irrigation system and its deficiencies, the author proposes an appropriate organisation framework for better management of irrigation systems. Two Sub-systems :
1) Organisation for attaining effective outlet discharges and
2) Organisation for attaining equity in distribution below the outlets working under the system consultative committee with all linkages are envisaged by the author.

**22 'Systems Management of Water in Industry', 1979
—Sundar A.**

In the past few years, it has been realised that environmental quality is a resource and that wastes disposed to the environment generate costs to the society. From this has emanated the criteria for disposal of wastes and agencies for enforcement. Waste disposal from industries has to meet these requirements. Industries that have the organisation and resources may move towards the concept of integrated water systems. Some thoughts on this aspect have been discussed in this paper.

**23 'Economical Investment of Lining Project', 1979
— Govindarajan P., Nagadevara V. and Sundar A.**

According to some studies, the efficiency of irrigation can be doubled from the present level of 28 per cent by adopting appropriate measures to reduce the loss in the distribution network of canal systems. The lining of water course on the basis of relevant permeability characteristics is important to minimise the losses. The paper argues that the cost of lining could be reduced considerably without much reduction in the anticipated benefits by adopting measures for optimal investment of lining based on the appropriate parameters.

ABC Analysis and Marginal Analysis are used to evaluate the net benefits for lining the four units of Periyar Main Canal under the Periyar-Vaigai improvement project. The necessary data have been collected from the Periyar-Vaigai Project wing of the State Public Works Department of Madurai.

This technique has significance in view of capital constraints. The paper shows the uneconomic aspect of lining the 2 and 3 units of this project by the above methods.

24 'Performance Evaluation of Irrigation Projects', 1979—Elumalai G. and Sundar A.

Many irrigation projects are not performing as envisaged at the time of planning or implementation. The reasons for this are many, some of which are lack of command area development, non-enforcement of the cropping pattern envisaged while planning the project, lack of credit and communication facilities. This paper highlights the reasons for the shortfall in utilisation of irrigation potential in Tamil Nadu and the reasons for the changes in the cropping pattern based on a field study. Suggestions are also made regarding possible remedial measures. This is illustrated by a study of the Parambikulam-Aliyar Project in Tamil Nadu.

25 'Evaluation of Pumped Storage Schemes', 1979—Ramanathan A. and Sundar A.

The power demand in electricity system varies with season, month, day and hour. The generation has to keep step with the demand fluctuations. In many electricity systems, the peak demand is twice the off-peak demand.

Pumped storage schemes are recommended to utilise the pump power available from various sources in order to pump water to/or higher elevation and subsequently generate peaking power. Since a pumped storage scheme is virtually a closed system, it enables reuse of water in power generation therefore, may require smaller storage capacity of reservoirs leading to less deforestation and other ecological effects. However, the pumped storage requires energy from other sources.

The other alternatives suggested to meet fluctuations in demands are :

- i) Levelling of load duration curve by staggering, differential pricing, etc.
 - ii) Installation of more incremental hydrostations.
-

- iii) Avoidance of power during off-peak hours by changing the mix of hydro-thermal-nuclear stations ; and
- iv) Provision of gas turbines and extended thermal generating sets.

The paper evaluates the various alternatives and tries to identify the circumstances favouring pumped storage schemes. A case study is presented to illustrate the methodology.

26 'Current Estimation Practice : A Hindrance to Network Usage in Irrigation Project', 1979
—Elumalai G., Balaraman V.T.D. and Sundar A.

Water is an important input necessary for increasing the productivity of agricultural land. Assured water supply in sufficient quantities is necessary to increase agricultural production in the country. This can be provided for by efficiently implementing irrigation schemes

Network technique is a modern management tool available for planning, efficient implementation of projects. In case of irrigation projects, however, information required for developing networks cannot be obtained directly from the project estimates as currently prepared. The authors have suggested some procedures to prepare the estimates in such a form that this information can be directly drawn.

The method is illustrated with the example of Kolavrapalli Reservoir Scheme, Hosur Taluk, Tamil Nadu which is under implementation.

27 'Network Based Contracts for Effective Project Implementation', 1979—Elumalai G. and Sundar A.

Based on the availability of resources and the target time of completion of a project, the works can be completed either by allotting to a single construction agency or a few agencies or many agencies. In deciding about the allotment of work to various contracts, the main consideration should

normally be the constraints of working seasons, working space and technology to be adopted.

A correct decision on whether to split up the major work into a number of minor works and if so, how to break them down suitably so that, each minor work can be awarded to a single agency and got completed within the scheduled time, is essential.

“Network Technique” is an important management tool which can be used with many advantages, to take decisions on the above aspects. Master network for a project enables identification of the single units, which can be awarded independently. Working networks help to delineate, to start and finish times of the minor activities, and also to monitor the progress of each individual contract.

This paper deals with how the awarding of contracts based on networks is useful to co-ordinate and monitor the progress of various individual contracts functioning in a project system, so as to enable achieving the objective of completing the project work within the scheduled time.

As an illustration, the salient features have been brought out by discussing the case of an irrigation project implementation.

28 ‘Water Resources Projects as Instruments for Socio-Economic Justice’, 1979—Krishnakumar T., Shivaramu S. and Sundar A.

The role of water resources projects in reducing socio-economic disparities are discussed in the paper. The socio-economic indicators for measurement of social justice attributable to water resources : 1. water supply and drainage, 2. irrigation (surface and ground water) 3. power 4. flood control, and 5. recreation are explained and the paper advocates that apart from the benefit-cost analysis, project planning should measure the socio-economic justice through measures of the qualities in social indicators.

The paper cites published literature to understand the distribution of accessibility of social amenities to different sections of society. Since the lack of information base does not permit consideration of aspects of socio-economic justice, the strengthening of information base through surveys and research is recommended.

29 'Farmers' Participation in Water Distribution and Maintenance of Minor Irrigation Tanks', 1981—Rao P.S. and Sundar A.

The paper presents the objectives, tasks and methodology of the project taken up by the authors in Karnataka.

30 'Farmers' Participation in Tank Irrigation Management in Karnataka', 1981—Sundar A and Rao P.S.

With the assistance the World Bank (IDA), the Government of Karnataka aims to take up the construction of about 160 new tanks distributed in various regions of the state.

The paper is an investigation of the existing farmers' organisations and their co-operation within tank command areas in order to suggest the means for establishing viable and effective participation of users in operation and maintenance of the new tank projects.

Selecting six existing and three newly proposed tanks objectively, the study has collected the necessary information through a structured questionnaire from a sample of farmers. Some of the findings of the study can be summarised as below :

1. Farmers prefer to manage the affairs below the outlets, leaving the responsibilities of maintenance of the main system to the Government.
2. Farmers perceive that a good physical system is necessary for effective organisation.

3. Farmers resolve most of the conflicts themselves. However, the role of officials is felt to be necessary and helpful to ensure equity in water distribution.
4. The dearth of personnel with technical knowledge for social science research in irrigation has been observed.

**31 'Farmers' Organisations for Efficient Water Use in Irrigated Agriculture: An Overview', 1980
—Sundar A. and Rao P.S.**

Presenting irrigation development in the successive plan period in India, the paper brings out the various problems to be resolved in irrigated agriculture. Though irrigation potential and food production have considerably increased, agricultural productivity has remained at a low level due to lack of timely inputs and the preponderance of small holdings. At present there is a gap of about 12% between the irrigation potential created and utilisation in major and medium projects.

The paper discusses the concepts of utilisation, efficiency and equity in the water resource management. The factors and deficiencies contributing to underutilisation of water resources are enlisted.

Farmers have an important role besides the government efforts to ensure equitable distribution of water and its efficient use. The authors opine that farmers need to be organised in order to participate effectively in the development projects. However, they recognise the relative inequity economic, social and political of the farmer as a limiting factor in the promotion of his effective participation in such organisations.

The paper points out the deficiencies of Government Agencies in the construction, maintenance, monitoring and remodelling of irrigation projects. Even the Command Area

Development Authorities (CADA) for the major irrigation projects, have become ineffective, to some extent due to organisational and financial problems and are unable to correct the under-utilisation of irrigation potential. The appraisal and review of the functioning of the CADA's has suggested some steps to improve the water use efficiency, utilisation of irrigation potential and crop yields.

In the prevailing socio-political environment where the social structure remains highly exploitative and inequality of ownership of land resources is bound to continue, the authors doubt whether the co-operative spirit required for the efficient functioning of such farmers' organisations would emerge.

32 'Efficient Conjunctive Use of Canal and Tank Systems', 1979—Govindarajan P., Nagadevara V. and Sundar A.

The paper deals with a study relating to the operation of canal-fed tanks for the efficient use of the available water resources. A procedure for storing water in the tank over selected periods in the year is suggested. The adoption of this operating procedure will lead to a considerable saving because of reduced evaporation and seepage losses.

The study utilises the data on the Thodaneri Tank fed by the Periyar Main Canal in Tamil Nadu for the year 1972–73 irrigated season. The performance of the tank was studied by adopting simulation techniques.

33 'Systems Approach to Water Management for Efficient Irrigation', 1980—Rao P.S.

It is widely accepted that only a deliberate public policy could bring about the optimum development of water resources. The system approach is explained as a systematic, conscious and comprehensive management technique providing a useful basis and acting as an integrating factor for collaborative inter-disciplinary activity.

The need of 'systems approach for optimum utilisation of river water in each basin with special reference to crop pattern, soil condition and agricultural practices' is well recognised now.

Through this paper, the author explains the problem of water management for efficient irrigation from a systems view point. The research gaps in this line are outlined.

34 'Emergence of Farmers' Organisations : A Survey', 1980—Bhaskaran P.

Recognising the importance of citizens' participation in the developmental process, the author presents the survey observations on the water distribution systems in Kerala, Malampuzha, Pothundi, Chitturpuzha and the Valayar and Chalay Projects in Palghat District form the ground for the study.

The problems faced by the authorities and the users are examined to suggest some appropriate remedial measures for efficient water distribution.

The paper first makes a critical appraisal of the existing irrigation advisory committee in terms of its functions, organisation and limitations. Even the new organs like sub-canal committees have been found ineffective to fulfil the Government's intention of equitable and economical use of water. The author pinpoints the defects in the organisation for its effectiveness.

As a consequence of the failure of these organisations, the associations of farmers in several places have emerged to represent their problems at higher levels and demand their rights. The author closely analysed the problem with the help of his discussions with the project authorities and the users.

A case study of the Pothundi Water Users' Association for the social and economic development of the farmers

suggests that these associations would be really helpful, if they are strengthened with specific directions.

The author concludes that the terminal facilities in the water distribution system should be intensified and public opinion should be mobilised through proper communication methods.

**35 'The Sixth Plan Irrigation Development Programmes : Their Techno-Economic Implications and Some Suggested Readings', 1981
—Roy, Shyamal.**

The paper lists the important aspects that need the attention of the planners and administrators in the Sixth Plan irrigation development programmes to achieve an annual increase of about 4.7 per cent in gross irrigated area.

Minor irrigation is to contribute 60 per cent of the area and the major and medium irrigation schemes the remaining part. The techno-economic factors that retard growth in the states mostly in the Indo-Gangetic plain need immediate attention of the planners. The rural electrification programme has to be intensified in the states where the potential for minor irrigation is established. The preponderance of small farms in these states may limit the minor irrigation programmes due to lack of credit facilities and risk aversion of the farmers to install pumpsets.

In case of major and medium schemes, the paper suggests improvement in efficiency of water use in the existing systems through various means and a proper evaluation procedure to assess the economic viability of new investments.

The current literature available on these aspects is cited in the paper.

36 'Choice of Technology in Irrigation Construction : Some Issues', 1982—Roy, Shyamal, Murthy R. and Seethamma K.K.

The paper discusses the main issues related to choice of technology in irrigation construction works from the point of view of generating more employment, simultaneously with growth. Certain guidelines for future research and data needs are also indicated in the paper.

The paper pleads for a proper economic evaluation of irrigation projects to determine whether labour-intensive or capital-intensive technology should be chosen for employment creation. This is important in view of the estimate of additional labour force of 34.42 million in the country and the allocation of investments in agriculture, small-scale sector and other unorganised activities to relieve the high concentration of unemployed in the rural areas.

37 'Integrated Rural Development : Upper Krishna Experiences', 1980—Nagadevara V.

The paper evaluates the planning efforts for the development of agriculture in India through various developmental programmes over the last three decades. The Integrated Rural Development concept presently adopted in the plans aims to reduce the disparities in income distribution through a multifacet framework involving a multi-disciplinary approach.

The author states that effective co-ordination can be achieved in the implementation of the plans with a proper monitoring system. The importance of such a system is explained in the paper with the help of the comprehensive implementation plan developed by the Institute for the Upper Krishna Project in Karnataka. The lack of such a comprehensive implementation plan breeds many problems in the developmental project.

III Crop Production

38 'Land Use Pattern and Agriculture Policy : A Macro Level Approach to Resource Management in a Developing Economy'—Ratnam N.V., Rao M.R. and Viswanadham Y.K.

This is a pilot study to explore the data availability and evolve a methodology to arrive at optimal cropping pattern in a set of homogeneous agro-climatic zones in Southern Karnataka. The study relies upon the rainfall patterns drawn up by the National Commission of Agriculture. A study of its kind is the application of Linear Programming Method at macro level to bring out the factor-product relations in the major crop activities.

The price and land use policies to be followed to serve the interests of the individual farmer and the state are studied through a set of models based both on gross and net returns. The implications of such optimum cropping patterns are illustrated by utilising the farm management data systematically gathered by the Department of Agriculture through a sampling method covering the important crops and by taking the land-holding basis into consideration.

The objectives of the study are :

1. To identify the existing data sources appropriate to the developing and testing of the empirical optimisation models for the land use at the regional/state level.
2. To delineate the optimal cropping and land use patterns for the homogeneous agro-climatic zones as identified in the southern region of Karnataka.
3. To analyse the results and test the appropriateness of the methodology employed.

4. To identify the macro and micro level parameters or policy instruments in order to promote, at regional and national levels, for healthy agricultural development.

The study includes methodology and data collection as a part of policy recommendations and the guidelines for the State Governments to initiate the land use planning. The limited land resources have to be distributed among various agricultural and non-agricultural activities in a planned manner. Some of the conclusions which have policy implications can be summarised as follows :

1. Rational cropping patterns will be useful to optimise production and rural income so that the country's food requirements are met on a priority basis while the marginal lands identified in this process could be earmarked for protective and conservation purposes.
2. Intensive farm management studies based on farm holdings, their cropping and yield patterns, and cost structure are necessary. It is recommended that other states too should initiate studies on the basis of the Karnataka model.
3. Identification of agro-climatic homogeneous zones in the country on the lines of the study would enable the formation of an agricultural land use policy at the macro level. The policy should include instruments such as parity prices preferably on annual basis to facilitate successful implementation of these policies at the grass root level.
4. The study clearly brings out the consequences of the factor-product advantage enjoyed by a few crops affecting the production of other crops notably pulses and oilseeds in the country.

suggests that these associations would be really helpful, if they are strengthened with specific directions.

The author concludes that the terminal facilities in the water distribution system should be intensified and public opinion should be mobilised through proper communication methods.

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39 'Diversification in Agriculture, An Empirical Study' 1982—Viswanadham Y.K.

The study makes an attempt to find out the possibility of diversified agricultural activities in the selected agro-climatic regions of Hassan District. The land use models under land use policy research have indicated the potential crops in the Districts of Karnataka and suggested the readjustment of cropping patterns.

Through a sample survey of 200 farmers in 5 agro-climatic zones of Hassan District, the study identifies the characteristics of the favourable farmers to change their cropping patterns and the problems of extension, credit and inputs for them. The study makes use of scaling techniques to quantify the economic motivation, scientific orientation, risk aversion, and value orientation of the farmers and the multi-variate statistical method to identify the important variables to locate the potential farmers to render the possible help.

The study concludes that diversified agriculture would be beneficial to a large number of farmers to augment their farm incomes and the State should help the farmers who intend to diversify their agricultural activities when this is agreeable with the optimal cropping patterns.

40 'A Linear Programming Approach to Agricultural —Land Use Policy in India'—Rao M. R. and Ratnam N.V.

The paper gives the theoretical aspects of the linear programming models and then explains how they can be applied to arrive at the optimal cropping patterns in a given region. Utilising the agro-climatic regions and the productivity levels of different crop activities in Karnataka, the paper demonstrates the technique. The methodology developed in the paper has been applied in a study for refined data.

**41 'Risk Management in Agriculture', 1976
Nagadevara V.**

The paper makes a distinction between risk and uncertainty. It discusses the various risk situations in agriculture. The main sources of risk in agriculture are: 1. technological variability, 2. market variability, 3. production variability, 4. institutional or political uncertainty. The farmer is confronted with one or more risk situations depending upon the agro-climatic conditions in the region.

There is no unique method to measure risk but different techniques have been devised for operational purposes. The paper cites the available literature on this aspect.

Risk management is gaining importance though elimination of risk is an impossible proposition in farming of late insurance of crop, livestock and agricultural implements is being attempted but it has not had any impact so far due to various operational problems. The other means normally adopted to reduce risk are: 1. contracts 2. tenancy, 3. inclusion of risk as a cost 4. selection of low risk enterprises and 5. diversification of crop activities. Mathematical programming and game theory will help minimise risk but non-availability of data base and predominance of small holdings make them non-viable in Indian agriculture in general.

The risk-bearing ability of a person is a function related to the size of the operational holdings and the capital investment. It is obvious that a new crop which involves risk. Short term loans will not be used by small farmers to cultivate.

Availability of complete information on the variability associated with the new technology, crop insurance against natural damage, a minimum price policy for crops and short-term credits covering sufficient number of crop seasons are suggested as means of risk management in agriculture.

42 'A Methodology for Assessing the Economic Feasibility of Adoption of Technology at Farm Level: Some Conceptual Issues', 1978—Nagadevara V.

The paper brings out some of the conceptual issues relating to farm technology and its adaptability in different farm situations, since the major factors influencing the adoption of farm technology are: 1. size of the land holding 2. value of assets 3. literacy 4. prior awareness of the use of improved practices. The assessment of the economic feasibility of adoption of a new technique at the farm level, based on either the cost-benefit analysis or the efficiency criterion, is not enough, according to the author.

Developing the theoretical arguments on various aspects of this problem with case and project studies, the author suggests an operational strategy for wider adoptability of technology at the farm level. They are: 1. generation of low risk technology 2. availability of reliable and full information on input and output costs of crop activities along with the risks involved 3. formation of organisations at the farmer level to increase the awareness among the farmers and to increase the potential for adoption.

43 'Feasibility of Animal Husbandry Development in Dharmapuri District', 1978—Gopalaswamy T. P. and Radhakrishnan V.

The study recognises the importance of viable alternative under diversification of agricultural activities based on resource endowments to stabilise the production and incomes in areas where crop husbandry is pursued under subsistence land due to erratic rainfall and yields. Dairying is an important subsidiary activity with multiple benefits to small and marginal farmers as well as landless labourers.

The study extensively takes stock of resources to foresee dairying as an important and viable activity in Dharmapuri District.

The objectives of the study are to study the present status of dairy development activities and their economic aspects in the DPAR District, Dharmapuri in Tamil Nadu, to find the scope for integrated dairy development in relation to the resource endowments and the market demand and to explore the feasibility of dairy enterprise as a supplementary source of income for small and marginal farmers and the role of the TNDDC in such situations.

Methodology : Discussions with the State and District level officials concerned with animal husbandry and dairy development, a detailed inventory of relevant resource endowments in the District and the current pattern of utilisation and a farm level sample survey with a structured schedule are used in the study.

The sample survey indicates that only 17 percent out of 86 percent of sample farmers having crop farming as their main activity, have this activity as a subsidiary occupation.

Predominance of subsistence crops in the cropping pattern, low quality of the milch animals in terms of the market value, low milk yield and long calving interval and non-availability of cattle feed (green fodder and concentrates) are observed to be limiting points in the District. Only 37 percent of the milk produced (chiefly by marginal land owners) is marketed in the District.

The study identified the existence of potential for increasing milk production to augment the incomes of weaker sections in the District. The market facility exists for such activity through the TNDDC and the network of dairy co-operative societies, of milk and the chilling centres at a few points on the routes. Once the services of the corporation, like supplies of compound cattle feed, artificial insemination facilities, veterinary health care and cultivation of green fodder are extended to a large number of potential farmers, dairying becomes a viable activity.

The recommendations of the report relate to the improvement of the genetic make-up of the bovines in a phased manner, cultivation of high yielding perennial grasses in irrigated areas, involvement of the TNDDC for marketing of the milk and milk products and enlargement of co-operative societies and milk collecting centres.

The report highlights the importance of subsidies to the landless, marginal and small farmers until the programme gains momentum and yields economic benefits to them. The need for commercial banks to provide credit for dairy husbandry is stressed.

A programme for breeding through artificial insemination and for green fodder cultivation over a ten-year period has been worked out. It will, if implemented result in additional yield of about 4,500 litres in the fifth year which will increase more than fourfold by the tenth year, to about 20,000 litres.

The report under review is a positive contribution in the field of animal husbandry in the context of organisation of viable subsidiary occupations to increase the income levels of the weaker sections. Since the study has base in a DPAP District, it has a special significance. If the recommendations are incorporated in the programme, the supply of milk with improved livestock would result in healthy agricultural development.

**44 'Management of Dairy Development Project Under the IDA - Assisted DPAP in Bijapur', 1977
—Ratnam N.V. and Gopalaswamy T.P.**

This is a diagnostic study of a dairy development project in Bijapur to analyse the lack of progress in marketing, the working of milk producers' co-operative societies etc., and to identify the problems of planning and implementation in dairy development. This study is a corollary to the periodical progress review by the World Bank Review Mission. Bijapur is one of the six Districts where the DPAP is financed

by the International Development Association of the World Bank.

The short-term objective of providing a subsidiary occupation to a large number of small and marginal farmers and the long term objective of preserving the ecological balance in the area and reduction of unproductive bovine population in the Districts are intertwined in the DPAP programme. The study underlines the difficulty of developing dairying on commercial lines in areas where agriculture has not yet moved up from subsistence levels to become a economic occupation.

Taking stock of resource endowments and cattle resources for the dairy development programme, the salient features of the programme are given in detail. The dairy development programme in Bijapur District envisages the milk producers' co-operatives at the village level on the Amul Pattern. The programme objectives are :

1. Improvement of productivity of the local cattle through better nutrition and health management.
2. The specification of use and upgrading of local white cattle for production in the long run.

Though the detailed project proposed to establish about 80 societies over a period of 3 years, it could not be achieved. The programme has suffered due to some basic problems of marketing, planning and management.

The study under review makes some specific recommendations to improve the dairy development programme in Bijapur District based on the realities of the situation. Remunerative price policy for milk, enlargement of membership of village co-operative societies by including all owners of milch animals, collection of milk twice in a day, establishment of a few additional chilling centres at intermediate points along the milk routes and supply of concentrated cattle-feed through the societies, are suggested in the study.

As for planning strategy, the study suggests some readjustments in the milk routes, a standby chilling centre in each zone, free health care for all cattle owned by members, speeding-up of phase-II in Bijapur and cautious and selective financing. Infrastructure development and nutrition and health management are suggested to improve the dairy development programme.

Assignment of well defined roles to the spearhead team and organisation on the Amul Pattern for the dairying co-operative society are suggested in the study. Actual growth of production should be aimed at rather than merely financial achievements, it stresses.

The study wants the programme to be linked with the agriculture and forestry sectors. The District Development Authority under the DPAP could be entrusted with the programme for greater flexibility and co-ordination.

The latter suggestion helps to reduce multiple agencies acting in isolation for different programmes that have a single objective.

45 'A Market Study on Sheep Products – Ranebennur Taluk', 1981—Shivaramu S.

This is a diagnostic study to find out the market aspects of sheep products in Ranebennur Taluk. Since the market problem is limited to a few products, the author concludes that there is a real production problem in the taluk.

The feasibility of improving sheep breeding and weaving in short term to enhance the income of the people engaged in this occupation is established by the study. A proper programme of action benefitting the targeted people with proper priorities could be worked out.

The sectoral model constrained by material and human resources, is applied to study the economy of Medleri village

in the taluk. The problems faced by shepherds are : 1) Low incomes 2) Lack of grazing land. 3) Poor health care 4) Very strong traditional beliefs. The study points out that the large scale sheep breeding farm, Challakere, has not made much impact in modernising sheep in the area. There is one more agency, the Sheep and Wool Development Board, Govt. of Karnataka, to propagate modern techniques of sheep breeding and wool processing with better health care for sheep to help in this connection.

The role of middlemen in eating away the benefits is pointed out in the report. Since there is an assured market for meat and other products with the exception of shuttle loom products, the study suggests that quality of the sheep be improved.

The study makes a comparison between the strength and weakness of native cross-breeding and exotic cross-breeding and the opportunities and the treats involved in them. In this respect, it is a comprehensive study on sheep-rearing and the two district alternative development strategies cited for Ranebennur Taluk would be helpful to guide the programmes to be undertaken.

46 'A Systems Approach to Feed, Forage and Livestock Planning', 1980—Trivedi K. R. and Nagadevara V.

The paper deals with the systems approach and its utilities in planning livestock development. The linear programming model for simulating the livestock sector taking all the livestock as well as crop production activities into account is explained in the paper. Noting the use of such a model, the authors emphasize the need for development of an appropriate data base for operational utilities of the model. Availability of the data besides the limitations of the model itself is a limiting factor.

IV Forestry**47 'Social, Economic and Ecological Impact of Social Forestry in Kolar', 1981—Shiva V, Sharatchandra H.C and Bandyopadhyay H.C.**

The consequences of deforestation are (1) accentuation of floods and drought at macro level resulting in uncertainties in the level of agricultural production and (2) non-availability of forest products to the rural people like fuel, fodder etc., at micro level. Social forestry programmes, particularly under the DPAP aim to protect the eco-system and enhance forest products.

The study brings out the concealed threats created by the programme in the absence of proper organisation and economic pre-conditions.

Methodology : Four taluks in the Kolar District are taken for the study. A random selection of households in the villages, on the basis of closeness and remoteness to taluk headquarters is made. The questionnaire method is employed to collect the relevant information from the households.

The historical evolution of the land use pattern and community participation indicate that the cultivation of food crops like ragi, jowar etc., has declined in the area and that the people's participation is minimal. The benefits of the social forestry programmes have not been realised. A substantial amount of new forest cover has emerged at the cost of food crop cultivation. This shift in land use will affect employment and availability of food, fodder, fuel and other forest products. Since this programme was taken up on private farms to a large extent, only small and large farmers benefited.

The study rightly suggests the utilisation of uncultivated land for afforestation, the selection of species that would not disturb the local life support system and

people's participation in large numbers for the success of social forestry.

In view of the World Bank assistance to the social forestry programmes in Karnataka, the study brings out the social, economic and ecological impact on the people and the environment in rural areas. Programmes under the departments of agriculture and forestry appear to be working at cross purposes under the same ministry. Once the incentives are given to private farmers to encourage the special species under social forestry, the programmes of the Agriculture Department to increase food production will be defeated. Hence the study suggests an integrated and co-ordinated approach to the social forestry programmes.

V Inputs

48 'Need for Intensifying Research on and Agricultural Equipments Required by Small Farmers', 1979 —Naik V.A.P.

A large majority of the farmers and farm workers are still using the age-old inefficient labour-intensive-crude agriculture hand tools, implements and equipment along with the ill-fed animals. The recent survey, "utilisation of steel in the rural areas, "conducted by the IIMB revealed the absence of improve tools in private as well as in Government farms to reduce the laborious work and to enhance labour productivity.

The paper underscores the need for improvement of hand tools, and yokes for different animals, tillage and intercultural tools, sowing and plant protection equipment, harvesting the thrashing tools and equipments, storage equipments and processing machinery. Of late, the need for development and research on agricultural equipment is well recognised by the state number of All India co-ordinated schemes have been planned.

The author feels that the institutions like State Agricultural Departments and State Agro Industries Corporations should be involved actively in manufacturing and marketing for effective implementation and propagation of benefits of various schemes now under way. Instead of wasting the funds on superficial schemes as in the past, the author suggests a result oriented research on implements to relieve the drudgery of the worker and to increase the efficiency of the labour.

49 'Improved Inserts for Country Type Bullock Carts', 1978—Naik V.A.P.

The importance of the modernisation of Bullock Cart in helping the transport sector in the rural areas needs no emphasis. In this context, the paper gives the designs of of some improved inserts, viz., the spring shock absorbers, wooden brake shoes on steel poles, C.I. bush bearings and solid vulcanised rubber caps on the wheels fitted on a local prototype cart.

The benefits of these inserts are the increase in load-carrying capacities and the enabling of the bullock to work for longer durations. However, field trials to evaluate these improvements are contemplated.

Along with the modernisation of agriculture in terms of improved seeds, fertilisers and agricultural practices, the basic tools widely and extensively used in the countryside have to be upgraded. The collaboration of private agencies with the government agencies in this venture is required.

50 'Agricultural Engineering Technology for Integrated Rural Development : The Role of Steel in Farm and Rural Home'—Naik V.A.P.

The paper highlights the role of Agricultural Engineering Technology in the IRD Programmes. There is a great need to produce improved farm and rural home tools, implements, etc., by involving the rural artisans and

the people. As a result, the generation of employment opportunities and enhancement of efficiency of the labour could be achieved. The interest shown by the ICAR to improve the farm machinery and by the SAIL to extend their market to rural areas, together with the applied research of the AET would be helpful to the programmes or rural development.

The author in this context, suggests active involvement of agricultural technologists.

51 'Utilisation of Animal Energy and Development of Improved Carts', 1981—Naik V.A.P.

The paper reports a set of engineering drawings with material specifications of the 3 basic designs of the three improved carts for the benefit of the manufacturers. They are 'K, Y and M' carts. K—Kisan Cart, a general purpose rural cart with 2 - tonne capacity for a pair of medium-size animals.

Y - Yatra Cart, a special purpose semi-urban cart with 10 passengers capacity for a pair & medium to large size animals. M-Malnad Cart, a general purpose hill area, mountain cart for a pair of small size non-descript animals to carry half a tonne load.

52 'Socio - Economic Survey on Bullock Cart'—Bhaskaran P.

The agricultural development in India over the plan period has resulted in the growth of production to meet the demand of the growing population. The bullock cart as means of rural transport and the bullock as basic draught power have not received the necessary attention of the planners. Since large scale mechanisation of agricultural activities in Indian agriculture is neither feasible nor desirable due predominance of small size and fragmented land holdings, large unemployment of rural population and

scarcity of the energy resources, the bullock and the bullock cart are bound to continue for a long period.

The understanding of the socio-economic aspects of this transport system and power resource would be helpful to strengthen the system with appropriate measures. Such an effort to document the significant role of the cart in rural traffic, the pattern of its ownership and usage and related aspects is made in this study.

Methodology : 150 Districts covering several rural areas in 7 Southern States 2 union territories have been stratified into homogeneous groups on the basis of a composite prosperity index (CPI). Each District is assigned a specific number of strata in proportion to its population. A random sample of households from the selected villages provided the information on animal cart ownership, usage and traffic. The survey has a coverage of 44 percent of the country's rural inhabitants as in 1978.

Findings : The description of various types of carts in use in different regions are documented.

The traditional cart dominates in the rural areas. Three fourths of the total distance covered by the cart in rural areas consists movement of 31 percent over field tracks, 46 percent over kacha surfaces and only 23 percent over pucca roads. Intra-village movement dominates in the total traffic and it accounts for 80 percent of the total tonnage carried.

The load capacity of the carts varies widely over different regions. Only one percent of the carts improved. The cost of the traditional cart and improved carts in use are studied.

The need of improving the present bullock cart arises mainly for the following reasons : 1) It is the main transport means suitable for rural roads. 2) At present it has many technical deficiencies and it is feasible to device two

to three models for different purposes and 3) the movement of large quantities of foodgrains to consumption centres and to the focal transport points necessitates an economical means of transport.

53 'A Review of the Fertilisers Supply & Demand Situation in South India', 1977—Warriar R.N.

The paper proposes a method to find out the supply and demand position of fertilisers in South India. The constraints in forecasting demand and supply of fertilisers are 1) uncertainties in imports with regard to quantum and time as well as to type. (2) Levels of indigenous fertilise production. (3) availability of fertilisers and transport bottle-necks and (4) consumption prediction.

For operational purposes, the author contends that a reasonably accurate forecast of supply and demand can be developed with the information from local sources, viz., competitive dealers, field officials and agricultural development agencies for the supply position and the post consumption survey, survey of farmers' practices with reference to cultivated area, crop pattern and fertiliser application rate etc., for demand position.

The paper takes the supply and demand situation for the period 1975-76 to 1977-78 and presents the projected consumption figure district-wise for Southern States.

VI Supporting Services

54 'Marketing Strategies for Foodgrains in the Eighties of this Country'—Ratnam N.V.

The paper makes an analysis of the past strategies for storing, handling and processing of foodgrains in terms of the objectives and priorities as laid down from time to time in the government food policy. Present day marketing strategies of foodgrains are then analysed in the light of

projected production and utilisation of foodgrains hypothesised for the eighties of this country.

**55 'Impact of Area Under High Yielding Variety on Marketable Surplus of Paddy in West Godavari District : Agricultural Situation in India', 1975
—Gopalaswamy T.P. and Ramachandra N.V.**

The authors report a sample study on the land holding of 80 farmers in the year 1968–69. Information on the marketable surplus of Paddy and the area under local and high yielding varieties in these farms collected.

A stratified three-stage sampling design has been employed to collect the necessary data.

It is found that the marketable surplus of paddy is high, if the yield rate of paddy is high. The authors conclude that marketable surplus could be increased under high yielding varieties as shown by the inter-relationship of the varieties.

**56 'Allocative Efficiency of Market Mechanism Under Control : A Case of Foodgrains Marketing', 1976
—Gopalaswamy T.P. and Ratnam N.V.**

The paper analyses the implication of the policy of controls imposed (varying from time to time) on foodgrains marketing during the first two decades in terms of the allocative efficiency in the foodgrains distribution.

The longterm solution to the foodgrains problem clearly lies in increasing production to keep pace with the increasing population in India. The analysis has indicated that the present controls on foodgrains distribution policy has resulted in certain rural urban imbalances.

The rice consuming States, it is the urban consumer rather than the rural consumer who has benefited from the controls. The production of crops like jowar, bajra, ragi and maize is dependent on rainfall. The highly fluctuating production of these grains, mostly consumed by the rural

poor, will be affected in the deficit situation. The inequitable distribution policy of the Government has resulted in the irrational price behaviour with respect to surplus/deficits of rice in the rural areas in the context of overall surplus of rice availability.

The paper suggests the procurement of millet in surplus years and distribution of it in rural areas. The welfare objective of changing the pattern of income distribution indirectly could be achieved by changing the relative prices of particular commodities, according to the author.

**57 'Co - operatives, Yes, but for Whom ?'-
Kurukshetra, 1978—Ratnam N.V.**

The paper explains the origin of the co-operative movement in India and the subsequent developments. The analysis of co-operatives brings out their benefits, the role of political forces in making them institutions which serves vested interests and organisational deficiencies.

The author calls for some rethinking on the structure and organisation of co-operatives to revive the true co-operative spirit in the rural areas and to make co-operatives an effective instrument of social change and development. He makes a few suggestions in this connection.

**58 'Credit and Relative Economic Efficiency', 1979
Ramadoss N. and Nagadevara V.**

The paper examines the relative economic efficiency of three categories of farmers—marginal, small and large with respect to the credit availability for their agricultural operations. The paper used a reduced form of a model containing the assumed production function. The independent variables are: 1. land holding 2. value of fertiliser 3. value of contract labour and 4. availing of credit as a

dummy variable and the value of crops produced (minus the variable costs) as a dependent variable.

The paper concludes that the relative economic efficiency of the small and marginal farmers will substantially increase with the availability of credit to these classes. This shows the need of providing credit to these groups on priority basis.

59 'Management and Organisation for Social Development Programme in Rural Areas', 1978—Ratnam N.V. and Bhaskara Rao B.

The social development programme of applied nutrition has been taken by the authors to highlight the management and organisation role in such programmes.

The paper says that the extent of social acceptance and willingness of the people to participate in the programme are the major factors for the success of the programme. The authors feel that a wide-ranging programme of this type which does not have proper institutional base and people's support, is bound to misdeliver the benefits and runs the risk of becoming irrelevant in the long run.

60 'Management of Social Development in the Rural Areas', 1979—Ratnam N.V. and Bhaskara Rao B.

A balanced development of both basic sources and human resources is important for sustained economic growth and equitable distribution, since economic development as an objective to be achieved comes with the optimisation of resources use and human resources. The diverse programmes attempted under the C. D. movement have required dissimilar management process in past. In the absence of such institutions an inefficient and superficial implementation of programmes has taken place under C.D. In a system context, agricultural development and social development have to be integrated at different levels. Peoples participa-

tion, an important ingredient of the social development programmes. is also missing.

The authors report that so far no study has been made to help effectively integrate the social development programmes at the district level and to link them with agricultural development. The study suggests an appropriate organisation model based on the procedures for planning and implementation of the social development programmes, keeping in view the integration of the social development programmes with the agricultural development administration and the district administration at large.

Selecting Dharmapuri, a backward DPAP District in Tamil Nadu, the study first evaluates the programme planning and implementation of these social development programmes and identifies the organisational and planning problems. Intensive discussions with both social beneficiaries and the official in the selected programme villages. critical appraisal of the social development programme, case studies relevant to the management process at village, block, district and state levels form the material for the study.

A comparison of the per capita investment and the level of amenities created so far in the taluks does not indicate any investment based on the deficiencies in the level of amenities and services. Achievement of financial targets under various social programmes has dominated the plan implementation.

The indepth study of the programmes in the three blocks—Palacode, Schoolagiri and Thalli which stand at different levels of social development. reveals that excessive bureaucratisation has defeated the spirit of the programmes. The mobilisation of local resources and community participation in decision making for rural development are set at naught.

The existing organisational and personnel management for social development administration neither delegates authority to the personnel in the rural development department nor demands any accountability from them. The alienation of the important village officials, the village patwari and the village munsiff is not desirable.

The study suggests that the persistent and widening development disparities between the settlements of different sizes be narrowed down through social development process, shift from low norms to high norms and from high norms to the goal norms while taking care of the imbalances of development at different levels for the strategy of planning for social development.

The basic unit area, consisting of a cluster of villages based on 1. geographic or physical area 2. population threshold for social infrastructure at minimum level and 3. the viability of the core social infrastructure, is bound to be ideal for implementation of the social development programmes.

A three tier frame-work for the management of the social development programmes, consisting of 1. an autonomous district development society at the district level to enunciate policy, to channelise grants in aid and to perform audit and financing functions 2. a panchayat union at the block level to plan and control with adequate technical support 3. a rural panchayat on the lines of the basic unit area are suggested to identify the basic tasks for inclusion in the plans, to mobilise resources and to implement the tasks included in the block plan for social development.

61 'A Study of Socio-Economic Status of Artisans and Institutions Support for Development, Gudibande Block, Kolar, Karnataka', 1979—Warriar R.N.

This study brings out the problems of the artisan community of Gudibande Block, Kolar District, Karnataka, where

85 percent of the population depend on agriculture. One third of the population are either unemployed or under-employed. The artisans are mostly illiterate with low skill in crafts, engaging themselves in farming and allied activities. Only 38 percent of the artisans are occupied for more than 300 days a year Skill requirement is relatively low, traditional and inherited. The product and production pattern being oriented to local consumption, production for stocking to meet future requirements is neither warranted nor feasible at the present.

Rural industry and artisan development schemes under RIP, RAP, IRDP and DPAP operating in the block have made only marginal impact on the artisans.

The needs of the artisans identified by the study are :
1) remunerative employment on long term basis 2) liberalised credit plans to improve skills through training and improved implements and 3) preference for their products in Government Offices and Agencies.

The following recommendations are made to improve the lot of the artisans :

1. Establishment of co-operatives for entrepreneurs and artisans at panchayat and block levels to render the service of purchase, stocking and sales of finished products.
2. Organisation of training schemes on the model of the All India Handicrafts Board's massive Gurukula Training Schemes.
3. Strengthening of development activities to help artisans under the purview of the B.D.O. and ultimately start a Block Industries Centre in each Block.

62—68 'Block Development Plan for Full Employment State, 1978 : Seven Blocks in Karnataka'.

The seven block planning reports prepared by six faculty members have the common objective of developing a programme which can provide short term employment after taking stock of resources, viz., land, labour, etc., and the infrastructure facilities and the extent of unemployment in each region.

The use of block level planning as an integrated part of the overall planning process to achieve the objective of rural development is advocated by the planning commission. In this context, the studies report the nature and extent of unemployment and the type of programmes to be undertaken to enhance the employment opportunities in these blocks.

Dry farming, seasonal unemployment and lack of diversified economic pursuits are the common features in all the blocks under study.

The exploitation of groundwater resources, strengthening of infrastructure and the implementing machinery and selection of programmes that utilise local resources and are labour intensive are the basic recommendations for generating full employment.

These studies have taken note of the extent of seasonal unemployment of the small and marginal farmers and landless labourers and worked out the programmes that diversify agricultural activities.

69 'People's Participation in Development Programmes and Eradication of Rural Poverty—Towards a New Strategy', 1980—Bhaskaran P.

The paper reviews the past efforts to eradicate rural poverty through the implementation of various development programmes and creation of different institutions to attend to different facets of the problems in India. The performance

evaluation of these programmes reveals that the objective of eradication of rural poverty has not been achieved to the desired level. A number of Government Programmes have been haphazardly drawn up and executed without the active participation of the people.

The author argues that this approach has alienated the people who should benefit from the programmes. The identification of beneficiaries among a large number of people has itself become a formidable problem in many States. The author advocates that the active participation of people as a pre-requisite for the success of these programmes could be sought through a new strategy as outlined in the paper.

Organisation of community seminars, open workshops, training programmes and skill learning sessions in villages as a part of the strategy would be helpful to identify the local problems and priorities in the programmes to eradicate poverty.

The component of people's participation in the community development programmes has dwindled in successive plan periods as pointed out by a number of studies. The present argument has relevance for the success of the rural development programmes.

**70 'An Overview of Rural Development in Retrospect: Towards an Alternate Model', 1982
—Narasimhan C.L.**

Integrated rural development, the latest concept in Indian planning, is meant to transform life in the village as a whole and not just one segment of it. Concerted efforts are being made through various developmental programmes, some of which are area specific which others aim at benefitting a special target group. Assessing the status of rural development, the paper identifies (1) the composition of Indian populace (settled and ancient populations) (2) the

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unfavourable land - to - man ratio, (3) the wide prevalence of poverty and (4) the absence of political will in India, as the main factors hampering economic growth.

The author reviews the rural development in a framework of five indices of development, viz., (1) irrigation, mining and farming of water resources (2) capital in farming, particularly animal drawn implements and farming technology (3) rural population characteristics, rural-to-urban migration in particular, (4) sociological patterns of growth, such as motivation skill, infrastructure necessary for rural development and (5) identification of features unique to rural societies in India, in order to determine the possibilities for the growth of autonomous and self-reliant villages.

An image of a rural civilisation under the impetus of an autonomous and self-reliant ideology consisting of six essential features are postulated in the paper. The features are (1) dominance of small "urban" town (2) local resource use to meet the needs of the communities in each region (3) homogenous, inward-looking and autarchic rather than cosmopolitan societies (4) emergence of rural industries for developing rural societies on the basis of co-operation rather than competition (5) self-reliance in both physical and social infrastructure and (6) a society benefited by the elements of culture for organisation of the social life of the village.

71 'A Full Employment Model of a Regional Economy of India with an Empirical Analysis of Bangalore District', 1979—Dhar Ranjit, Rao M. R. and Srinivasan V.

The paper presents theoretical model to maximise employment in different sectors (various sectors covering the economy) : A linear programming model under constraints : (1) capacity, (2) inter industry demands, industry demands, (3) consumption, (4) domestic and foreign imports and (5) investment etc., has been formulated for a regional economy of India.

Thirteen sectors and 20 time periods are taken for the model. The population and workforce figures are projected for the next 20 years. The results for the Bangalore District show the possibility of achieving full employment in a 13-year period to cover a workforce of 19.5 lakhs.

The authors mention the need for refining the model with more data. It can be hoped that these models would be helpful for the district planning exercises.

72 'Food Strategies for Developing Countries', 1981 —Roy Shymal.

The production oriented food strategy is incompatible with achieving both production growth and equitable distribution. As a result of this policy, small farms and the rainfed agriculture have been grossly neglected. The distribution system has failed to ensure steady supply of food to the Vulnerable Sections of the Rural Population.

The author observes that the food strategy should aim at the following :

1. accelerated growth and improved pattern of production to ensure that all groups of farms on both irrigated and unirrigated areas can participate in the process
2. alleviation of rural poverty by way of special programmes and policies, in addition to increased crop production, and
3. development, mainly as an interim measure, of short-term intervention programmes so that the pressing problems of hunger and malnutrition are attended to immediately.

The existing strategy of agricultural development mainly aims to (1) accelerate growth in food production to reduce dependence on imports and (b) to increase food production to meet the needs of industry and exports. This approach, according to the author, is inconsistent with the rural development programmes presently taken up in the plans. Under the new strategy, the author suggests that the projected demand will have to explicitly take into account the increase due to change in the distribution of income and definite resource allocation has to be made to various sector

activities to improve rainfed agriculture, small farm development and alleviation of rural poverty, etc.

As an interim measure to provide food to the large number of rural poor, the author lays stress on the production of nutritious food for local consumption in backward areas and a food distribution plan linked with development programmes in rural areas. The use of food distribution for infrastructure and asset creation serves both developmental and nutritional needs of the rural people, the paper observes.

73 'Coconut Oil Situations in India : Analysis of Trends and Prospects'—Roy Shymal.

The paper examines the demand and supply situation of coconut oil in India with a view to suggest realistic policies on imports and domestic supplies.

The consumption pattern of coconut oil in 1977 was : 16 percent for industrial purposes, 38 percent for cooking and 46 percent for non-edible household consumption. A sharp increase in coconut oil prices has resulted inspite of the substitutes due to the stagnation of coconut production. The paper observes that coconut supply should increase to 7,120.8 million nuts by 1990 from the estimated base of 5,830 million nuts in 1980 to meet the complete demand in India. The technical factors contributing to the low yields of coconut production are 1) root-with disease 2) inadequate water 3) poor management 4) bad seedlings and 5) extension of area to marginal lands. Even the extension activities on coconut plantations have deteriorated in quality due to lack of competent people to handle the seedlings of improved varieties. The production of coconuts has become less profitable in India as indicated by the movement of farm harvest prices for coconuts in Kerala over a decade.

The following measures are suggested to arrest this in supply of coconut production in the next decade: (1) Rehabilitation tendency of root-wilt affected areas (2) varietal improvement (3) optimum fertiliser use and scientific cultural management and (4) strengthening of extension efforts.

Since there is implied demand increase of 2.2 percent per annum, the author concludes that the imports from Philippines under a trade agreement will not adequately affect the domestic market price in view of the past experience. Suitable plan measures with regard to the quantity and timing of imports are desirable. A reasonable support price may be extended to the producers to remove any fears created due to import policy.

BIBLIOGRAPHY**I Agrarian Reforms**

1. Narendra Pani, Reforms to Pre-empt Change—Land Legislation in Karnataka, 1981.
2. Nagadevara V., Tenancy and Relative Economic Efficiency, Agricultural Situation in India, Feb. 1975.

II Resource Management**a) Land Resources**

3. Ratnam N.V. and Das P., Management of Rural Development : A Study on Organisational Structure for Management of Drought Prone Areas Programme, 1976, Government of India, Ministry of Agriculture and Irrigation, New Delhi.
4. Ratnam N.V., Methodology for Watershed Management : A study on the Identification of Watersheds and Planning for Agricultural Development in Rural Areas. 1980, Government of India, Ministry of Agriculture, New Delhi.
5. Ratnam N.V., District Planning and Management of DPAP in Dharmapuri District, A study of evaluation of V Plan Achievement and Agricultural Development Planning for VI Plan in the District, 1978, Government of India, Ministry of Agriculture, New Delhi.
6. Ratnam N.V., An Approach to Land Use Management, Land use Management Seminar, IIM—Ahmedabad, June, 1979.
7. Ratnam N.V., Management Aspects of Land Use with Special Reference to Disaster Preparedness in Agriculture, Workshop on Disaster Preparedness and Land Use

Board, Ministry of Agriculture and Co-operation, Govt. of India, New Delhi, May 1981.

8. Ratnam N.V., Soil Census for Agricultural Planning and Land Use Management, Symposium on Land Use Potentials of Karnataka State, University of Agricultural Sciences, Bangalore, Feb. 1981.
9. Ratnam N.V., Management of Rural Development : An Integrated Approach to Resource Constraints and Human problems, Working Group Paper on Integrated Rural Development, Ministry of Rural Reconstruction, Government of India, 1978.

b) Water Resources

10. Balaraman V.T.D. and Nagadevara V. Ed., Net Works for Upper Krishna Project, 7 Volumes, Karnataka State Council for Science and Technology, Bangalore, 1978.
11. Warriar R.N., Sundar A. and Rao P.S., Organisation for Narmada Control Authority, 1981.
12. Sundar A. and Rao P.S., Ed., Farmers' Organisation for Efficient Water Use in Irrigated Agriculture : Workshop Report, IIM-B and the Ford Foundation, New Delhi, Aug. 1980.
13. Sundar A, Nagadevara V. and Balaraman V. T. D., Command Area : Use of Network Techniques and Related Problems, Seminar on Optimum Utilisation of Water for Irrigation and Water Management, K. R. Sagar, Mysore, Vol. 1, Sept. 1977.
14. Sundar A., Efficiency in Water Use Through Control of Uncertainties, Seminar on Optimum Utilisation of Water for Irrigation and Water Management, K.R. Sagar, Mysore, Vol. 1, Sept. 1977.

15. Sundar A. and Balaraman V.T.D., Information Systems for Controlling Environmental Impacts During Implementation and Operation of Irrigation Projects, Seminar on Environmental Activities and Adoption of Suitable Guidelines for Project Control, Hyderabad, Dec. 1977.
16. Sundar A., Water Resources Planning and Management, National Seminar on Resources Engineering and Technology, Bombay, 1977.
17. Sundar A., When Water is Scarce, Lift and Sprinkle, National Seminar on Groundwater and Lift Irrigation, Rourkela, Jan. 1978.
18. Sundar A., Materials Management for Economic and Efficient Implementation of Projects, Indian Journal of Power and River Valley Development, Calcutta, Sept. 1978.
19. Sundar A., Optimal Expansion of Existing Urban Water Supply System, Institution of Engineers (India) Calcutta, Vol. 59, Oct. 1978.
20. Sundar A., Irrigation Project Evaluation Deficiencies and Suggested Remedies, International Symposium on Resource Engineering and Technology, IIT, Bombay, Jan. 1979.
21. Sundar A., Organisation Structure for Better Management of Irrigation Systems, Workshop on Management of Water Resources for Agriculture in the Bhavani River Basin, Tamil Nadu Agricultural University, April 1979.
22. Sundar A., Systems Management of Water for Industry, Journal of the Institution of Engineers (India), Vol. 59, May 1979.

23. Govindarajan P., Nagadevara V. and Sundar A., **Economical Investment Lining Project, Agricultural Engg. Today, Indian Society of Agricultural Engineers, Vol. 2, Nov., Dec. 1978.**
 24. Elumalai G. and Sundar A., **Performance Evaluation of Irrigation Project, International Symposium on Resource Engineering and Technology, IIT, Bombay, Jan. 1979.**
 25. Ramanathan A. and Sundar A., **Evaluation of Pumped Storage Schemes, International Symposium on Resources Engineering and Technology, IIT, Bombay, Jan. 1979.**
 26. Elumalai G., Balaraman V.T.D. and Sundar A., **Current Estimation Practice : A Hindrance to Network Usage in Irrigation Projects, Indian Journal of power and River Valley Development, Calcutta, March 1979.**
 27. Elumalai G. and Sundar A., **Network-Based Contracts for Effective Project Implementation, All India Seminar on Construction Management, Madurai, March 1979.**
 28. Krishnakumar T., Shivaramu S. and Sundar A., **Water Resources Projects as Instruments for Socio-Economic Justice, Seminar on Water Management for Food Production, IIM-B & Institution of Engineers, Bangalore, Nov. 1979.**
 29. Rao P.S. and Sundar A., **Farmers' Participation in Water Distribution and Maintenance of Minor Irrigation Tanks, Workshop on Irrigation Management with Special Reference to the Problems of Water Distribution and Delivery at the Chak Level, Gandhian Institute of Studies, Varanasi, July 1981.**
 30. Sundar A. and Rao P.S., **Farmers' Participation in Tank Irrigation Management in Karnataka, Workshop on**
-

- Modernisation of Tank Irrigation, Problems and Issues, P. A. University of Technology, Madras, Feb. 1982.
31. Sundar A. and Rao P.S. ed., Bibliography on Synthetic Generation of Streamflows, IIM-B, Jan. 1982.
 32. Sundar A. and Rao P.S. ed., Bibliography on Precipitation and Streamflow Networks, IIM-B, Oct. 1981.
 33. Sundar A. and Rao P.S. ed., Bibliography on Floods, IIM-B, August 1981.
 34. Sundar A. and Rao P.S., Farmers' Organisation for Efficient Water Use in Irrigated Agriculture : An Overview, Workshop on Farmers Organisations for Effecient Water Use in Irrigated Agriculture, IIM-B, August 1980.
 35. Govindarajan P., Nagadevara V. and Sundar A., Efficient Conjunctive Use of Canal and Tank Systems, Journal of the Institution of Engineers (India), Vol. 60, Nov. 1979.
 36. Rao P.S., Systems Approach to Water Management for Efficient Irrigation, State Level Seminar on Water Use and Management for CADA Officers, Mysore, April 1980.
 37. Bhaskaran, Emergence of Farmers' Organisation : A Survey, Workshop on Farmers' Organisation for Efficient Water Use in Irrigated Agriculture, IIM-B, August 1980.
 38. Roy Shyamal, The Sixth Plan Irrigation Development Programmes : Their Techno-Economic Implications and Some Suggested Readings, WAMANA, Vol. 1, No. 2, April 1981.

39. Roy Shyamal, Murthy R. and Seethamma K. K., Choice of Technology in Irrigation Construction : Some Issues, WAMANA, Vol. 2, No. 1, Jan. 1982.
40. Nagadevara V., Integrated Rural Development – Upper Krishna Experience, Seminar on IRD, NCTC, Madras, Feb. 1980.

III Crop Production

41. Ratnam N.V., Rao M.R. and Viswanadham Y.K., Land Use Pattern and Agricultural Policy – A Macro Level Approach to Resource Management in a Developing Economy, Indian Council of Agricultural Research, New Delhi, 1979.
42. Viswanadham Y.K., Diversification in Agriculture : An Empirical Study, IIM-B, March 1982.
43. Rao M.R. and Ratnam N.V., A Linear Programming Approach to Agricultural Land Use Policy in India.
44. Nagadevara V., Risk Management in Agriculture, Seminar on Management for Risk - Bearings in Agriculture and Agro-Based Industries, Indian Institute of Socio-Economic Studies, Bangalore, Sept. 1976.
45. Nagadevara V., A Methodology for Assessing the Economic Feasibility of Adoption of Technology at Farm Level : Some Conceptual Issues, Symposium on Economic Problems in Transfer of New Technology, LARI, New delhi, July 1978.

IV Animal Husbandry

46. Gopaldaswamy T.P. and Radhakrishnan V., Feasibility of Animal Husbandry Development in Dharmapuri District, Government of India, Ministry of Agriculture, New Delhi, 1978.

47. Ratnam N.V. and Gopaldaswamy T.P., Management of Dairy Development Project Under the IDA-Assisted DPAR in Bijapur, A Diagnostic Study, Government of India, New Delhi, 1977.
48. Shivaramu S., A Market Study on Sheep Products : Ranebennur Taluk, Dharwar District, IIM-B, 1981.
49. Trivedi K.R. and Nagadevara V., A Systems Approach to Feed, Forage and Livestock Planning, Seminar on Forage Production at Anand, Jan. 1980.

V Fisheries

50. Ratnam N.V. ed., FA/SIDA Workshop on Fishery Development Planning Project Preparation and Administration, Vol. 1, Background Papers and Vol. 3, Group Report on Project Management.

VI Forestry

51. Shiva V, Sharatchandra H. C., and Bandopadhyay, Socio-Economic and Ecological Impact of Social Forestry in Kolar, IIM-B, 1981.

VII Inputs

52. Naik V.A.P., Need for Intensifying Research and Development on Agricultural Equipments Required for Small Farmers, AMRITA, Nov. 1979.
53. Naik V.A.P., Improved Inserts for Country Type Bullock Carts, Annual Convention of the Indian Society of Agricultural Engineers, IIT, Kharagpur, Dec. 1978.
54. Naik V.A.P., Agricultural Engineering Technology for Integrated Rural Development, The Role of Steel in Farm and Rural Home, Annual Convention of the Indian Society of Agricultural Engineers, Dec. 1978.

55. Naik V.A.P., *Utilisation of Animal Energy and Development of Improved Carts*, Seminar at the Institution of Engineers (India), Karnataka Centre, Bangalore, Nov. 1981.
56. Bhaskaran P., *Socio-Economic Survey on Bullock-Cart, The Animal Cart in the Rural System, Part-1, The Analytical Report*, Ministry of Shipping and Transport, New Delhi.
57. Warriar R.N., *A Review of the Fertiliser - Supply and Demand Situation in South India*, FAI-SR, Training Programme for Sales Representatives, Bangalore, Oct. 1977.

VIII Supporting Services

58. Ratnam N.V., *Marketing Strategies for Food Grains in the Eighties of this Century*, Symposium on the Strategies for Storage, Handling and Processing of Food Grains in the Present Day Context, Bangalore, Sept. 1976.
 59. Gopaldaswamy T.P. and Ramachandra N.V., *Impact of Area Under High Yielding Variety on Marketable Surplus of Paddy in West Godavari District*, Agricultural Situation in India, 1975.
 60. Gopaldaswamy T.P. and Ratnam N.V., *Allocative Efficiency of Market Mechanism Under Control : A Case of Food Grains Marketing*, IIM-B, 1975.
 61. Ratnam N. V., *Comparatives : Yes, but whom ?* Kurukshetra, 28, 1, Oct. 1978.
 62. Ratnam N.V., *In Search of Concept and Strategy*, Kurukshetra, Oct. 1980.
 63. Viswanadham Y.K., *Awareness of Dry Farming Technology*, Kurukshetra, Sept. 1977.
-

64. Ramadoss N. and Nagadevara V., *Credit and Relative Economic Efficiency, Farm Finance*, Vol. 5, No. 10, Jan. 1979.

IX Social Development

65. Ratnam N.V. and Bhaskara Rao B., *Management and Organisation for Social Development Programme in Rural Areas*, National Seminar on Applied Nutrition Programme, NIRD, Hyderabad, Aug. 1978.
66. Ratnam N.V. and Bhaskara Rao B., *Management of Social Development in the Rural Areas*, United National Childrens Fund, Geneva, 1979.
67. Warriar R.N., *A Study of Socio-Economic Status of Artisans and Institutional Support for Development*, Gudibande Block, Kolar, Karnataka, Govt. of India, New Delhi, 1979.
68. Apte P.G., *Block Development Plan for Full Employment*, Karnataka State, Sringeri Block, Chickkamagalur District, Govt. of Karnataka, 1978.
69. Dhar Ranjit, *Block Development Plan for Full Employment*, Karnataka State, Kanakapura Block, Bellary District, Govt. of Karnataka, Bangalore, 1978.
70. Dhar Ranjit, *Block Development Plan for Full Employment*, Karnataka State, Sundur Block, Bellary District, Govt. of Karnataka, Bangalore, 1978.
71. Dhruvarajan P.S., *Block Development Plan for Full Employment*, Karnataka State, Gudibande Taluk, Kolar Dist., Govt. of Karnataka, Bangalore, 1978.
72. Indira Rajaraman, *Block Development Plan for Full Employment*, Karnataka State, Nelamangala Block, Bangalore Dist., Govt. of Karnataka, Bangalore, 1978.

73. Ranganathan V., Block Development Plan for Full Employment, Karnataka State, Kudligi Block, Bellary District, Govt. of Karnataka, Bangalore, 1978.
74. Shivaramu S., Block Development Plan for Full Employment, Karnataka State, Malur Block, Kolar District, Govt. of Karnataka, Bangalore, 1978.
75. Bhaskaran P., People's Participation in Development Programmes and Eradication of Rural Poverty—Towards a New Strategy, Regional Science Seminar, Bangalore, 1980.
76. Narasimhan C.L., An Overview of Rural Development in Retrospect - Towards an Alternate Model, Kurukshetra, 1982.
77. Dhar Ranjit, Rao M.R. and Srinivasan V., A Full Employment Model of Regional Economy of India with an Empirical Analysis of Bangalore Dist., IIM-B, 1979.

X Supply and Demand Studies

78. Roy Shyamal, Wheat Imports - Pros and Cons, The Hindu, Sept. 1, 1981.
 79. Roy Shyamal, Food Strategies for Developing Countries, Kurukshetra, Nov. 1, 1981.
 80. Roy Shyamal, Coconut Oil Situation in India—Analysis of Trends and Prospects, Agricultural Situation in India, May 1982.
-

IDENTIFICATION OF INHIBITING FACTORS IN THE DEVELOPMENT OF AGRICULTURAL LABOURERS' ORGANISATION

This study is an attempt to understand the impact of capital and labour intensive technologies on the socio-economic conditions of the agricultural labourers, in comparison with the traditional technology. The technologies that examined here are HYV paddy and sugar-cane, mulberry and sericulture and traditional ragi growing.

The findings of the study shows that the technological advancement in no way frees labourers from the stranglehold of landlords. The increased demand for the additional labourers by the new technologies do not necessarily bring in higher wages. To meet the required labourers the landlords may resort to heavy lending and form mutual help groups.

The study also shows how the classification of farmers on the basis of landholding is a misleading one. Taking into consideration the cut-off point as suggested by Boothalingam's Committee, the study regroups the farmers on the basis of income into those who are below the poverty line and those who are above it. Such an exercise equates the marginal farmer in a Green Revolution Belt with that of the big farmer employing traditional technology. In the same way, sericulturists with quarter acre of land each can be equated with marginal farmers in Green Revolution Belt.

The study concludes that the modern technologies which are capital and labour intensive are in no way beneficial in breaking the dependency web of agricultural labourers to develop an organisation among agricultural labourers.

ONGOING RESEARCH

1

Title : Land Use Policy – Tamil Nadu (State I) and Karnataka (II)

Project Leader : Ratnam N.V.

Sponsors : Indian Institute of Management, Bangalore

Objectives :

- a) To identify the agro-climatic regions in the Karnataka State.
- b) To study the present cropping pattern and yields in the different agro-climatic region in the state.
- c) To optimise the existing pattern in the region based on the existing farm level technology and yields.
- d) To build up a computer-based data bank for the States in stages, with data on agro-climatic zones and their productivity and attending cost information.

Methodology :

- a) The agro-climatic zones have been identified by demarcating homogeneous soil and rainfall regions in the State.
 - b) The primary data on Farm Management Studies of Department of Agriculture for three years are computerized for generating a Data Bank System.
 - c) The optimisation procedure with production and profitable enterprise as objectives yielded this cropping systems to be promoted in each district. This will be incorporated in the District Plans of the Department of Agriculture.
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Publication :

1. Rathnam N.V. and Rao M.R.
Land as Limiting Resource Option in Agricultural Policy for Optimal Land Use. Proceedings of the Second INPUTS Conference, East-West Centre, Honolulu, May 1978.
2. Rao M.R. and Ratnam N.V.
Linear Programming Approach to Agricultural Land Use Policy in India, W. W. Cooper Memorial Volume, Academic Press, New York.
3. Ratnam N.V., Rao M. R. and Viswanadham Y. K.
Land Use Pattern and Agricultural Policy—A Macro-Level Approach to Resource Management in a Developing Economy, Interim Report Submitted to the ICAR, New Delhi.

Articles Generated :

Ratnam N.V. and Viswanadham Y.K., Crop Planning and Land Use Management in Tamil Nadu (Draft report under finalisation for release).

2

Title : India's Food Import Policy and Management of Food-Grain Supplies.

Project Leader : Roy Shyamal

Sponsors : Indian Institute of Management, Bangalore

Objectives :

The broad objective of the study will be to review Government's food import policy and more specifically to examine :

- a) if the Government's food import combined with stock management policies have been in the right direction.
- b) if the timing of the imports has been correct; and drawing from the above.
- c) if the imports could have been avoided with a better management of the domestic supplies.

Methodology :

The study is based on the secondary data.

3

Title : TRYSEM

Project Leader : Ratnam N.V.

Sponsors : Department of Rural Development, Ministry of Agriculture and Rural Development, Government of India.

Objectives :

The study involves following 3-level analysis of the project, implementation :

- a) **Administrative processes**
-

- b) Identification of beneficiaries and availability of suitable infrastructure
- c) To elicit the opinion of the beneficiaries themselves regarding their attitude and benefits due to TRYSEM on a sample basis.

Methodology :

Study will be confined to 3 Districts of Karnataka State, chosen on a purposive sampling basis representing the most average and least successful District as per the experience of the State Government. A semi-structured questionnaire will be used to collect the data from the beneficiary which are randomly selected.

Articles Generated :

Ratnam N.V., Strategy for Vocationalising Education in Rural Areas, Prepared for the National Seminar on Development of Training Infrastructure for IRD/TRYSEM, Vigyan Bhavan, 18-19 December 1981, Organized by Ministry of Rural Reconstruction, Government of India.

Title : Karnataka Tank Irrigation : Farmers' Organisation.

Project Leaders : Sundar A. and Rao P.S.

Sponsors : Irrigation Department, Government of Karnataka.

Objectives :

The central objective of the study is to determine the options for appropriate institutional and organisational arrangements including water users' organisation for effective tank irrigation performance. Will include public policy consideration and will have production and equity components. To attain this objective the following components of irrigation management would be examined in depth :

1. Water distribution within the tank command ;
2. Maintenance of the distribution system ;
3. Management of water related conflicts, and
4. Resource mobilisation.

Methodology :

Survey method and interviews with key informants have been utilised to assess the potentials for organising farmers and select the most feasible option.

Articles Generated :

1. Farmers' Participation in Water Distribution and Maintenance of Minor Irrigation Tanks, Presented at the Workshop on Irrigation Management with Special Reference to the Problems of Water Distribution and Delivery at the Chak (outlet) Level, Organised by Gandhian Institute of Studies, Rajghat, Varanasi, July 27-31, 1981.
-

2. Farmers' Participation in Tank Irrigation Management in Karnataka, Presented at the Workshop on Modernisation of Tank Irrigation—Problems and Issues, Organised by the Centre for Water Resources, PAUT, Madras, Feb. 10-12, 1982.

5

Title : ARDC—Evaluation of Dugwell Scheme in Bangalore District.

Project Leaders : Gopalaswamy T. P. and Nagadevara V.

Sponsors : Agricultural Refinance & Development Corporation, Bombay.

Objectives :

1. To analyse the increase in the number of Dugwells during the last decade in Bangalore District with reference to the ground water potential and also classify them as per source of finance.
2. To study the time-lag in well loans and suggest remedial measures for reducing the time-lag.
3. To estimate the incremental income, output and employment due to the investments in wells at Micro and Macro levels.
4. To analyse the benefit-cost relationship and to suggest a rationalised repayment pattern.

5. To estimate the coverage of small farmer under ARDC's scheme for irrigation wells, and
6. To estimate the future scope for irrigation wells in Bangalore District with the investment requirements.

Methodology :

Three completed schemes and three ongoing schemes of ARDE have been identified for the study. In each one of these schemes, the beneficiaries will be classified as small, medium and large farmers. With regard to the completed schemes, 108 farmers will be studied and with regard to the ongoing schemes, 54 farmers will be studied. A structured questionnaire will be administered to the selected farmers for eliciting the data apart from collecting data at the village level. A few schemes will be selected for in-depth case studies. The data thus collected will be analysed to meet the objectives.

TRANSPORT

MAHESH CHAND & S. VAIDYANATHAN

There is a dearth of research in the field of transportation whether it is road, rail, water, air or any other mode of transport. Despite this fact, a major part of the work done in India relates to road transport and railways. However, studies related to management, planning, policy and economic aspects of rail and road transport are limited.

The Centre for Transportation Studies (CTS) at the Indian Institute of Management, Bangalore, has conducted research on various aspects of transport management. The major field of the research work of CTS* is in the area of road transport and air transport.

The studies relating to these topics of the research can be identified as :

- Network Analysis
- Urban Transport Planning
- Corporate Planning
- Safety
- Rural Transport
- Distribution & Logistics
- Traffic Management
- Transport Economics – Feasibility Studies, Forecasting and Cost-Benefit Analysis.

The members of CTS are now working on other vital topics of transport sectors, like rural road planning and economic feasibility studies.

*The work done by CTS is given in the form of a Matrix. (App. A)

The following sections provide a brief review of the work carried out at CTS.

Network Analysis

Regarding this field of research the paper by Anantharamaiah and Kaujalgi deals with some pitfalls that the planner has to watch out for while designing the transportation system. The authors have shown certain strange results which may occur in transportation networks without the planner being aware of them.

Urban Transport Planning

There are three papers dealing with the models of urban transport planning. Anantharamaiah in his paper "Urban Transport Planning Models" deals with the methodology and mathematical models that can be adopted for obtaining long term solutions to traffic problems by integrating land use and transport plans. He has reviewed a number of urban planning models including land use, trip generation, trip distribution, model split and traffic assignment models. Non-availability of the required data has been pointed out as a limitation affecting transportation planning in India for evaluating the performance as also hindering the development of planning models. The author has suggested long term projection for meeting overall objectives and within this framework, short-term projections of five years for preparation of operational plans. The accuracy of the forecasts and efficiency of the models can then be checked by undertaking monitoring of the traffic parameters at the end of the five years period.

Another paper by Anantharamaiah, "Traffic Assignment Model for Mixed Traffic Consisting of Slow and Fast Vehicles", investigates the traffic assignment problem for mixed traffic flow. The criterion used in the assignment is that all drivers will optimise their costs such that no particular driver can change his route to reduce his particular travel cost as

determined by the cost function applicable to him. The author assumes two cost functions—one increasing and one fixed, for each link of the network. He investigates the properties of the equilibrium situation for traffic flow and proposes an algorithm to conduct such a traffic assignment.

The third study on models of urban transport is by Anantharamaih and Kaujalgi, "Transportation Models and Computer Requirement". The authors propose a negative incremental algorithm to solve the traffic assignment problem wherein every driver optimises his individual travel time. The authors have also made a brief review of digital computers in India and discussed the suitability of such computers to solve the algorithm keeping in view the core requirement. They have pointed out that there must be matching between the sophistication of the algorithm, type of computing device available and the accuracy of the data. They have also suggested that the bigger sized networks on a particular computer can be handled with a secondary storage device.

Corporate Planning

A number of papers in the area of corporate planning and policy are by Subramaniam. The interesting one on "Corporate Planning in Domestic Airlines - An Indian Case Study" by Subramaniam and Sharma, where the authors consider the problems of planning in the airline industry, drawing specifically on experience in the domestic Indian Airlines.

The paper seeks to examine some of the strategic issues relevant to domestic airlines which, while related here to the Indian environment, may be seen to be pertinent to most developing countries.

In a different paper on "Planning Problems of State Road Transport Undertakings", Subramaniam draws attention to the planning problems of public road transport undertakings. The problems discussed are nationalisation of private operations, consolidation and expansion, traffic

and route surveys and scheduling aspects. The author concludes that finally what matters is what the passenger gets and not what the undertaking plans. He also stresses the importance of operational planning to meet the needs of the passengers as the basis of corporate planning of state transport undertakings.

Subramaniam and Mahesh Chand in a paper on "Planning and Administration of Motor Transport in India" have brought out that planning of motor transport in India is still carried out in bits and pieces, and that legislation is more regulatory in nature than conducive to development. The paper also gives a summary of important committee reports on motor transport. Another useful paper in the area of planning is on "Engineering Manpower Planning in an Airline" by Subramaniam. The objective of this paper is to discuss the long term planning for engineering manpower resources in an airline.

Safety

The rate of accidents in India is quite high when compared with developed countries, despite a low level of per capita vehicle availability. This high rate of accidents can be partly attributed to environmental conditions like, quality of roads etc. There is no need to emphasise that accidents can be reduced considerably by adopting proper management and engineering methods. In fact, safety in transport is one of the important areas of research.

Anantharamiah in his paper discussed a number of methods to reduce the rate of accidents. He has identified the factors causing traffic accidents. Some of the factors are :

- Nature of Roads
 - Nature of Road Net-Work
 - Number of Vehicles in Circulation
 - Nature of Road Users
 - Light Tools and Degree of Enforcement
-

- Human Factors
- Physical Factors
- Effect of Alcohol and Drugs
- Weather.

The author has discussed a number of measures to reduce accidents by considering the engineering, education, enforcement, environment and economical aspects.

Pillai, in his paper, "Organisation Structure for Traffic Enforcement" deals with that area which falls within the jurisdiction of traffic enforcement for reducing accidents. He has listed the causes of accidents which include dearth of trained traffic personnel to man traffic enforcement effectively. He has suggested an organisational structure for traffic enforcement. He has also stressed that traffic regulation and enforcement should go hand in hand and should be within the purview of specially trained police officers. He has also suggested a training programme for the police officers.

Public Transport System

Public road transport undertakings occupy an important place in the sphere of passenger transport. A number of papers have been written on public road transport undertakings in India. The topics covered are productivity, systems efficiency, cost of operation, taxation, pricing, planning and control.

Anantharamaiah argues in his paper that productivity should be viewed in terms of efficiency of operation and also in terms of the level of passenger service. The author suggests that peak hour and non-peak hour traffic flow problems can be solved by proper scheduling of buses. The author suggests proper training of the decision-makers in transport planning techniques. In addition to considering such operational factors as fleet utilisation, fuel consumption per km, revenue collection per km, passenger service factors such as average delay, average cost etc. should also

considered while evaluating transport performance. The author has said that the efficiency of the bus transportation system is measured by the extent to which the transportation objectives are met. The objectives are :

- Minimisation of Travel Time
- Minimisation of Travel Cost
- Increase in System Safety
- Increase in System Reliability
- Improvement of Accessibility
- Minimisation of Air and Noise Pollution
- Development of the Desired Land Use Arrangement.

Anantharamaiah and Kaujalgi, in their article, "Profile of Transport Organisations in India" have proposed a standard format in which all the transport organisations in India can maintain their data for easier comparison of inter-transport organisation.

A typical transport undertaking has been described in terms of the following :

- | | |
|----------------------|-----------------------|
| 1. Organisation | 6. Traffic Activities |
| 2. Fleet | 7. Capitals |
| 3. Cost of Operation | 8. Operations |
| 4. Working Results | 9. Quality of Service |
| 5. Staff | 10. Assets |

The data for the profile has been directly filled from the annual administrative report supplied by various organisations.

Ramaswamy and Shivaramu have carried out three micro studies each for road transport, air freight and shipyard. The main objective of these three micro studies was to examine the performance of individual units in a given environment. These studies identified the goals of the units both in respect of the efficiency of their operation as well as their effectiveness and analysed the environment under which the individual enterprises were operating (whether the environment was conducive to its efficient

operation or otherwise), evaluated the performance in quantitative terms, assessed the extent of trade off among different objectives and explained the divergence between the observed performance and the feasible performance. The performance was analysed through (i) intra-firm comparison (trend analysis) (ii) inter-firm comparison (iii) intra-industry comparison and (iv) inter-national comparison.

The study in the field of air-transport analysed the working of Indian Airlines. Taking a system view of Indian Airlines, the analysis was carried out in respect of (i) environment, (ii) internal management and (iii) external effectiveness measures. The environmental analysis included a historical development of Indian Airlines, operational goals and corporate objectives, and the external constraints under which the airlines was operating. In the section on internal management analysis, different functional areas of management were covered. The financial management analysis focussed the attention on the mounting deficits. Operations management covered fleet composition, aircraft utilisation, load factor, operating characteristics, commercial activities, etc. The study also analysed in depth the materials management, personnel management and organisational design. The study ended with a cost-benefit analysis of Indian Airlines which showed the ratio of cost-benefit approximately equal to one with a little improvement over the past years.

Like Indian Airlines, the working of Maharashtra State Road Transport Corporation, Bombay was also analysed. The study concluded that (i) accessibility to the village has increased, (ii) contribution to the general exchequer has been substantial, (iii) benefit cost ratio has been positive despite losses and (iv) benefit cost ratio has declined from 1.62 to 1.30 in the last ten years. The study brought out that the organisational structure is centralised and labour productivity is declining in spite of increase in load factor. However, the liquidity of the undertaking was found to be high.

The third study was carried out for shipyard and all the three studies were submitted to the International Development Research Council.

Shivaramu, in a paper presented at IAMI Conference, Pune, analysed the system efficiency and financial efficiency of State Road Transport Corporations. The author has analysed efficiency through supply parameters of transport facilities and reliability through operational efficiency. The author has linked operational efficiency with financial efficiency and has discussed the cost-alignment principle in pricing policy.

Mahesh Chand has written a number of papers on different topics related to public road transport undertakings. Some of the topics covered are taxation, pricing, cost efficiency, and problems of urban transport.

The paper "Problems of Urban Transport" attempts to explore some of the problems specific of urban transport system. The analysis is confined to public road transport system. He has discussed several problems including accidents, heterogeneous mix of traffic, low utilisation of vehicles, high fuel consumption, frequent breakdowns, low profitability, high peak demand and other problems like congestion on roads, environmental distortions, inaccessibility to narrow streets, limited space for parking, harm to property during agitations, unions' unproductive and wasteful practices, changing land use patterns etc. This paper has brought out many issues. This may be of great help to planners of urban areas on improving transport service and taking many strategic decisions like pricing, cost control, capital investment, etc.

The paper, "MIS for Road Transport Undertakings" emphasises the vital need for MIS in road transport undertakings.

The paper, "Cost Efficiency of Public Road Transport Undertakings" makes an attempt to analyse the cost structure,

factors affecting costs, cost road efficiencies and inefficiencies of public transport undertakings in India.

The paper "Impact of Taxation on Public Transport" studies the system of motor transport taxation in the context of public road transport undertakings. Issues like multiplicity of taxes, lack of uniformity in the rate of taxation, high incidence of taxation have been examined and their impact on financial performance of public road transport undertakings has been studied in this paper. The author has said that poor roads coupled with high rate of taxation are affecting financial performance of public road transport undertakings adversely. Mahesh Chand's paper, "Current Issues in Public Transport Management" evaluates the pros and cons of transport nationalisation and the constraints of public transport management. The author has emphasised that nationalisation of road transport should be given a strong momentum to complete the process of nationalisation.

In the paper "Traffic Projections for Karnataka SRTC" Mahesh Chand has worked out projections - number of passengers, passenger kms, vehicle kms and fleet size for KSRTC. The forecasting was preceded by construction of five growth models and then based on forecast error analysis selection of the best model. Using the model, the number of passengers and through this other traffic projections were made. The projections were made upto 2001.

Mahesh Chand in "Fare Policy for Public Road Transport Undertakings" emphasises the urgent need of laying down explicit and clear-cut corporate fare policies and objectives, modernisation of the fare structure, collection of managerial data required for these purposes and standardisation of fare level, fare structure and amount and type of subsidies to be given.

"A Comparative Study of Public and Institutional Transport in Bangalore City" by Mahesh Chand and Ramanayya studies the institutional and the public bus transport systems

in Bangalore City. The study includes the motivation of the employers in providing transport facilities, the cost pattern of these services and a comparative analysis of the operating performance of the BTS and Institutional transport. The study also discusses broad details of integration and expected problems of integration of the BTS and institutional transport''.

The paper "Energy Consideration in Transport" by Subramaniam and Pradyumna, deals with methods of allocation of traffic to various modes to minimise energy consumption and to reduce the import bill.

"Automobiles and Air Pollution" by Subramaniam and Srinivasan studies various factors leading to air pollution by automobiles, their ill-effects and various ways of controlling to reduce emissions. The paper also discusses the legislation in India on air pollution, the number of standards evolved by Indian Standards Institution, and the interface between automobile manufacturers, gasoline refineries and the age of vehicles and road transport authorities in the reduction of emissions from automobiles. They have suggested setting up of emission standards for different types of vehicles at the national level as well as the state level.

Rural Transport

In the area of rural transport, IIM has conducted research work. The work of Ramaswamy is on bullock-cart. The author has highlighted the vital role the bullock-carts are playing in the agricultural sector of the economy. By analysing the techno-economic aspects of carts and applying many modern management and engineering techniques a number of improved bullock-carts have been designed. These designs are expected to meet specific requirements, such as animal size, freight nature and density and terrain conditions.

Para-transit Systems

Para-transit modes in Indian cities occupy an important place. On para-transit three studies have been made by Mahesh Chand.

“Para-transit in Indian Cities” Mahesh Chand attempts to study some of the aspects of the para-transit modes. The objectives of this paper are to identify and study the characteristics of para-transit modes, analyse and study various issues like organisational set-up, policy and planning, impact on employment, co-ordination and competition, cost of services and to develop modes to estimate the demand for para-transit systems.

The supply and demand aspects of autorickshaws in metropolitan city of Bangalore has been discussed in the article “Autorickshaw Transport System in the Metropolitan City of Bangalore” by Mahesh Chand. The author has developed a model to estimate the present shortage (or excess) of autorickshaws in Bangalore. He indicates that the present supply of autorickshaw just meets the overall demand by the peak-hour demand and regional fluctuations still remaining unsatisfied.

In the area of water transport and international shipping the CTS has done only a limited work. “Demand for World Shipping Service” by Mahesh Chand studies various dimensions of world shipping demand.

Rail Transport

In the area of rail transport, Jayaram and Srinivasan have analysed the behavioural aspects of the users of rail transport.

Distribution and Logistics

Distribution and Logistics constitute one of the important topics in marketing management, which is related to transportation. Subramaniam in his paper on “Logistics and

Distribution for Rural Marketing'' has highlighted the importance of rural transport in fostering agricultural development. Infact, there is a lot of scope for research in the area of freight transport, which has been neglected in the past.

''On International Trade and Transportation'' by Mahesh Chand brings out the importance of transportation as an input to international trade and the need for pooling of widely varying measures and technologies available with each country, so as to develop a network of transportation to foster trade. The author has pointed out the limitation to the political status and foreign policies of the government and the geographical location of the country.

Subramaniam was awarded a consultancy project on the establishment of distribution and advisory services to plan and programme the development of air freight both inbound and outbound. The study was primarily to set up cargo distribution advisory services for Air India. This was meant to market better the cargo space in both passenger and freighter air services of Air India. This study practically demonstrated the broad concept of the distribution of total cost analysis for converting the incoming sea freight into air freight. This was demonstrated with reference to BHEL in Bangalore, the State Trading Corporation in Delhi and the Handicrafts Export Development Corporation. Based on the recomendations, Air India has established separate Cargo Marketing and Distribution Advisory Services for promoting air cargo transport. The corporation has also accepted the cost analysis and the methodology based on the concept of the distribution of the total cost for converting and claiming potential sea cargo for freighting by air.

The article ''Materials Planning and Provisioning in an Airline'' bySub ramaniam deals with better materials planning and effective inventory control of high value and fast moving items in an airline industry.

Traffic Management

The traffic stream on Indian roads is heterogeneous. It has both fast moving and slow moving vehicles. The static and dynamic characteristics of each group of vehicles vary to a great extent from those of others. At present, there is hardly any literature for the purpose of determining the carrying capacity of a road under conditions of mixed traffic.

Ramanayya has developed a computer simulation model to gather data on speed, flow, density and maximum and minimum speeds of individual types of vehicles for different percentage combinations of each type in the traffic stream at different volume levels. The author has examined a number of linear relationships between different streams. In all cases, the author found a greater proportion of slow-moving vehicles influencing the traffic variables. He has also noted that slow moving vehicles in the stream remain reciprocally unaffected by the changes in the composition and volume of the total. The author concludes that the level of road service extracted by different units in the stream varies with the traffic.

Transport Economics

In the area of transport economics, CTS has worked on cost-benefit analysis and economic feasibility of a transport project. The work carried out for the Bombay Metropolitan Regional Development Authority is essentially on traffic projections and cost-benefit analysis. Pillai, Krishnakumar, Bhaskara Rao and Ramaswamy have developed a computerised Simplified Interface Model for Planning Transport and Development (SIMPTAD). The SIMPTAD model reflects the interface between transport and development. This model is :

- descriptive – expressing a set of relationship at a given point of time

- predictive - projecting a set of relationship by time factor and
- planning-incorporating alternative futures preferred.

The model is a simple in operation, capable of repeated use and applicable to any urban area with minor modifications using only easily available data. It provides information about :

- zone wise trip distribution by purpose considering residential location and mode of travel
- trip distribution by purpose - work and non-work
- trip distribution by mass transport system and
- the link loading on suburban railway network.

Based on the output of SIMPTAD and the social cost-benefit analysis, the authors concluded that :

- the mass transport system will account for nearly 80 percent of the trips in 2001
- the impact of the completion of East-West Corridor and the acceleration in the development of New-Bombay will reduce travel demand on the North-South corridors
- from 1986 to 2001 the bus system would require a public investment of Rs. 1,079 crores where as East-West corridor would require Rs. 753 crores
- internal rate of return for different streams of projections exceeds 12 percent and
- in terms of the incremental internal rate of return/benefit-cost ratio, stream (v) emerges as the most desirable investment.

The study observed the residential areas planned in New Bombay are inadequate for the envisaged population to settle in this sector. A suitable policy of increasing residential area and if necessary, reducing it in T-K complex,

may be considered. A policy of dispersal of economic activity would be desirable to ensure shorter distances to work places and reduce multi-mode trips. The study suggested that a system of traffic operations with a supporting road-based transport structure complementary to the SRS must be part of the overall transport plan for the future.

Pillai and Anantharamaiah also carried out consultancy work for the Bombay Port Trust on social cost-benefit analysis of Nhava Sheva Port Project. The study analysed the effect of shifting certain activities to Nhava Sheva from Bombay Port in terms of :

- population and employment distribution
- cost of transportation
- de-congestion on the road and rail systems in the Greater Bombay area
- improvement in the environment in the Greater Bombay area.

The study intends to arrive at total costs and total benefit to carry out a special cost benefit analysis of the investment in the Nhava Sheva Port.

Pillai and Anantharamaiah were awarded a feasibility study on the traffic projections and the social cost-benefit analysis of a computer railway line in the Nhava Sheva sub-region by the Metropolitan Transport Project (Railways), Bombay. This study presents several alternative railway networks in New Bombay for the traffic demand in 2001 under :

- population and employment distribution
- trip distribution
- loadings on the railway network and
- cost-benefit parameters.

Based on this study, they have recommended the Bandra-Kurla line, Mankhurd-Belapur line and Belapur-

Panvel line and Dharave-Uran line stream as an outstanding choice, and the Bandra-Kurla line, Mankhurd-Belapur line and Dharave-Uran line stream as the most viable alternative projects among the other alternatives.

"An Exercise on Alternatives in Development Plan System and An Abstract of a Basic Plan for Baroda, a Perspective for Growth and Structure" by Bhaskara Rao, deals with the structural plan for the City of Baroda. He has highlighted the importance of traffic generators in the structural plan, which holds the key for the future pattern of development.

An arterial grid system, location of traffic generators and open space system are the main elements in the proposed structural plan suggested in this report.

The paper "Transportation and Development-Environmental Issues" by Bhaskara Rao and Anantharamaiah attempts to study the relationship between two variables namely transportation and development. The effects of transportation and development on the environment of a city are explored. The study also deals with aspects such as the prevailing disparities in the traffic needs and road utilisation, the advantages of mass transportation system and the policies for the improvement of transport environment.

Subramaniam was awarded a study by the National Transport Policy Committee of the Government of India to look into the economic feasibility of short-haul operations. The objective of this study was to examine the existing fleet route structure and the proposed additions to the route structure, if any, with a particular reference to the desirability of running short-haul air services especially to inaccessible regions. The study also aims at assessing the cost structure of the existing operations and routes, the existing demand pattern and potential demand for passenger and freight. He has recommended that in the first instance

short-haul services appear to be viable in the North-East region of India and a separate short-haul airline called Vayuduth can be formed for this purpose.

In the paper "Short-Haul Air Services in India" by Subramaniam, Dhruvarajan and Srinivasan, a model has been developed for forecasting the demand for short-haul air travel with a view to providing a means for evaluating the feasibility of short-haul passenger operations for routes connecting cities suggested by the Third Level Air Services Committee. The model basically is a behavioural econometric model based on price and income variables supplemented by other variable suggested by the generalised gravity model, namely population and distance. The important feature of the model is the incorporation of the value of time of air travellers to improve the measure of travel cost and to increase the predictive power of the model.

Road Planning

The Ministry of Shipping and Transport has awarded a consultancy project to CTS to develop a methodology for rural road planning with an application to Ratnagiri District in Maharashtra. The rationale of selecting the Ratnagiri was that it is a Backward and Hilly District. The project, inter alia, intends to link economic development and road development. The project is under progress and the phase one report has already been submitted.

Cases

There are two cases written on the problems of Indian transport system. Gopalan has written a case related to the materials management in a public road transport undertaking.

Mahesh Chand has written a case on the working of Karnataka State Road Transport Corporation, Bangalore.

Conclusion

The above review gives an idea of the kind of work carried out by the members of CTS at IIM-B. Though, CTS has done research in different fields of transportation, many areas are not covered adequately. CTS has plans to conduct basic research in the fields of :

- Inland water transport
- International Shipping
- Freight transport
- Pipelines
- Rail transport.

REFERENCES

1. Anantharamaiah K.M. and Kaujalgi V.B., "Profile of Some Transport Organisations in India"—Research Project, 1980.
 2. Anantharamaiah K. M. and Kaujalgi V.B., "Some Peculiarities in Transport Network Analysis", Indian Highways, January, 1979.
 3. Anantharamaiah K.M., "Urban Transport Planning Models", Engineering Design, Vol. VIII, Nos. 3 and 4, July, October 1979.
 4. Anantharamaiah K.M., "A Traffic Assignment Model for Mixed Traffic Consisting of Slow and Fast Vehicles", Proceedings of the Seventh International Symposium of Transportation and Traffic Theory, University of Kyoto, Japan, August 1977.
 5. Anantharamaiah K.M., "Traffic Management for Accident Reduction, Seminar on Road Accident and Insurance Claims, IJET, Madras, July 1978.
-

6. Anantharamaiah K.M. and Kaujalgi V.B., "Transportation Models and Computing Requirements", International Conference on Computer Applications in Civil Engineering, October 23-25, University of Rooker.
7. Anantharamaiah K.M., "Productivity in Transport Operations", State Transport News, March 1977.
8. Bhaskara Rao B., "An Exercise on Alternatives in Development Plan Systems".
9. Bhaskara Rao B., and Anantharamaiah K.M., "Transportation and Development-Environmental Issues".
10. Gopalan M.R., "Super Transport Corporation"—A case.
11. Jayaram Y.G. and Srinivasan V., "A Study of the Behavioural Aspects of Rail Transport", Journal of Transport Management, October 1980.
12. Kumar S.P., "Long-Term Planning for Indian Shipping", Long Range Planning, December 1976.
13. Mahesh Chand, "Problems of Urban Transport", Indian Highways, May 1979.
14. Mahesh Chand, "MIS for Road Transport Undertakings", Journal of Transport Management, June, 1979.
15. Mahesh Chand, "On The Cost Efficiency of Public Road Transport Undertakings", Indian Highways, February 1980.
16. Mahesh Chand, "Impact of Taxation on Public Transport", Journal of Transport Management, March 1980.
17. Mahesh Chand, "On Estimation of Transport Demand", Abhipraya, Vol. 1, No. 2, April 1980.
18. Mahesh Chand, "Current Issues in Public Transport Management", Lok Udyog, August 1980.
19. Mahesh Chand, "Traffic Projection for Karnataka SRTC", Journal of Transport Management, September 1980.

20. Mahesh Chand, "Automobile Industry", Commerce, November 1980.
 21. Mahesh Chand, "Planning and Control of Motor Transport" Eastern Economist, Annual Number 1980.
 22. Mahesh Chand, "Para-transit System in Indian Cities", Indian Highways, February 1981.
 23. Mahesh Chand, "Spotlight on Shipping-Big Growth Prospects", Economic Issues, March 15, 1979.
 24. Mahesh Chand and Sridhar Krishna, "On International Trade and Transportation", Presented at the AISEC. India's Second National Seminar, New Delhi, Nov. 14-15, 1978.
 25. Mahesh Chand, "Autorickshaw Transport System in Metropolitan City of Bangalore", Presented at Seminar on Policy and Priorities in Traffic, Transportation and Development in Bangalore City, February 1978.
 26. Mahesh Chand, "Karnataka State Road Transport Corporation-A Case Study".
 27. Mahesh Chand, "Demand for World Shipping Service".
 28. Mahesh Chand, "Fare Policy for Public Road Transport Undertakings", Indian Manager, Vol. XI, No. 2, April, June 1980.
 29. Mahesh Chand, "A Study of Intermediate Public Transport System in Indian Cities", November 1981.
 30. Mahesh Chand and Ramanayya T.V., "A Comparative Study of Public and Institutional Transport in Bangalore, coming in Indian Highways.
 31. Mahesh Chand, "Productivity Analysis of State Road Transport Undertakings", Journal of Transport Management, December 1980.
 32. Mahesh Chand, "Problems of Urban Transport", Indian Highways, May 1980.
 33. Pillai K.S.(ed), "Transport Planning and Management".
-

34. Pillai K.S., "Organisational Structure to Traffic Enforcement".
35. Pillai K. S., Anantharamaiah K. M., Ranjit Dhar, Ramanayya T. V. and Bhaskaran P., "District Level Planning of Rural Roads in Ratnagiri District" (Maharashtra), Phase I Report, Mimeographed, Indian Institute of Management, Bangalore, 1981.
36. Pillai K. S., and Anantharamaiah K. M., "Social Cost-Benefit Analysis of Nhava Sheva Port Project—Interim Report", Mimeographed, Indian Institute of Management, Bangalore, 1981.
37. Pillai K. S., Anantharamaiah K. M., Krishnakumar T., Bhaskara Rao B. and Ramaswamy N. S., "Travel Demand and Social Benefit Cost Analysis—East-West Railway Corridor in BMR", Mimeographed, Indian Institute of Management, Bangalore, 1981.
38. Pillai K.S. and Anantharamaiah K.M., "Travel Demand Projections and SCBA of Proposed Railway Commuter Lines in Bombay", Mimeographed, Indian Institute of Management, Bangalore, 1981.
39. Ramaswamy N. S., "Redesign of Bullock-Cart for Improved Utilisation—An JE Approach", Industrial Engineering Journal, October 1980.
40. Ramaswamy N.S., "The Modernisation of the Bullock-Cart System and the Management of Annual Energy Resources", Background papers to an address delivered, IIM-B, January 1979.
41. Ramaswamy N. S., "The Bullock-Cart".
42. Ramaswamy N. S., and Shivaramu S., "Performance of Public Enterprises in Asia", Vol. 3. (Multi Lateral Corporation Comparison Cases on Shipyard), Project Draft Report, January 1977.
43. Ramanayya T.V., "Analysis of Mixed Traffic Stream Parameters, 1981.

44. Shivaramu S., "State Road Transport Corporation in India—System Efficiency to Financial Efficiency", IAMI Conference, June 1979.
 45. Shivaramu S., "A System Study on Indian Airlines—A Draft Report, March 1977.
 46. Shivaramu S., "A Systems Study on Maharashtra State Road Transport Corporation—Draft Report", January 1977.
 47. Subramaniam S. and Sharma C.K. "Corporate Planning in Domestic Airlines: An Indian Case Study", Long Range Planning, August 1975.
 48. Subramaniam S., "Planning Problems of State Road Transport Undertakings", Long Range Planning, April 1976.
 49. Subramaniam S., "Engineering Man-Power Planning in an Airline", Long Range Planning, August 1977.
 50. Subramaniam S. and Mahesh Chand "Planning and Administration of Motor Transport in India", Indian Journal of Public Administration in India, January-March 1980.
 51. Subramaniam S. and Mathur S. K., "Mass Transportation Criteria for Cities in Developing Countries—A Case Study of Hyderabad", Abhipraya, Vol. 1, No. 3, December 1980.
 52. Subramaniam S., "Logistics and Distribution for Rural Marketing".
 53. Subramaniam S., "Economic Evaluation of Operating Short Haul Air Services".
 54. Subramaniam S., "Materials Planning and Provisions in an Airline", International Journal of Physical Distribution and Materials Management, Vol. 8, No. 8, December 1979.
-

55. Subramaniam S., P.S. Dhruvarajan and Srinivasan R., "Demand Forecasting for Short Haul Air Services in India, Paper presented to International Conference on Operations Research in Indian Transportation, Nov. 1980.
 56. Subramaniam S. and Pradyumna, "Energy Consideration in Transport", Paper Presented to International Conference on Operations Research in Indian Transportation, Nov. 1980.
 57. Subramaniam S. and Srinivasan R., "Automobile and Air Pollution", Indian Highways, December 1979.
 58. Subramaniam S., "Cargo Distribution and Advisory Services for Air India".
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RESEARCH AND CONSULTANCY WORK OF CTS AT IIM-B

Field	Mode			**
	Road	Air	Railway	
Network Analysis	2			
Urban Transport Planning	3, 4, 6			
Corporate Planning	50, 48	47, 49		12
Safety	5, 34			
Public Transport System	1, 13-19, 28, 30, 31	45	11, 37, 38	36, 42
System Efficiency	1, 7, 44, 46, 56	45, 48		42
Productivity	7			
Cost of Operation	15			
Taxation	16			
Pricing, Planning & Control		54		
Problems of Urban Transport	13, 32, 57			
MIS	14			
Behavioural			11	
Rural Transport	39, 40, 41			
Para-Transit	22, 25, 29			
Distribution & Logistics	52, 24	58		
Traffic Management	43			
Transport Economics				
- Feasibility Study		53		
- Forecasting	8, 9	55	37, 38	
- Cost-Benefit Analysis			37, 38	36
Rural Road Planning	35			

** Inland water transport, pipelines, roadways, etc.
The number in the blocks represent the serial numbers given in the references.

ENERGY MANAGEMENT

NARENDRA PANI

Research on energy can be classified broadly into two categories. First, we have studies which accept the current emphasis on the different sources of energy and raise issues pertaining to the functioning of such energy systems. This classification would include, for instance, studies on hydel and thermal power generation. Second, we have studies which are based on evolving alternative sources of energy. By this, we imply not only the relatively new sources of energy such as solar energy or bio-gas but also traditional sources which are not currently in use, such as animal energy.

From the point of view of energy management, further subdivision of these two areas of research is useful. It might be appropriate to classify studies in the two areas, according to their emphasis, into those which concentrate on the existing patterns of production and consumption of energy and those studies where the emphasis is on policies to change the existing patterns of production and consumption of energy. Thus we can speak of four separate categories into which energy studies would fall : (i) Study of existing patterns of production and consumption of currently emphasised sources of energy (ii) Studies seeking policies to change the existing pattern of production and consumption of currently emphasised sources of energy (iii) Study of existing patterns of consumption and distribution of new or currently unemphasised sources of energy (iv) Studies

evolving policies to change the pattern of production and consumption of alternative sources of energy.

This classification also indicates that they are highly inter-related. A study of alternative sources of energy implies atleast an implicit critique of the currently emphasised sources of energy. Again, suggestions on alternative production and consumption patterns are based on an equally implicit critique of the existing pattern. Thereby the inter-actions between these classifications are as important as the studies within each group. This brings us to the fifth category in energy research—those studies which emphasise the advantages of one or the other source or form of management of energy. For lack of a better term, we can refer to such work as theoretical studies.

The following essay analyses the research done on the energy question at IIM-B in each of the five categories. Studies which seem to cut across more than one category are classified based on what we believe is the major emphasis of each study.

I Production and Consumption Patterns in Currently Emphasised Sources of Energy

This field accounts for a very large part of the research on energy done at IIM-B. In this, coal industry undoubtedly gets the greatest attention. In a report entitled "Technical Change in India's Coal Mining Industry", Naganna seeks to analyse technical change from the basic premise that the choice of techniques is a techno-economic choice in a particular social setting. However, the study itself concentrates on techno-economic relationships rather than the social setting. Two major objectives of the study are : i) To bring out the structure, trend and extent of technical change in the coal mining industry. ii) To estimate the impact of such change on the unit costs of extraction,

productivity, labour input requirements and the material input coefficients. The study is based on data collected from 22 coal mines in five different coalfields with an annual total output of a little over three million tonnes, forming about five per cent of the All India Coal Output in 1965.

The important finding of the study is that there has been a 20 percent saving in unit cost in the coal industry as a result of mechanisation. This saving partially affected employment as there has been replacement of labour due to mechanisation. To that extent the technology is moving away from the norm of appropriate technology. Thus there is a growth in productivity without growth in employment. This productivity increase, however, does not imply that now the choice of techniques is necessarily the most efficient. It merely indicates that the present levels are higher than the past. For instance, open cast mining is yet to reach significant levels, though productivity is higher.

In a related study Naganna has looked into the planning and management aspects of the coal industry. The basic purpose of this study is to make general observations on the technical laws governing the behaviour of the input/cost structure in the coal industry. Based on the same data as in the previous study, Naganna concludes that there are different scale effects in different individual material input / output coefficients. Regarding inputs there are diseconomies of scale while the capital inputs are faced with economies of scale.

In a third study, Naganna sets for himself two objectives. First to bring out the characteristic features of the material inputs consumption in an extractive industry like coal and second, to examine the stability/variability of the annual rate of material consumption over different operating units. Here too, the data base is virtually the same as the preceding works. The main conclusion is that

the materials bill per tonne does not vary much. More over the materials cost in pithead costs also does not vary significantly. However, he finds large variations in individual material input coefficients over the mines. While the composition of the annual rate of materials consumption changes widely over the mines, the absolute levels of total consumption do not vary as significantly. The high cost bearing mines have lower proportions of material cost in their respective pithead costs. He finally points out that the age is "the catchy all variable in the coal industry". The age of the mine affects all kinds of structural variation.

An obvious shortcoming of the three studies is the age of the data. Collected in the year 1964-65, the data is today nearly two decades old and the relevance of these studies is bound to be affected by this fact. What is, perhaps, a major difficulty is that these studies tend to restrict themselves to the techno-economic factors though the social setting is equally important. As a result of this concentration on techno-economic factors, many important questions relating to the coal industry today are left unanswered. For instance, the question of nationalisation of the coal industry has hardly been referred to, though this has been one of the most significant factors in the history of the industry since independence. Though we get a technical picture of the coal industry as it existed in 1964-65, we know little or nothing about the past, present or future role of this industry in Indian economic development.

Another work on the coal industry is the system study by Shivaramu S. This study relates to Coal India, a holding company set up in 1971 by the Government of India. The two conclusions of this analysis are that there has been an annual growth rate of 12 percent in output since the Government takeover and that losses suffered by the company have been due to the increasing labour cost. The

study, however seems to severely lack comprehensiveness because of the absence of sufficient data.

A more comprehensive systems analysis has been done of the Gujarat Oil Refinery by Shivaramu and Naganna. In this analysis, several aspects of the company have been studied. The authors find no conflict between the goals and objectives of the company. They find that the company has internalised national objectives to a large extent. Moreover, the production structure has been organised on scientific lines to meet the objectives of the company. A fairly high level of security is ensured in the production operations. The company prefers import substitution as a matter of policy. The liquidity position of the company is also fairly sound as reflected in the total debts position which was found to be low. The stock position was satisfactory in some respects and unsatisfactory in other respects. The study also calculates the social benefit cost ratio which works out at 1.92 in 1973-74. This is a decline from 2.72 in 1971-72. The decline is the result of taking the market price of crude oil into account, which has, as is common knowledge, risen abnormally.

In another paper "Energy Demand Forecast for the Southern Region", Ranganathan and Subba Rao seek to arrive at some conclusions regarding the future power position in South India. The paper begins with two fundamental premises.

Firstly, due to power cuts from 1971-72, actual demand is an underestimate of the ideal demand. Secondly, all power surveys have overestimated load demand. Further analysis leads the authors to conclude that the actual growth in energy consumption would be much less than projected by the tenth APS. And if the present accelerated programme materialises, the Southern Region can expect to have a surplus of 800 MU by 1983-84. Even if the tenth Annual

Power Survey demand projection materialises, this would lead to a marginal deficit of only 1,000 Million Units. Finally the authors' projections estimate that the present schemes would generate surplus of 1700 MU even in 1988-89 with no further additions contemplated. This rosy picture is based on the fact that demand for power will not grow as fast as expected. These expectations will be realised only if industrialisation does not pick up a very rapid pace. This leads us to a paradoxical situation which has not quite been emphasised by the authors—if there is large scale industrialisation, power will be a constraint on industrial growth but if we have no industrialisation at all, power will obviously cease to be a constraint. In other words, the surplus power could be the result of a lack of industrialisation. When viewed in this perspective, the surplus power picture does seem to be a lot less reassuring than the paper makes it out to be.

In another paper Ranganathan raises some policy issues in rural electrification. He contends that rural electrification becomes economically viable when we look upon costs and benefits to society as a whole. He further states, that there is, in fact, no need to invoke social objectives. This latter contention does seem to benefit the society as a whole and we are in essence, invoking the social objectives.

Based on published material and village studies, Subba Rao, Narayana and Jayaprakash have prepared a note on some salient features of the energy picture in India. The focus here is also on the power situation in India. The authors list several reasons for the under-exploitation of hydro-power resources. First, the capital intensity of hydro-power projects envisages large financial resources. Such financial constraints, therefore, restrict the use of hydro-power resources. Second, these projects involve long gestation periods of upto 8 and 10 years. Further,

unsettled inter-state water disputes ensure that a large part of hydel resources is left unutilised. Fourth, the underutilisation is the result of the uneven distribution of hydro-power resources. Potential for hydro-power exists in regions which have small power demands and/or have no finances for meeting the demands of other states. Finally, thermal power plants have been set up to meet short-term demands in hydro-rich regions limiting the utilisation of hydroresources.

The note summarises the findings of a BHEL study of the cases of underutilisation of thermal plants and suggests several remedies including use of pump storage schemes. Further the utilisation of thermal plants can improve if there is indigenous design, manufacture and replacement of components. The note also suggests improving the quality of coal and the availability of fuels in general. Lastly, it emphasises the role of the human factor in the utilisation of thermal resources.

In another paper Ganesan P. V. raises several aspects of the management of maintenance inventory in a power system. The focus here is on two models. The first is to be used to identify those materials over which a close management control is necessary. The second model is for the control of inventory of maintenance spare parts.

II Studies on Policy in Currently Emphasised Sources of Energy

Work in this section has been done mostly by NSS Arokiaswamy. Various aspects of the State Electricity Board and power planning have been covered in a series of articles. His suggestions based on years of experience enumerate several measures to improve the functioning of the power systems. The suggestions range from asking for realistic planning under prevailing conditions to the use of

management techniques in power management. While the suggestions may have a great deal of relevance, it is difficult to critically evaluate their validity. Most of the studies are written in a journalistic style and do not specifically build up a case for any of the suggestions mentioned. Though this represents a great volume of work, its relevance cannot go unquestioned.

A methodologically tighter study by Indira Rajaraman and Subba Rao S. attempts to estimate the costs of providing electrical connections to rural households. The study attempts to estimate the minimum cost at which electrical connections can be provided to those households that are at present excluded from the rural electrification programme. The study is based on a survey of 22 sample villages comprising 2200 households of which 368 had electrical connections already. It is therefore a study of 1359 potential beneficiaries. The estimated cost was Rs. 297 per structure, if it is to be provided with only one light point and one plug outlet. This figure was arrived at on the basis of 1978 prices. Inflation in each succeeding year will tend to push these prices up and correspondingly diminish the relevance of this work.

III Studies on the Production and Consumption of Alternative Sources of Energy

In the efforts towards evolving alternative sources of energy at IIM-B the focus has been on animal power. In a report on Draught Animal Power prepared by N. S. Ramaswamy for the FAO, data has been collected for purposes of comparison from several countries. The major recommendation of this report is that immediate operative action must be taken by way of international assistance for the development of animal energy. It also recommends conducting socio-economic studies to identify problems and formulate policies and action. Moreover, the study

recommends expenditure on Research and Development for design improvements, testing, adaptation, etc., for better utilisation of animal energy.

Another study which has received significant attention is "Social and Ecological Impact of Social Forestry in Kolar" by Vandana Shiva, Sharatchandra H. C. and Bandyopadhyay J. It sets out to assess the Social Forestry Programme in Kolar and is based on a sample survey of 34 villages in Bagepalli, Bangarpet, Kolar and Malur Taluks of Kolar District. The major finding of the study is that the main focus of the social forestry programme has been on planting eucalyptus which is hardly used as firewood. This has several social and ecological impacts. First, eucalyptus provides the inputs for large industries. Second, the granting of free samples of eucalyptus has led to farmers preferring eucalyptus to ragi cultivation. Thus there is potential for a decline in ragi output. Since eucalyptus is less labour intensive than ragi cultivation, this has to lead to a decrease in the demand for agricultural labour. Ecologically, the growth of eucalyptus affects soil building adversely.

Though the study does seem to arrive at interesting conclusions, it is not comprehensive. Consequently, it is open to question on several grounds. Firstly, the benefits of eucalyptus cultivation to small farmers have not been studied vis-a-vis the large, especially when the small farmers owning less than 5 acres account for 67 percent of the landholding households studied. If a small farmer who has been at subsistence level for decades is getting large monetary gains, is it possible or even desirable to stop this process? This question has not even been posed by the study. Secondly, the possibility of providing alternative benefits for the landless labour has not even been considered. When landless labourers account for just 9 percent of the total sample, must one rule out the possibility of providing them with

alternative employment, even if we do not want to demand land redistribution? Thirdly, a decline in ragi production alone is not sufficient cause in itself to believe that there will be a shortfall in its production. If the small farmers who benefit from eucalyptus also switch to rice, the demand for ragi would also fall. There is, therefore, a need to analyse ragi price in addition to the analysis of output. Finally, the possibility of meeting such shortfall as may exist, by increasing the production of irrigated ragi, has not been considered.

Another attempt is currently being made by Vyasulu V. and Bhagwan M. R. to study the energy crisis in relation to the masses. The objective of the study is to identify social relations in the production and distribution of energy and its implication for development policy. This objective is sought to be achieved by a series of case studies in Karnataka.

IV Studies Relating to Policies for Alternative Energy Sources

The major work in this field at IIMB is N. S. Ramaswamy's "The Management of Animal Energy Resources and Modernisation of the Bullock-Cart System". The study begins with identifying the deficiencies, the uneconomic nature of operations and the damage to roads. Despite these deficiencies, there is no real alternative to the bullock-cart. It identifies three major reasons. First, the mechanisation of rural transport is unlikely for a very long time. Second, such mechanisation could adversely affect the employment of carpenters, blacksmiths and others. Third, the bullock-cart does not use any fuel. The bullock lives almost entirely on farm produce.

It further identifies the inefficiencies of the conventional bullock-cart and suggests corrections. The first

inefficiency noticed is lack of proper balance which has two effects. First, the animal has to take a load even when the cart is not in motion and second, the animal's legs have to move up and down in addition to forward and backward. The optimal balance must ensure that the animal only pulls the load and does not carry it. The second inefficiency of the conventional bullock cart arises from the crude bearings used. This leads to a retardation in speed and reduces the load bearing capacity. A third difficulty is that the animal itself has to act as a braking mechanism. This entails very great wear and tear on the animal. Fourth, the use of unsuitable material in the cart frame ensures that the weight is heavy. Finally, the iron rings of the wheels cause road damage. The main thrust of the alternative bullock-cart is, therefore, to remove these five faults.

The renewed interest in animal energy is testimony to the freshness of this approach. Despite its freshness, the study is not without its limitations. The approach is essentially technocratic and little is known of the social and economic impact of such a bullock-cart modernisation programme. Is the modernised bullock-cart within the reach of most bullock-cart owners in India today? Is the bullock-cart a commonly owned commodity or is it restricted to certain sections of the population? These questions are to be answered.

V Studies on Theoretical Issues

This is by far the weakest sector in the research on energy at IIM-B. More attempts are required to explicitly question the existing priorities in utilising energy sources so as to suggest a comprehensive alternative. While specific sources of energy have been studied, little or no emphasis has been laid on the inter-relationships between various sources of energy. The only work done in this regard is a bibliography consisting of 1,015

articles, reports and books by Chidambara Iyer from sources in Delhi, Calcutta, Dhanbad and Madras.

In conclusion, it can be said that the research on energy management at IIM-B covers a very wide range. The diversity is both in terms of the topics researched as well as in terms of methodological strength.

BIBLIOGRAPHY

I Naganna N.

- 1) **Materials Planning at the Corporate Level: The Case of Coal Mining Industry with a Demonstration Exercise, 1978.**
- 2) **Coal Resources: Planning and Management—A Behavioural Approach, 1979.**
- 3) **Technical Change in India's Coal Mining Industry: Structure, Trend, Impact and Extent, 1979.**

II Subba Rao S. and Naganna N.

Perspective for Coal Demand in the Southern Region: 1990, IIM-B Workshop on Energy, Association of Indian Engineering Industry, Bangalore, March 24, 1979 Also pub. in URJA, Vol. 6, 1979.

III Vandana Shiva, Sharatchandra H. C. and Bandyopadhyay J.

Social, Economic and Ecological Impact of Social Forestry in Kolar, 1981.

Sponsored Project Reports*IV Shivaramu S. and Naganna N.*

A System Study on Gujarat Oil Refinery : Draft Report, Sponsored by International Development Research Centre, Ottawa, Canada, April 1977,

V Ramaswamy N. S.

The Management of Animal Energy Resources and the Modernisation of the Bullock-Cart System, Department of Science & Technology, Government of India, 2nd ed., March 1979.

VI Subba Rao S.

Seminar on Power and Energy Management Material, held at KEB Auditorium, March 29, 1976.

VII Arokiaswamy, N. S. S.

- 1) Power Engineers Handbook, Tamil Nadu Electricity Board Engineers Association, Madras, 1976.
- 2) Scope of Power Development in Tamil Nadu, Swarajya, April 1976.
- 3) Power Needs and Development in Tamil Nadu over the Decades, Swarajya, April 1976.
- 4) Management of Operation and Control of Power Generation, Engineering Times, October 1977.
- 5) Execution & Monitoring of Power Projects : Some Practical Aspects, URJA, Vol. III, No. 2, January 1978.
- 6) Functioning of State Electricity Boards, URJA, Vol. III, No. 5, May 1978.

- 7) Power Production Targets for Sixth Plan—Prospects and Challenges, *Engineering Times*, July 1978.
 - 8) Techno-Economic Aspects in Meeting Long Range Power Needs of Karnataka, *URJA*, Vol. IV, No. 2, July 1978.
 - 9) Management of Energy for Rural Development : Energy Management, Vol. II, No. 3, July–Sept. 1978.
 - 10) Power Scene in India : *URJA*, Vol 5, No. 1, January 1979.
 - 11) Why Chronic Power Crisis in the Country ? *URJA*, June 1979.
 - 12) Heading for an Energy Crisis in Villages, *URJA*, December 1979.
 - 13) Energy Alternatives for the Rural Poor, *Cable and Conductor News*, Sept. 1979.
 - 14) Energy Problems and Policies for India : Energy Management, Vol. 3, No. 4, Oct.—Dec. 1979.
 - 15) Financial Ailments of Power Boards, *URJA*, Vol. 7, No. 4, Jan. 1980.
 - 16) Energy for the Rural Poor, *CAPITAL*, 18 Aug. 1980.
 - 17) Ecology and Hydel Power Development, *URJA*, Vol. 8, Oct. 1980.
 - 18) Planning and Management of Commercial Energy Resources, *Journal of Southern India*, Chamber of Commerce and Industry, Madras, Nov. 1980.
 - 19) Gearing-up Thermal Plants, *CAPITAL*, Annual 1980.
-

- 20) Management of Hydel Power Resources : Energy Management, Vol. 5, No. 1, Jan.—March 1981.

VIII Indira Rajaraman and Subba Rao S.

Costs of Providing Electric Connections to Rural Households. URJA, April 1978.

IX Naganna N. and Subba Rao S.

Perspectives for Coal Demand in the Southern Region, Workshop on Energy, Association of Indian Engineering Industry, Bangalore, March 1979.

X Ramaswamy N. S.

Redesign of Bullock-Cart for Improved Utilisation : An Industrial Engineering Approach, Industrial Engineering Journal, Vol. 6, No. 1, January 1977.

XI Ranganathan V.

Policy Issues in Rural Electrification, URJA, Vol. 4, No. 8, October 28, 1978.

Articles Published in Newspapers

XII Arokiaswamy N. S. S.

- 1) Subsidised Power for Rural Development : D.H., December 16, 1977.
- 2) Need for Thermal Plant in Karnataka : D.H., Sept. 5, 1978.
- 3) Ushering in the Solar Bio and Wind Energies : D.H., August 6, 1978.
- 4) Managing Power Shortage : D.H., Oct. 22, 1980.
- 5) Electricity for Rural Poor : D.H., Jan. 3, 1979.
- 6) Heading for an Energy Crisis in Villages : D.H., August 9, 1979.
- 7) Karnataka Must also Tap Smaller Hydro-Resources : D.H., Sept. 18, 1979.

- 8) Can Karnataka Produce Enough Power :
D.H., Dec. 13, 1979.
- 9) Decentralised Energy Sources :
D.H., Oct. 7, 1980.
- 10) Revamping Power Boards :
Times of India, November 6 & 7, 1980.

XIII Ramaswamy N. S.

- 1) Animals—Ill-treated and Ignored Sources of Energy : E. T., March 14, 1979.
- 2) An Ignored Source of Energy :
F. E., March 16, 1979.

Conference Papers

XIV Arokiaswamy N. S. S.

- 1) Some Aspects of Organisation in State Electricity Boards, All India Apex Seminar on Management of Power Systems, New Delhi, 18-19 Feb. 1977, Sponsored by the Institution of Engineers (India).
 - 2) Perspective Planning for Power Generation, Workshop on Planning and Operation of Power Systems, 13-17 Dec. 1977, Sponsored by Central Board of Irrigation and Power, New Delhi, at College of Engineering, Guindy, Madras.
 - 3) Functioning of Electricity Boards, Presented at Punjab, Haryana and Delhi Chambers of Commerce and Industry Conference on Power for Development of Agriculture and Industry, New Delhi, 8-9 May, 1978.
 - 4) Meeting the Long Range Power Needs of Karnataka, Paper Presented at the Seminar on Technical Evaluation of Power Crisis in the Country, 15 Oct., 1978, Organised by KEB, Bangalore.
-

- 5) Energy Alternatives for the Rural Poor, National Seminar on Energy Economy and Alternatives at Hotel Taj Coromandal, Madras, 27-29 July, 1979.
- 6) Energy Scenario of Karnataka, Seminar on Energy Planning for Karnataka-1980 to 2000 AD, Held at Institute of Engineers, Bangalore, 10-11 November, 1979.
- 7) Financial Management Problems of Power Boards, Seminar on Financial and Commercial Operations of Electricity Boards, Bangalore, July, 7, 1980.
- 8) Public Sector Involvement in Decentralised Energy Production, National Seminar on Energy Generation and Utilisation, Bangalore, 3-5 Oct. 1980.
- 9) Energy for Rural India, National Seminar on Energy Conservation at Vigyan Bhavan, New Delhi, 17-19 March, 1981.

XV Naganna N. and Subba Rao S.

Perspectives for Coal Demand in the Southern Region-1990, Association of Indian Engineering Industry Workshop on Energy, 24 March, 1979, Bangalore.

XVI Ramaswamy N. S.

The Modernisation of the Bullock-Cart System and the Management of Animal Energy Resources, Background Papers to an Address Delivered at IIM-B, January 1979.

XVII Ranganathan V. and Subba Rao S.

Energy Demand Forecast for the Southern Region, Association of Indian Engineering Industry Workshop on Energy, 24th March, 1979, Bangalore.

XVIII Subba Rao S. and Arokiaswamy N.S.S.

Effective Management for the Power Sector—
Some Thoughts, All India Apex Seminar on
Management of Power Systems, New Delhi,
18-19, 1977, Sponsored by the Institution of
Engineers, India.

Case Studies

XIX Arokiaswamy N. S. S.

- 1) Deccan Pradesh Electricity Board—A case study on its financial management.
- 2) Deccan Pradesh Electricity Board—A case study on its materials management.
- 3) Deccan Pradesh Electricity Board : Fairy Town Ratnapur 220 KV Transmission Scheme—A case study on its execution.
- 4) Deccan Pradesh Electricity Board : Kapila Thermal Plan Power Project—A case study on its implementation and operation.
- 5) Deccan Pradesh Electricity Board : Sivapuri Rural Electrification Project—A case study on its execution.
- 6) Deccan Pradesh Electricity Board : Swarnagiri Hydro—Electric Project—A case study on its implementation and operation.

XX Chary S. N.

Badrasm Hydro—Electric Project—A case study.

ONGOING RESEARCH

Title : Futuristic Energy Demand in India

Project Leaders : Arokiaswamy N.S.S. & Subba Rao S.

Sponsors : Indian Institute of Management, Bangalore.

Objectives :

The project has dual objectives :

- 1) It will study the inter-relationship of such economic and demographic factors as G. N. P., industrial production and population growth with future energy demand. Quantitative models are being developed. It is hoped to integrate the models to use on a computer.
- 2) A policy oriented approach to the problems of meeting the growing needs of rural energy. This aspect of the project will project and examine the dimensions of the energy needs of rural areas keeping in view the long-term goals of the Government. It will also explore the supply side of energy picture, specially decentralised systems. Various policy issues to generate the resources for harnessing such energy from conventional and non-conventional sources will be examined.

Methodology :

This is a desk research study involving mainly literature survey and limited use of available computer.

HEALTH

S. T. SOMASHEKARA REDDY

The Centre for Population and Health Management (CPHM) was started in 1976 with the following objectives :

1. To help improve the management of health care services and population programmes through management training programmes for senior and middle-level health and family welfare programme administrators.
2. To contribute to the literature on population and health management by undertaking research and case development activities.
3. To help health services administration by providing consultancy assistance in resolving management problems and in improving management of the health services.
4. To train future managers and teachers in population and health management through academic programmes.

The main emphasis was on fulfilling the commitments of the Institute to perspectives in social relevance and social productivity. The activities of the Centre can be examined under five different categories: Manpower Planning, Family Planning Programme, Population Policy, Communication, Administration.

Manpower Planning

The CPHM's work in this direction is mainly in the area of assessment of needs. 'Manpower Planning in Specialities and Super-Specialities : A Long-Term Perspective for Karnataka' is one of the biggest research projects taken up by the Centre. It is based on the methodology suggested by Bogatyrev at a WHO Seminar in 1980. The study has provided a directory of 25,277 specialists and super-specialists in Karnataka. The study shows that 91 per cent of the

specialists are in urban areas. Most of the remaining 9 per cent in rural areas are attached to medical colleges ; mainly the Kasturba Medical College, Manipal. Of the 91 per cent specialists in urban areas, 82 per cent are in Bangalore. The study holds the organisations and the concentration of facilities for these specialists in urban areas, as the reason for this unequal distribution. It also holds the organisation's responsibility for the underutilisation of certain specialists by posting them at wrong places.

As for workload, the study comes to the conclusion that it is the specialists in general medicine and ophthalmologists who are over-worked. But the study says that in general, the specialists are overloaded. The impact of such heavy loading is inefficiency, as in the case of Victoria Hospital, Bangalore, where the study reports low agreement between the initial and final diagnoses. Based on these and other factors like 'mortality' rate among the specialists, number of fresh specialists coming out of all the medical colleges, command area of hospitals, the study estimates the requirement of specialists from 1984 to 1989.

For better health manpower planning, studies on the requirement of basic and paramedical forces are necessary. In the same way, exercises in manpower planning will be complete, if impact of development activities on health can be forecast. So far no work has been done in that direction as there is a slight difficulty in assessing the morbidity status of those regions where development activities are planned. It may be possible to overcome this by studying the registers in various hospitals in that region over a 10-year period. Such a study would reveal both the nature of cases prevalent and the morbidity. If this is compared with the studies of the impact on health due to developmental activities, one can, probably, predict what sort of cases can increase over the years and also what sort of manpower is required. Such an exercise will also help preventive efforts.

Coming to the impact of developmental activities, there is a debate going on about whether this aspect can be a part of the family planning programme or not. But about the impact itself, very few studies have been done and many of these are journalists' reports. Hence, work in such a direction will not only help in manpower planning, but also in managing the health of those who will be affected in the future.

The CPHM project has examined various methodologies in health manpower planning and has highlighted the appropriateness of each methodology and application, which can serve as a ready reference. A methodology to assess the availability of indigenous health manpower and the efficiency aspects could have provided a good comparison between allopathy and homoeopathy.

One of the reports contains a detailed study of the cost of medical education carried out in a private medical college in Karnataka. Though this study provides a methodology, it would have been much more valuable, if aspects like the cost of input by faculty to students at hospitals, the cost of maintaining a patient while the students learn, and the input and co-operation by the patients had been taken into consideration.

Another aspect of manpower planning is the evaluation of the efficiency of the existing staff and the structure of the present organisation. A detailed examination of the organisation of health systems is included in another chapter of the study. It takes into consideration almost every individual involved in the system and every other aspect. Though the study is restricted to Karnataka, it throws light on the situation in other places like AIMS, New Delhi. Examining whether the present organisation is capable of reaching the goal of "Health for all by 2,000 AD", the study estimates the manpower need as 50 million by 2,000 AD. In respect of the number of doctors, who may be available, everything depends on the Governmental programmes and policies to employ them properly.

The study points out that large-scale increase in manpower among dentists, nurses, ANMs and pharmacists is imperative. It suggests reorganisation and appointment of specialists in health administration to administrative posts. Going into the need for job descriptions, the study has developed a description for Medical Superintendents. The study also proposes methods for budgeting and for maintaining information systems in hospitals.

The above study covers the manpower programme extensively. A study on Indian medicine on the same lines can also be carried out. As the above study points out the discrepancies at the reception counter and at the stores that are thrown up in follow up aspects after an in-patient is discharged, can be taken into account for a study. This is necessary because, at present there is no way of keeping a check on the in-patient's progress after he is discharged. Does the patient follow the advice given by the doctor? Does he get admitted again for some other ailment later on? and so on. This information is urgently required in order to gauge the efficiency of the service rendered by the doctor.

Family Planning Programme

Studies on family planning can be classified into two groups: methodology and deliverance. From the time the family planning programme was first launched, there has been a debate on whether family planning activities should be part of developmental activities or not. In various places attempts have been made to implement it as a developmental programme. But the practice of involving developmental staff at the district level in FP activity cannot be regarded as any indication of the linking of the family planning programme with developmental activity. The performance of this staff does not complement the FP activity as they are already overburdened with other activities. A study on vasectomy campaign supports the argument that development as a necessary prerequisite is not necessary. People's participation in the FP programme is the next question.

This is generally sought to be incorporated into the programme. But the acceptors lured by incentives cannot be included under the head of public participation.

For efficient realisation of the objectives of family planning the efficiency of the officials at the delivery points is crucial. A functional analysis of the part played by Primary Health Centres in family planning and welfare activities, taking six PHCs in Tumkur District (chosen for low and high performance in FP activities) concludes that the staff of the low performance PHCs, compared with the staff of the high performance PHCs, tended to lack motivation & commitment. The study reports that a greater percentage of employees in high performance PHCs feel that their success is due to their immediate superiors who understand the job problems of their subordinates, involve the subordinates in problem solving and in decision making.

The study mentioned above has examined the utilisation of clinical facilities available at PHCs by the acceptors. The findings say that about 70 per cent of the acceptors utilise the PHC for various problems.

The implementation of the family planning programme depends to a great extent on the policy decisions taken at higher levels. Proper decision making requires an efficient information system in the Health Department. The existing information system is very poor. Hence, a new type of information system is suggested by two studies. One of them deals exclusively with the application of operational research technique to the family planning programme so that information is readily available.

With regard to motivating non-acceptors to try family planning, a study says that the communications media should address themselves to the non-acceptors to drive away the misconceptions that prevail.

Population Policy

The increasing size of population has also been dealt with. The paper on population policy opines that increasing

age at marriage or offering incentives to those who accept family planning do not help contain the population. On the other hand, the study rejects the opinion that development must precede family planning.

Subjects like the maternal/child health care, non-acceptors of family planning etc. have not been studied. Further studies on the importance given to minorities and their acceptance of family planning can go a long way towards bringing credit not only to the institute, but also to the minorities, who have to receive the comments made very constructively. Such studies, if undertaken, would bring out the problems the minorities face in accepting family planning, the religious hold, if any, on them, etc.

Communication

The success of family planning in India must depend on propaganda. But policy material is intelligible only to a section of the population. The failure to reach some important sections points to the need for different types of material of the kind easily digestible by the masses. Such a change requires a thorough understanding of folk language and art. Hence, the study calls for research work in that direction. Also the common man's suspicion that more is spent on propagating family planning programmes than on the programme itself, has to be cleared. Further, as a study suggests, the acceptors are influenced more by health workers than advertisements. This knowledge necessitates an assessment of the impact and usefulness of propaganda.

Administration

Good results depend not only on extension of functional units but also on better administration. In this regard, keeping in view the latest staffing norms developed by the Government of India and the pattern followed by efficient private hospitals, a few recommendations are made. The study tries to clear the confusion with the medical

superintendent and district level officers. The study also examines the role played by the boards of visitors at present and suggests means to make them more active.

References

1. B. Ghosh, "Man-Power Planning in Specialities and Super-Specialities : A Long-Term Perspective for Karnataka", Sponsored by ICMR, Nov. 1980.
 2. Ibid.
 3. Malathi Somaiah, "Health Man-Power Planning—An Overview", Report No. 7 of the Study of Health Man-power in Selected Specialities and Super-Specialities : A Long-Term Perspective for Karnataka, Sponsored by ICMR, Nov. 1980.
 4. Vatsala Nagarajan, "Costing of Medical Education", Report No. 5 of the Study of Health Man-power in Selected Specialities and Super-Specialities : A Long-Term Perspective for Karnataka, Sponsored by ICMR, Nov. 1980.
 5. A. Sahni, "Management and Organisation of the Karnataka Health System", Sponsored by Government of Karnataka, July 1980.
 6. B. Ghosh, "Integrating Family Planning with Development Programme", *Social Review*.
 7. Ibid.
 8. A. Sahni, "Functional Analysis of Primary Health Centre for Family Planning and Welfare Activities (Karnataka State)", Sponsored by Family Planning Foundation, New Delhi, June 1981.
 9. Ibid.
 10. B. Ghosh, "Quantitative Methods in Management Applications to Health and Family Planning Programme", *Management in Government*, Vol. 10, No. 3, 1978.
-

11. B. Ghosh, "An Analysis of the Differential Rates of Achievements in Various PHCs during Gujarath Mass Vasectomy Camps", Demography India, Vol. 4, No. 1 and 2, 1976.
12. B. Ghosh, "India's Population Policy—An Appraisal", Demography India, Vol. 7, No. 1 and 2, 1978.
13. A. V. Shanmugam, "Population Information Network Analysis", Paper Presented at the Population Correspondent Workshop, ESCAP and National Institute of Health & Family Welfare, New Delhi, February 1978.
14. A. Sahni, June 1981.
15. A. Sahni, July 1981.

ONGOING RESEARCH

1

Title : Drug Price Control Policy

Project Leader : R. K. Vijayasathy

Sponsors : Indian Institute of Management, Bangalore

Objectives :

- 1) To find a correlation between statutory price control and their effects on growth and profitability of firm size in public sector drug enterprises.
- 2) To evolve the basis for right pricing policy for the above enterprises in order to subsidise the goods and services to common man.

Methodolgy :

Literature Survey of Govt. Report, Committee Reports, RB Publications and so on. Sample of 2 public sector enterprises, collection data through primary sources, enterprises and executives and so on.

2

Title : Assessment of Primary Health Care Needs of Rural Communities (Pilot Study) (Karnataka)

Project Leader : Jagdish C. Bhatia

Sponsors : Indian Institute of Management, Bangalore

Objectives :

- i) To quantify health needs as perceived by various segments of the rural population.
- ii) To identify the magnitude of morbidity existing in the community.
- iii) To find out the pattern of utilisation of existing health services by the community.
- iv) To find out unmet needs for health services and identify reasons for the existence of such a need.
- v) To find out direct and indirect costs of all types of medical care.
- vi) To study the decision making process in the family with regard to health care seeking.

Methodology :

8 Villages were selected in the PHC of Solur in Bangalore District with the following criteria: a) Two villages within 5 kms of PHC Hqs. b) Two villages where Primary Health Units are located c) Two sub-centre villages d) Two remote villages. A random sample of 25 per cent of households were selected in each village and interviewed with six sets of prestructured questionnaires, by two trained female investigators supervised by an Asst. Research Officer.

Medical Officer in-charge, ANMs, and LHVs were interviewed informally and an inventory of health facilities at PHC was taken. A total of 400 households were interviewed.

3

Title : Evaluation of Dais-Training in the States of Karnataka and Maharashtra.

Project Leader : Jagdish C. Bhatia.

Sponsors : National Institute of Health & Family Welfare, New Delhi.

Objectives :

- i) To study the profile of trained/untrained dais in terms of:
 - a) Socio-cultural, educational status and income ;
 - b) Knowledge, attitudes and practices with respect to midwifery ;
 - c) Performance perception regarding last 5 cases attended by each dai ;
 - d) Motivation for training ;
 - e) FP motivational activities.
- ii) To assess the training of dais including their training performance.
- iii) To assess the job performance of dais and that of trainer in relation to training.
- iv) To study the perception of community about dais and their services.
- v) To study the implementational problems of dai training at various administrative levels.

Methodology :

A total of 5 Districts were selected in two States viz. Karnataka (2 Districts) and Maharashtra (3 Districts). In each District four PHCs were randomly selected out of which one PHCs had the dai training going on at the

time of investigation. At each PHC, both trained and untrained dais were selected randomly as below :

- i) One trained and one untrained dai from the village closer to PHC Hq.
- ii) Two trained and two untrained dais from two sub-centres of the PHC.
- iii) Three trained and three untrained dais from remote villages beyond 5 kms. of PHC.

Interviews were conducted with Trainers, Health Workers (F), Medical Officers in-charge of PHCs, District Health Officers and other officials concerned.

Interviews were conducted with the mothers related to last five cases of delivery as identified by each dai.

A total of eleven female investigators were employed who were supervised over by an Asst. Research Officer in the field. The field operation was coordinated by the Project Leader through frequent personal visits to the field. A total of 236 dais and 1180 mothers were interviewed.

EDUCATIONAL MANAGEMENT

MALATHI SOMAIAH

Management has been traditionally associated with the sector of business and industry. Further, in the recent decades, its application has been moved on to the hitherto neglected sectors of our economy namely education, agriculture, transport, health etc. With this objective, the Institute has started the Centre for Educational Management. This Centre with its main objectives of taking management to the planners, administrators, and others in the field of education, had come up with three broad functions. They are :

1. Teaching and Training
2. Policy Research and
3. Consultancy.

This report looks at the achievement of this Centre in its research function. It has been the objective of the sector to undertake basically policy research looking at various issues and problems in the field of education from the management point of view. As such, the Centre will not involve itself in any aspect of pedagogical research as related to education, since the Centre feels that this area is attended to by the traditional universities and post-graduate departments in this country.

From this background, a few research studies conducted in this Institute, have been reviewed highlighting the major strengths and limitations of these studies. At the same time, an attempt has been made to indicate the areas of research which could be furthered in the topics of ongoing research.

Most of the research done at the Centre can be broadly categorised into two areas :

1. Study of the various sub-systems in education from a micro analysis.
2. Study of certain broad assumptions and questions in education covering various areas and spectrums of society.

Education as a total system consists of various sub-systems. They are classified based on two major criteria :

- a. Levels of education, i.e., nursery, primary, secondary, higher secondary, and post-graduate education.
- b. Various areas within education such as planning, administration including institutional administration, evaluation of projects and programmes, critical analysis of several existing policies and programmes.

In this section, a few studies related to this broad area of education systems management have been reviewed. One of the important sub-systems of education is the pre-primary education. Considering the importance of this phase of education and its impact on future phases of education, a study has been conducted to look into the management of nursery schools. The study highlights the importance of the pre-primary education by quoting the amount of money allocated by the Department of Education for the pre-primary education. It also brings out the fact that there are no systematically developed guidelines for the financial and academic management of these nursery schools. Bangalore city has a total of 521 nursery schools including 57 run by the city corporation. The conditions of many of these schools are beyond description. The study gives a picture of nursery schools in terms of medium of instruction, school buildings, working hours, equipment, per student space area, sitting arrangement,

income of nursery schools, expenditure per student cost, working conditions and other related variables. These variables have been studied comparing the types of nursery schools within the pre-primary education programme. The types include the schools run by the government, city corporation, private aided schools and private unaided schools.

The methodology used for collecting the data includes a structured questionnaire, an unstructured interview and an analysis of financial records.

The study highlights some of the major areas which need to be given importance to make the pre-primary education more meaningful and crucial for the development of the child in his future years of intellectual training.

The researcher feels that mere enactment of any law would not serve the purpose unless it is implemented with the required perseverance, so that certain minimum standards could be enforced in pre-primary education. Since there is a lack of norms for the development of basic facilities in terms of land, building, equipment, play-ground, teachers, helpers, working conditions, service rules, etc., an enactment bringing out the norms is of utmost importance. This is to be further evaluated by a strong and committed inspecting team to enforce the implementation of the act. The study also indicates that both private aided and unaided schools should be allowed to function under a registered legal organisation which should have representation from active and committed department officials and parents. Steps should be taken to prevent these registered associations from becoming private proprietary concerns. The study also suggests the development of strong and active parent teacher associations, package programmes for children's health to be introduced and fixation of norms and provision for certain percentage of expenditure for teaching aids, class rooms, audio-visual aids, play-ground, etc.

Though this study is limited only to Bangalore City, the research indicates the possibility of expanding it to other geographical areas and finding out the problems involved in the management of nursery schools.

Another sub-system of education which has been studied from the management point of view is the management of medical colleges. This is more a case study of one medical college in Karnataka. One of the observations the study makes is that every medical college should function not in isolation but in a given social and educational environment. The organisational factors and policies and criteria in urban and rural medical colleges as well as in private and government colleges influence to a considerable extent the nature of student they receive and the services they offer to the society as teaching hospitals. The study looks at various aspects of the management of medical colleges in terms of the profile of students, teachers, the socio-economic pattern of the student, their perception of medical education and also their feed-back after having gone through medical education. Obviously the three interest groups who are studied in this research include students, teachers and the alumni. The responses of these interest groups are compared and contrasted on several issues concerning them with the objective of looking at the impressions of these groups of people about any given phenomenon in medical education.

A few of the important findings of the study are summarised below :

The study suggests the introduction of alternative sources of funding to help the poor students to have the benefits of medical education. Some of the schemes should include study loans. The researcher feels that there is a great need to develop bridge courses for providing the required social skills for the students coming from economically and socially developed families before they join the medical education programme. A reliable aptitude test could be helpful in attracting the right

type of students to the programme. The need for the professional development of teachers is also greatly stressed. The study also indicates that more emphasis on research both in non-clinical and clinical sciences is essential to teaching and to make medical education more realistic and relevant to the students. Therefore, research work should be made a part of the academic work of medical colleges. Another important aspect of the study is the recommendation that the curriculum of medical colleges should include various management skills required by the doctors for managing their own clinic efficiently whether they are small clinics or nursing homes. The study also feels that a great deal of preparation should go into the +2 level of education so that the students are oriented to the realities of the medical world.

Though the study is limited to one college, some of the findings and suggestions are applicable to most of the medical colleges in Karnataka. Further, the study suggests that such studies should be undertaken in different types of medical institutions managed by government, private bodies and also prestigious all India institutions of medical sciences. Another aspect which is emphasised in this study is to conduct longitudinal studies in the field of medical education. They may provide more valid conclusions which could be effectively used for making crucial decisions on financial and other policy issues related to medical education.

Another study that has been conducted by the Centre looks at one more aspect of the sub-system in education and that is the financial management of education. The study entitled 'Expenditure on Education' looks at the per student cost for various levels and types of education in Karnataka and Tamil Nadu. The objective of the study is to understand the rationale, if any, in incurring a certain percentage of expenditure on education and also in providing a lower priority to primary education as compared to secondary and higher education. This study is more a critical analysis of educational deci-

sions which give an impression that the higher the level of education, more the money to be spent on it. This study basically questions these assumptions through the calculations and figures computed and also comparing these figures for the two states mentioned above and for some of the developed and developing countries of the world. Some of the questions that were explored through the study are:

1. How does the cost of education of our country compare with that of some other developed or developing nations? What are some useful indicators to make meaningful comparisons?
2. Is the resources allocation among the three major levels of education namely primary, secondary and higher education conducive to the achievement of economic development? How are our policy makers' decisions compared with other nations on this aspect?
3. Is it possible to follow a rationale for the allocation of resources to the education sector as well as the allocation within the sector? What measures or indicators may be useful in developing such rationale?

The data has been collected for the study in Tamil Nadu and Karnataka based on the various documents prepared and published by these two governments. Most of the unpublished data have also been obtained from the State Department of Education. Some of the finding of the study are summarised below :

1. The comparison of educational expenditure with the percentage of SDP indicates that the educational expenditure of the two states under study are far from adequate when compared to developed countries of the world in terms of their GNP including USA, Japan and Asia as a whole. This
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analysis indicates the need for planning to invest atleast a minimum of 8 to 9% of the SDP to begin with. This would not only provide better opportunities for those who are already in school, it would also help to develop programmes and schemes to bring children out of school to formal or non-formal educational institutions.

2. When the resources allocation among the three major levels of education are considered, we spend about 8 times of the per capita expenditure of primary education on secondary education and about 11 times of primary education expenditure on higher education. Again a comparison with the developed nations indicates that this enormous disproportion should be reduced. The study suggests that atleast half of the per student expenditure of secondary education should be spent on primary education.

3. The study brings out certain important rationale that could be used in making allocations decisions in education. They are, the rate of the growth of population of the given age group should be considered. The rate of dropouts and stagnation should be used to decide the amount to be allocated for formal and for non-formal education programmes. The percentage of GNP spent by other developed countries for similar target policy should also be considered. The percentage of expenditure on other services such as health, defence, transport, etc., should also be taken into account. Due consideration should be given to the multiplier effect of the education on the literacy rates of the country and on the economic growth.

The second broad category under which a few other researches are viewed are what can be called problem centered researches where certain crucial problems in the field of education are looked at, investigated and studied irrespective of the levels of education, target group, or any one particular sub-system of education. Some of these studies are reviewed in the following paragraphs.

One of the crucial problems in the field of education has been wastage and stagnation in primary education. Though Article 45 of the Indian Constitution says that education should be free and compulsory for all children in the age group of 6-14 years, it has not been possible to achieve this target so far. Several attempts have been made to introduce compulsory primary education in many states of India. There have been many failures in these attempts, and the reasons for the failures are also looked into. Most of these studies look at the target population in the age group of 6 to 14 and the number of dropouts. A few other studies also look at the amount of money spent on primary education and its wastage. The usual method of calculating per pupil cost of education in terms of the amount spent per pupil does not take into account the resources spent on dropout and repeaters. This cost at the elementary level is quite significant and it gets reflected in the cost of producing students with a given number of years of schooling. Such an analysis is not useful because, the amount spent on dropouts cannot be considered as the cost of educating students who remain in the system.

In a study entitled 'Effective Cost of Education in Karnataka', an attempt has been made to find out the number of years spent per pupil for completing a given number of standards of schooling. These number of years are defined as the effective cost. Since the cost defined takes into account the wastage resulting from dropout and stagnation, this methodology is helpful in estimating the schooling level of attainment of student leaving the elementary school system. The analysis attempts to calculate and compare the effective cost incurred at the elementary stage for four consecutive academic years (1974-79) in Karnataka. For analysing the inflows and outflows of educational system, a simple markov-chain model is used. Enrolment data obtained from the statistics department of the office of the Commissioner of Public Instruction in Karnataka, has been used to prepare the transition probability matters. Some of the findings of the study

indicate that number of years required to produce one functional literate (four years of schooling) has been reduced between 1974 and 79. This tremendous decrease is attributed to some of the incentive programmes developed by the government namely mid-day meals schemes, free supply of text books, upgrading single teacher schools, periodical inspections and visits by the department officials.

The effective cost (number of years) of education of one functional literate girl is more than one functional literate boy. The study suggests that more and more girls should be encouraged to remain in the schools and that incentives should be provided for them to attend the school. The effective cost of education for seven years of schooling seems to be more than for four years of schooling. Again here, the trend is that the effective cost of girls' education is more than that of boys. Among the boys who drop out before completing the 7th standard of schooling, on an average they would have had only 3 years of schooling whereas the girls would have had only 2.55 years of schooling. Here again, one should not be carried away by the number of years of schooling and relate it directly with their learning. The value that a student remains for three years in school system does not really indicate that he had studied upto 3rd standard. On the contrary, a student might have stayed in the same standard for all the three years which cannot be distinguished from the values computed here. This limitation prevents one from making any further inferences.

However, such studies should take into consideration many more aspects of primary education in terms of the location of schools, kinds of facilities available in the school, the social and economic background of the students, and try to investigate the problem of wastage and stagnation from a different and practical point of view.

In a developing country like India, education has always been considered the means for upward social mobility. Keeping this in view, several educational benefits have been provided to socially and economically disadvantaged groups of people in order to enable them to avail the benefits of education. On the other hand, there are also certain privileged sections of the society who have access to the prestigious institutions of higher learning and they get the maximum benefit out of these types of education even though it is the poor man's tax money that has been spent on these institutions of higher learning.

A study entitled "Socio-Economic Class and Educational Achievement" attempts to look at the socio-economic background of two batches of post-graduate students who have passed out of IIM (Indian Institute of Management), Bangalore. Some features of the study are that a majority of the students come with the background of technical education, their parents are mostly in the upper income group. Definitely the students are not first generation learners because of the fact that most of their fathers have had college education and their mothers, high school education. A considerable number of them come from an urban background and from upper middle class families. Even the students have been exposed to a better 'quality' education as a considerable number of them have studied through English as the medium of instruction which provides them many advantages over others in obtaining admission to institutions of higher learning and also their performance during the programme.

Though it is a micro study of one institution for two academic years, such studies should be conducted for different types of institutions for a period of time in order to understand the recent trend in education. This question is important because one of the problems in the field of education today is providing equal opportunities. Even though several attempts have been made to implement the constitutional provision of equality in educational opportunities, the results have been

extremely insignificant. Today we see that every student requires a certain social and economic background to receive certain types of education. Though we talk about 'equal access' to education, this cannot be achieved until most of them are given equal capacity to use the access. This is why perhaps many of the educational programmes have widened the inequality rather than reducing it. Such studies with much more specific objectives and a good framework should help answer some of the questions raised in this field of education.

Another study which looks at some of the government schemes provided for Harijans is discussed in the report entitled 'Government Schemes for Harijans and its Non-utilisation'. This report is more a survey of the social welfare programmes including educational schemes available for the scheduled castes. To some extent, the report also discusses the financial allocation for the educational programmes for scheduled castes and scheduled tribes. At the end, the report says that lower caste values for education and occupation has been rather on the negative side. This is amply demonstrated by the high dropout rates in schools among the scheduled castes. Some of the sociological theories have been mentioned to support this phenomena. At the end of the report it is concluded that all commitment is further minimised since the average Harijan in a village refuses to make the necessary effort to attain a decent educational level.

One significant area of work for researchers in education is to study the relevance of various types of education to the needs of the learners. The needs of the learners can be broadly categorised into the two groups namely occupational needs and needs related to learners' self-satisfaction which may also include emotional needs. As far as the first area is concerned there is a need to study the relevance of various types of education especially professional and vocational education and find out how far the curricula of these programmes are relevant to the job needs of the students. A study entitled

'Relevance of Indian Institute of Management, Bangalore PGP Curriculum to the job needs of the Industry' states that its objective is to find out the effectiveness of the Management Education Programme to the needs of the industry. The study has chosen to obtain the responses of the alumni of the post-graduate programme in management who have put these in real working situations. Questionnaire covering the courses, grading system, project work and certain aspects of job satisfaction such as their job performance, relation with colleagues etc. is administered to the alumni and the responses have been tabulated. Some of the findings of the study indicate that project work has been highly relevant to the students and work experience of the students before joining the programme has helped them to get the maximum advantage from the programme. A few minor changes in terms of duration and sequencing of project work and change in some of the courses are recommended by the alumni. However, they feel that some of the theoretical knowledge provided in the programme would be useful, if there is a good organisational environment to implement these concepts of ideas.

This study though a micro analysis, does not cover many other crucial areas. Such studies with a much more detailed framework and specific objectives should be useful in making several policy decisions in the field of education and also to achieve higher relevance of various types of our educational programmes to the needs of the learners, employers and the society as a whole.

Another study which also attempts to look at the relevance of technical education to industry has considered one aspect of this relevance, i.e., the relevance of practical experience in industry to technical education has been stated in a research entitled 'Sandwich Courses Revisited' The main objective of practical experience in technical education is to condition the students for gainful employment by equipping them with those abilities which cannot be acquired in purely educa-

tional settings. Thus as a means of harnessing the resources of industry to those of institutions and integrating the act of learning with the context of action, the sandwich system represents a total educational process. It is therefore, a viable form of cooperation between technical institutions and industry.

The objective of the study is to find out the factors which motivated polytechnics to embark on sandwich courses. How was this motivation sustained overtime by principals, teachers and students? What is the state of the art in respect of sandwich courses? What is the impact of sandwich courses on the perceptions, attitudes and abilities of teachers? How is industry treated in sandwich courses? The study has also addressed itself to a few other questions like how does the government viewed sandwich courses within its overall policy for technical education? What is the impact of this course on the student community and few other related questions. The study has itself focussed on more than 350 polytechnic institutions in the country which offer sandwich courses. The methodology of the study has been questionnaire survey followed by personal interviews and discussions.

Based on the findings of the study, the researcher has discussed a few perspectives of sandwich courses in the report : The Sandwich system should remain an integrated approach to technical manpower development acceptable to Indian industry. The study also emphasises the joint responsibility of the industries and polytechnics in making this programme effective. The study brings out the fact that polytechnic education in India is facing serious crisis of goals and objectives, relevance and viability. Therefore, measures to tackle the basic issues involved in transforming the system are necessary. This study addressed itself to the root of the whole problem which lies in defining who is the first technician? Where is he working? What are the abilities that he possesses? How can education and training equip him with

these facilities? While discussing these issues, the study has brought about a new conceptual framework for integrated technical education with practical experience.

Another study has attempted to evaluate the performance of a research centre at an institution of higher learning. This study is entitled 'Report on the Survey of Performance of the Centre for Electronics Design and Technology at IISc., Bangalore. This study is mainly in the area of science and technology. The survey has looked at the analysis of the impact of Centre for Electronics Design and Technology (CEDT) in training students in its various programmes and its contribution to the industries or institutes in the field of electronics and its place in the fulfilment of the basic development objectives of India. This Centre is looked at as a machinery of transfer of technology in Electronics Design firstly from Centre to the students and secondly from the students, after graduation, to their respective sponsor organisations. The methodology of the survey has been based on soliciting information from groups of persons who could be directly or indirectly associated with the functioning of CEDT. The information was received mainly through the questionnaire followed by personal interviews. The report lists some of the findings of the survey. It says that the PGD training at CEDT is a very efficient and effective means of transfer of technology to the electronic industry in India from advanced institutions. Its training is helpful in surveying the small industries specifically, which will also lead to significant contribution to the attainment of technological autonomy for India. The study has found out that the uniqueness of CEDT, which lies in its practical orientation, can be largely identified with the presence of Swiss manpower. The visits of Indian staff to Switzerland need to be better planned and organised and should be more clearly coordinated with the long term involvement of the person concerned with CEDT. Since CEDT has become a vehicle for the transfer of techno-

logy, the survey strongly recommends that this Centre should be continued and further strengthened to take more useful tasks.

Most of the studies reviewed in this report are only beginning in their respective fields. Some of the micro studies, only explore the crucial problems in the respective fields. Much more detailed and systematic studies with larger groups should be planned and undertaken so that their contribution could highly be significant. Besides, the centre should also work towards undertaking more policy research in the field of education so that their customs could be valuable information or input to the decision makers in the field of education.

ONGOING RESEARCH

Following are some of the research studies going on in the Centre for Educational Management.

1. Apprenticeship

A study of human resources development in the Indian Industry.

2. Governance of Universities in Karnataka

The various aspects of governance of universities in Karnataka in terms of the powers and function of administrators, decision making process, participation by various interest groups such as parents, students and faculty are studied. The study intends to highlight the crucial areas requiring management inputs to improve the administration of universities

3. Education and Labour Market

This study has been aimed at trying to understand the relationship which exists between the present formal education and its relation to labour market. The study has identified four interest groups who play a very crucial role in establishing the relevance of education in the labour market. They are administrators, students, teachers and employers. Ques-

tionnaires have been prepared and the data is being collected from these four different groups. The findings of the study may help us to establish the linkage between education and job market and the implications arising out of such findings in terms of curriculum, duration and structure of education will also be highlighted in the study.

4. Transfer of teachers does not serve the educational end.

REFERENCES

1. Management of Nursery Schools — Malathi Somaiah
 2. Management of Medical
Colleges — Malathi Somaiah
 3. Expenditure on Education — Malathi Somaiah and
Ramakrishna K.
 4. Effective Cost of Education in
Karnataka — Malathi Somaiah
 5. Socio-Economic Class and
Educational Achievement — Malathi Venugopal
 6. Government Schemes for Harijans
and its Non-Utilisation — Malathi Venugopal
 7. Relevance of IIM-B PGP Curriculum
to the Job Needs of the Industry — Malathi Venugopal
 8. Sandwich Courses Revisited — Chandrakanth L. S.
 9. Report on the Survey of the Per-
formance of the Centre for Elec-
tronics Design and Technology at — Bandopadhyay J.
IISc, Bangalore Shiva V.
Krishnan S.
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ORGANISATIONAL & INDUSTRIAL RELATIONS

SUBHA VENKATARAMAN

In the past decade a lot of attention has been paid to human relations at work. A question frequently asked by frustrated managers is "Why don't my subordinates behave the way they are supposed to?" The same question is often asked by subordinates about their bosses. As a result an understanding of the behaviour of people in organisations has become increasingly important in the present day. In the past, though many people have attempted to understand human behaviour, no systematic study was ever taken up. This void is filled up by the discipline, "Organisational Behaviour", which studies "Why people behave the way they do, in organisations. It is a systematic study of 1) the causes of human behaviour (alone and in groups) and 2) how this knowledge can be used to help people be more productive and satisfied in organisational settings.

Some pertinent questions which are raised in an organisation are - "On what basis should one candidate be chosen for a job and another rejected? What factors should be used in determining the pay rate for a particular position? What is the best way of training employees so that they can achieve high levels of productivity? Personnel Management addresses itself to these questions. It may be defined as the process of developing, applying and evaluating policies, procedures, methods and programs related to individuals in organisation. Closely linked to this is "Industrial Relations", concerned with formation of unions,

collective bargaining, labour management problems & legal aspects of all these.

The last few years has seen a mammoth increase in the labour force of Indian Organisations. Growth in size has naturally led to complexity in these organisations. Therefore a systematic understanding of the people who are faced by rapid technological changes on one hand and increasing complexity of organisations on the other, has become very urgent today. It has brought to the fore the significance of OB/PM/IR in India. Not much research has been done in these fields in our country till now. Keeping in mind the goals and objectives of these disciplines, we shall set forth to review the research done in the OBIR area.

We shall broadly classify research done in two major heads :

- 1) Organisational Behaviour
- 2) Personnel Management & Industrial Relations

Research in O.B.

We shall classify research in this area into the following sub-headings in order to make the review more systematic.

- a) Motivation
- b) Personality
- c) Cultural values
- d) Miscellaneous research :
 - (i) Managerial styles
 - (ii) Management movements
 - (iii) Organisation development
 - (iv) Entrepreneur development.

Motivation

Considerable and sustained attention has been paid to the area of motivation by both practising managers as well as researchers. What motivates people, how the satisfaction or dissatisfaction of a person's various needs affect his performance, his perception of the organisation and his mental health are all very relevant topics in motivational research and would give us insights into many problems faced by industries today.

The article "what makes you tick" (Valecha 1974) deals with significant aspects of motivation, the link between motivation and performance, extrinsic and intrinsic motivation, unconscious motives and the role of environment in motivation. The effect of Indian literature, art, architecture and philosophy on motivation makes very interesting reading. It is a purely theoretical paper and will prove to be stimulating, especially for non-academic audiences.

Different studies have been made to find out the effect of organisational variables such as size of the company, managerial level and corporate ownership on satisfaction of one's need, using Porter's Need Satisfaction Questionnaire based on Maslow's Need Hierarchy. It was found that overall need satisfaction was higher in small organisations than in medium and large organisations (Valecha 1981) and that the self-actualisation need is most unsatisfied at senior, middle and lower levels of management (Venkataraman & Anantaraman 1981). Using two matched groups Venkataraman and Valecha (1981) have compared managers from public and private sector organisations and found that in the public sector, there was a greater need for autonomy and self-actualisation. Closely linked with the above studies, is the paper that deals with need satisfaction and organisational climate (Venkataraman and Anantaraman 1981). The

authors studying climate using Likert's Organisation Climate Scale have found that when needs are not satisfied, the perception of the organisational climate becomes negative. So we can see that research in this field of need satisfaction has been somewhat substantive and the results are interesting.

One of the major problems faced by many organisations today is absenteeism which is linked with motivation (to come to one's place of work regularly). Bhatia and Valecha (1978) have made a systematic analysis of the problem and ways to control absenteeism.

They have empirically identified certain personal and organisational factors associated with absenteeism in a public sector organisation. Since the employees' immediate environment is very crucial, suggestions have been made as to how to motivate them better. The same authors have also compiled a comprehensive review of research findings on absenteeism and in the light of these have made suggestions for further research. This article will prove very useful for the researcher providing a useful framework for research on absenteeism.

Personality

Understanding individual behaviour requires, that we know something about the influences that make a person behave the way he does in a particular situation. A basic understanding of personality and how its development is of direct importance to organisational behaviour. Though human beings are of complex personality, characteristics demonstrate the broad patterns of ways in which we react and behave. Therefore it will be interesting to find out whether one is inner-directed or outer-directed and how this affects one's performance and to find out traits are

desirable for people in certain positions and the reactions of individuals to certain stresses in life.

Outlining traits which are essential in a manager for being an educator, Valecha (1976) has named eight qualities such as dependence, positive attitude, empathy etc. Since the article makes no mention of any previous study or any rationale for choosing these qualities, among a whole range of them, it loses some of its value. That empathy is one of the desirable qualities for a manager and essential in all walks of life has been discussed by Valecha (1978). It has been defined in a clear manner with every day examples. The importance of empathy in various realms have been brought out, but the organisational setting, where it is very essential, has been given only a passing mention. Though mention has been made of exercises and techniques to develop empathy, it would have been worth while to outline a few of them. Hence we see that even though both these papers are theoretical in nature, they are of general interest to one and all.

Transactional analysis (TA) is one of the techniques which is very popular in industry, for it helps to resolve many a conflict and gives a better understanding of one's self. Valecha (1979) has described in detail the three faces of man. The child, parent and adult interwoven with his own personal experiences. The most interesting feature in the article is the way TA has been linked with Indian culture, philosophy and yoga. Though the article makes very general reading, it reveals the author's knowledge of the subject.

In today's changing environment, many managers are subjected to a lot of stress and strain. In his article, "Stress in Managers and Professionals in Indian Organisations," Sahni (1978) has discussed the nature and dynamics of stresses and strains, the characteristics of professionals who

experience low stress, reactions to stress, organisational and individual variables producing stress, and some prevention programmes. Some interesting findings regarding the above factors have been detailed. The findings are based on data gathered from 307 professionals, but the paper makes no mention of methodology, analysis, and results. This makes it theoretical rather than empirical.

The relevant questions that are raised today are: "Is it destiny or will? or belief in oneself or fate? or internal vs. external locus of control?" Internal-external locus of control refers to the extent to which an individual believes he is self-motivated, directed or controlled (internal frame of reference) or the extent to which he believes that environment (luck, fate, chance) exercise. The major influence on his behaviour (external frame of reference). Valecha (1976) has outlined the factors underlying both these concepts and has supplemented it with an empirical study. With a large number of males, he has studied the characteristics of externals and internals and found that internals have a more progressive portrait. Though the study is based on an American Sample, it has brought out some interesting results which may be applicable even in an Indian setting.

Cultural Values

In recent years behaviour scientists have begun to recognise the importance of personal values in understanding human behaviour. Values affect one's way of thinking, one's decision-making, corporate strategy choices and the like. According to study (1959), "Each individual member of any organisation has been socialised in a larger society, and thus brings with himself into the organisation from the outside various expectations and values which inevitably influence the way he plays his role and interacts with

others". It will thus be of great significance to find out the value systems of Indian managers which will definitely be shaped by the Indian culture.

Soares, Valecha and Venkataraman (1981), have studied the personal value systems of managers. Using an open ended question "What is your philosophy in life? and forming a conceptual framework with the answers, 5 different types of values have been classified. They are: 1) Goals of the organisation 2) Task related goals 3) Inter-personal goals 4) Those regarding self 5) Those higher than self. The results of the study indicate that "good work" ethics has the highest priority for Indian managers, followed by inter-personal values such as being helpful, supportive and empathic. The authors have raised the questions what do the managers say they value and what their values really are? The study would have been more useful if it had been linked to performance and efficiency.

Using the same format Soares (1981) has studied the effect of size of organisation on managers' values. His finding is that better values are fostered in smaller organisations. Both these studies have an advantage. The method of investigation involved open-ended questions, instead of an a priori set of values. Had these studies been linked to specific phenomena like productivity or efficiency, the articles would have been more valuable.

Miscellaneous Studies

There are a few research papers which do not fall into any of the above classifications and are too few to be classified separately. They can be classified into: (a) Managerial styles (b) Management movement (c) Organisation development (d) Entrepreneur development.

a) Management Styles

According to Rensis Likert and many others, participative style of management is the most desirable and efficacious of all. Valecha (1979 and 1980) examines the foundations, assumptions and building blocks on which participation is based. The author discusses that the Indian society, where feudalistic family relationships, cultural values and hierarchy of casteism exist, does not permit a participative style of functioning. The Indian theory of management believes, in Theory X and has a long way to go towards Theory Y. An empirical study with 23 subjects, who were engineers and scientists, provides some very interesting results. It indicates that they anticipated changes that will or may take place in the next 5 years from individual as well as organisational points of view. Also, there is lack of sufficient identity between individual and organisational goals. The picture in the Indian context is a lack of participation as well as insufficient preparation in terms of organisational framework and psychological development of the individual concerned. Therefore we see that these papers have provided some food for thought by discussing various aspects of participation in the Indian context, which makes a very relevant topic today.

b) Management Movements

Two articles (Padaki 1978 and Valecha 1978) talk about the management movement in India. The first one is pertinent to the textile industry which pioneered the modern management movement but has remained static for some-time. The author talks about reasons for the failure of the movement and the changes that should be made. Though this paper is relevant to only one specific industry, it raises some important issues like the importance of management development programmes and the manner in which they should be conducted. The second article which is

more general, discusses how each culture is different and if we are to have an effective internationally competitive calibre, management concepts have to be based on Indian culture. The interesting suggestion is that there are many management principles that can have foundations in Indian ethos (Ex. the Ramayana and the Mahabharata) and so we need not rely on American literature. This article proves to be an eye-opener to many management thinkers, proponents and schools in India.

c) Organisation Development

The objectives of organisation development, are; i) to enhance organisational effectiveness and (ii) to develop methods for coping with adapting to change. There have been 3 studies done on two of the OD techniques : Management by objectives (MBO) and experiential learning. Valecha (1975) has brought out a theoretical paper discussing all aspects of MBO. He has briefly outlined how it could be used in the industry by highlighting the advantages of participation and participative style of management. If more empirical evidence had been quoted, the paper would have had more value.

The ISTD, Bangalore study group has made a detailed study of experiential learning, its fundamental assumptions and its relevance to Indian conditions. They have carried out a few successful experiments in a public sector organisation. They have outlined the advantages of action learning programme, experiential learning in education and community and references to value systems of Indian managers and transactional analysis. It seems to be a very interesting and novel study.

d) Entrepreneur Development

Many programmes have been undertaken to promote entrepreneurial behaviour among young Indians. Behavioural

scientists are of the opinion that achievement motivation training will be very effective in modifying their psychological and motivational attributes. Roy (1976) has discussed the rationale of achievement motivation training and the effect of environmental support on entrepreneurial development. Considering this the author feels that the behavioural scientist should perceive the total situation of the individual including the economic reality which is very vital for development.

Research in Industrial Relations

Very little has been done in this area. Gandhi (1981) explored the inter-relationships between officers and workers organisation in a bank. In direct action like strikes, do working support each other or comfort each other? Interviews have been conducted with various people and it was found that at the local level there was no union rivalry. But at the central office, there is a very limited association. The typical picture in India is a multiplicity of unions which hamper industrial peace. This study brings forth some very interesting results and the only draw-back is that the sample used is very small.

In a very general article, Bijoor (1977) talks about the cause of labour problems and the loopholes in Indian management. He writes that improper training, absence through manpower research and planning, workers' participation, good performance appraisal systems, inadequate motivation and poor leadership are the causes for most of the problems in India. We find many questions have been raised, but no answers have been provided.

Case Studies in the Area

1) Case studies are of great importance to the student of any discipline, for it enables him to get a better grasp of the

subject. It is surprising that in a field with such a vast scope, we find only 3 case studies. They are : Bijoor (undated) has made case study of a bank with about 50 employees, which was facing many problems (Two managers left the bank because of them). The new manager was in an unenviable predicament. He was not given much respect and there was lot of bickering among the staff. An incident involving the Union Secretary and the Branch Manager made the situation explosive.

Though there is a lot of scope for discussion on how the situation could be remedied and the reasons for the deterioration of the climate, some more details on the existing situation could have been given.

2) Bijoor has made another case study and it is about a labour welfare officer who fought for his rights on joining a public sector company. He bypassed his immediate boss, the personnel manager and made it known that the labour welfare officer should be the head of the department and his department should be different from the personnel department. He waged a continuing battle and even started a house building society and took all the employees out from work without prior notice. It is an interesting case which throws opens many situations for discussions.

3) Valecha (undated) has written a case about the Welders' strike at Trichy. The organisation is a large division with foreign collaboration, good pay and cordial relations among the welders. The high pressure welders (HPW) formed a separate union. When a technical snag was discovered, management used pressure to increase productivity, but the welders did not respond. Only three workers have worked harder. Their colleagues protested. The others did not improve in their work and thought management was trying to break their unity. Shortly the HPWS' union indicated they would go

on strike. A good deal of empirical data and information is given in the case study which can be highly educative.

Suggestions for Further Research

We can get a fair idea of the activities in the OBIR area, from the research reviewed so far. Some interesting findings and ideas have been put forward in some amounts of novel writing. Considering the vast scope of the area, what strikes one is that not enough of research has been done so far. An observation that can be made at this juncture-is that though some areas have been studied there is no set direction for research in the area. To facilitate more coordination, its end research have to be decided. Secondly, we find that though a lot of new and exciting ideas have been brought out, quite a few of the articles take light approach, using minimal empirical evidence. We often get the feeling that these articles are meant for the general reader rather than the academecian.

We do not investigate human behaviour in organisations to look up the results in an ivory tower, but to translate the findings into applications in the real world. The research done so far is more theoretical in nature and applicability value is not very much.

In the light of the above criticism, we would like to make a few suggestions for future research. Since the scope of the field is very vast, we will just name a few pertinent but interesting areas;

Action Research

Take up one particular industry and study some aspects which are of importance. Give them some input and feedback and then study them again. This kind of research will prove to be very useful.

Women

Very little has been done about women in organisations. In-depth studies are necessary to fill the void.

Public Sector Undertakings

With an abundance of public sector undertakings in the city many aspects like the climate and role conflict linked to performance and efficiency, and ways to improve them can be studied.

Quality of Working Life

This is very essential for effective functioning and should be studied at all levels of management as well as among the workers.

Testing

Tests should be developed for Indian conditions, as they will definitely differ from those in foreign countries.

Successful managers and entrepreneurs could be studied, so that we will know that are the essential qualities for a successful manager or entrepreneur. These can be emphasised in management schools while training students.

Case Studies

Since inter-personal behaviour as well as many of the incidents in industrial relations can provide a lot of scope for discussion, case studies on these topics should be done. They will give a better insight into many concepts in this area.

BIBLIOGRAPHY

Research in O. B.

Motivation

1. Bhatia S.K. and Valecha G.K., **Absenteeism-An Industrial Malady**, *Integrated Management*, Volume 13, No. 4, April 1978.
 2. Bhatia S.K. and Valecha G.K., **Absenteeism II-An Empirical Study of Factors Associated with It**, *Integrated Management*, Vol.13, No.4, April 1978.
 3. Bhatia S.K. and Valecha G.K., **A Review of Research on Absenteeism**, *National Labour Institute Bulletin*, Vol. 5, No.11-12, Nov. Dec. 1979.
 4. Valecha G.K., **What makes you tick ?** *Quarterly Journal of All India Institute of Local Self Government*, Vol.14, No.2, Oct. Dec. 1974.
 5. Valecha G.K., **Motivation-The Crux of Human performance**, *National Institute of Personnel Management*, Southern Regional Conference, Feb. 1-2, 1981.
 6. Venkataraman S. and Anantaraman R.N., **Organisational Climate and Need satisfaction**, *Indian Journal of Applied Psychology*, 1981.
 7. Venkataraman S. and Anantaraman R.N., **Need Satisfaction and Need Importance among Managerial Personnel**, *Journal of Psychological Researches*, 1981.
 8. Venkataraman S. and Valecha G.K., **Comparative Motivation-Pattern of Managers in Public and Private Sector Organisations**, *Managerial Psychology*, July 1981.
-

Personality

1. Sahni A. K., **Stress in Managers and Professionals in Indian Organisations**, *Indian Management*, Vol. 17 No. 10, October 1978.
2. Valecha G.K., **Qualities Essential in a Manager for being an Educator**, *ISABS Journal*, January 1976.
3. Valecha G. K., **Empathy**, *ISABS Journal*
4. Valecha G. K., **The Three Faces of Man : Child, Parent and the Adult**, *Phone Industry*, Vol. 31, No. 2, June 1979.
5. Valecha G.K., **What Matters in Life.....? Destiny or Will?** *Hocus*, October 1976.

Cultural Values

1. Soares, **The Effect of Organisational Size on Values of Indian Managers**, *Indian Management*, Vol. 20, 12 Dec. 1981.
2. Soares, Valecha G.K. and Venkataraman S., **Values of Indian Managers ; The Basis of Progress**, *Indian Management*, Vol. 20, No. 10, October 1981.
3. Valecha G. K., **Values: The Basis of Progress**, Key Note Address, 10th Annual Conference of Ethological Society of India, 27-29, January 1981, U A S, Bangalore.

Miscellaneous

1. Valecha G. K , **Participative Style : Is That Your Cup of Tea ?** *Behavioural Science*, Vol. 2, June-July 1977
2. Valecha G. K , **The Role of Sense of Control and Participation in Productivity Seminar on Human Side**

- of Enterprise, 2 - 3 February 1979, Managerial Psychology, Vol. 1, No. 1, 1980.
3. Padaki V., Management and Change, Paper Presented at 35th All India Textile Conference at Ahmedabad.
 4. Valecha G.K., Towards an Indian Style of Management, 10th Annual Conference of LAMD, IVCCER and All India Seminar on Management Education, December 31, 1978 & January 1 - 9, 1979.
 5. Valecha G. K., Management by Objectives, A Motivation Techniques Integrated Management, No. 1151, Nov. 1975.
 6. Varadhan M. S. S., Nath I. V. S., Roy S. K., Valecha G. K., Seromany, Prof. Rebello, The ISTD, Bangalore Study Group Experiential Learning, Seventh Annual ISTD Convention, Bombay.
 7. Roy S. K., Entrepreneur Development in India, Is Achievement Motivation Training, the answer? from MM Karnik (Ed), Entrepreneur Development, MSSRDC, Bombay 1976.

Research in I. R.

1. Gandhi K., Inter-Relationship between Workers and Officers Organisations-A study of Canara Bank.
2. Bijoor S. R., Labour and Industry in India, Karnataka Labour Journal, Vol. 11, No. 6, 1977.

Case Studies

1. Bijoor S R., A Case Study about a Bank.
 2. Bijoor S.R., A Case Study of a Labour Welfare Officer.
 3. Valecha G. K., Welders Strike Notice 1 at ADP, Trichy.
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PUBLIC ENTERPRISES

KUMUDINI BAXI

Most developing countries of the world have resorted to state enterprises to bring about rapid economic development and the desired social change.

In India, the public sector has been greatly expanded and diversified from its original base in the infrastructural sphere of posts and telegraphs, irrigation, public works ordnance factories, telephones, communications and railways, to almost all key and basic sectors of the economy including coal, copper, zinc, lead, atomic energy, electricity production. Public sector is partly in aluminium and iron ore. It now includes bulk of the large commercial banks, insurance companies, the major segment of steel industry, oil exploration, production, refining and marketing of crude gas, and fertilisers, heavy engineering, heavy electricals, electronics, railway locomotives, aircraft and air transportation, ship building and even substantial segments of the industries or machine tools, heavy earth moving equipment and watches. For entirely different reasons, the State has also in its fold 100 and odd ailing textile mills, some of the sick engineering units, besides a significant portion of the country's imports and a quarter of the national exports, as also some of the basic drugs and pharmaceuticals.

Although the public industrial sector has assumed an increasingly significant role in India, there are many areas of public enterprise which require formulation of business like and concrete strategies so that the sector can become an effective and self-generating instrument of economic development. These areas require research and further thinking for their development. A considerable amount of research has been carried out on public enterprises in India.

The purpose of this note is to take a rapid inventory of the research and academic out-put on public sector enterprises by the faculty of Indian Institute of Management, Bangalore, in terms of objectives, methodology and results.

The major research work done by the IIM-B faculty is under the Research Programme of IDRC which seeks to assess the performance of public enterprises at macro and micro levels. The other work done in this field is in the form of unpublished monographs, articles and journals and news papers. The latter briefly touch on areas like conceptual framework of the public sector in India and of public sector management, relative growth of public and private sector, public administration and public enterprises in the Indian sub-continent, public enterprises system in UK and Europe, key strategies and issues for public corporations for long-range planning and towards continuing education.

IDRC Research Project on Public Enterprises

As stated earlier, the major research work on public enterprises falls under the research programme of the International Development Research Centre of Canada with the aim of making an objective appraisal of the systems and performance of public enterprises in the South East Asian Countries. At the invitation of the centre, India also participated in the programme along with seven other Asian Countries. In this research project, the Indian Institute of Management, Bangalore and the Bureau of Public Enterprises, Government of India, New Delhi, worked in close collaboration.

The project leaders for this research project were Ramaswamy N.S. (Director, IIM-B) and the Director of Bureau of Public Enterprises. Shivaramu S. (IIM-B) was the co-ordinator for micro studies and some of the faculty members and the research staff of IIM-B worked in this research project as team members.

The Indian Research Project consists of two parts, one relating to the overview and performance of the public enterprises (micro study) and the second concerning the performance of evaluation of management practices of selected public enterprises (micro study). The results of the research projects have been published in various reports at different conferences from time to time. The period taken carrying out this research project is from 1975 to 1978. Performance of Public Enterprises-Macro Report (1978) is the final published report of this research project, superseding the three drafts presented earlier. The first draft was presented at the Seoul Conference in September 1975, a second, and a revised draft was presented at Kathmandu Conference in March 1976. It was further revised by adding some mandatory requirements, and the third draft was presented at the Bangkok Conference in January 1977.

The reports on the micro study include a report on the environment, a report on the total sample, seven case studies, two bi-national comparison studies and 19 system studies of individual enterprises. There are some other publications like Summary of the Micro Studies or Comparative Review of Kathmandu Papers which highlights the methodologies adopted for micro study by India or other participating countries.

Objectives of Research Project

The basic objectives of the macro study are :

- 1) to describe systematically the public enterprises sector in India
- 2) to identify specific goals of public enterprises
- 3) the established criteria to measure the achievement of these goals
- 4) to evaluate the performance of a sample of public enterprises in the light of established goals and criteria ; and

- 5) to make concrete policy recommendations for improving performance of the public enterprises in India.

The objectives of the micro study are to examine the performance of industrial units in a given environment.

The macro study attempts :

1. to identify the goals of the units both in respect of efficiency of its operation as well as its effectiveness.
2. to analyse the environment under which a particular enterprise was operating, whether the environment was conducive to its efficient operation or otherwise.
3. to evaluate the performance (as far as possible) in quantitative terms by :
 - a) Inter-firm comparison
 - b) inter-firm comparison (trend analysis)
 - c) inter-industry comparison and
 - d) inter-national comparison.
4. to assess the extent of trade-offs among different objectives :
 - a) functional efficiency affecting total efficiency
 - b) effectiveness vis-a-vis conflicting goals, and
 - c) efficiency of performance.
5. to explain the divergence between the actual performance and the expected performance.

Data Collection Procedure

The scheme for data collection and processing has been described below :

For macro study, the statistical data has been drawn from the National Accounts Statistics published by the Central Statistical Organisation. The constant year has been shifted to 1969-70 base as per the Kathmandu Guidelines.

The methods of estimating the various parameters used in the Central Statistical Organisation has been given in the macro report.

To get a detailed list of Central Government Enterprises, use has been made of the Commerce Year Book 1973-74 and the Annual Report of the working of Public Enterprises published by the Bureau of Public Enterprises. The employment figures have been obtained from the Economic Survey, 1973-74, published by the Directorate General of Employment and Training, Ministry of Labour and Rehabilitation, New Delhi.

Regarding micro studies the scheme adopted for data collection and processing has been:

- i) Preparation of detailed specific questionnaires according to various types of industries or service organisations
- ii) Collection of data through questionnaire and visits
- iii) A preliminary analysis in consultation with the Chief Executive of that particular enterprise
- iv) Preparation of "Systems Approach" paper on units for detailed comments from the units. These comments have been incorporated in the reports.

Review of the Macro Report

Performance of Indian Public Enterprises, Macro Report, is the Final Report of this Research Project.

The concept of public enterprises employed in this report covers organisation control, ownership and marketing aspects of productive entities. The Report describes the evolution of public enterprises, its current status and also the quantitative measure of its magnitude in terms of such macro national parameters as domestic product, savings, capital

formation and employment. The conclusions of the macro study with recommendations for improving performance are given in the last chapter of the report.

Three preliminary reports have also been on similar lines of the final report. These publications define clearly the concept and method used for the preparation of the studies concerned and point out the limitations of the studies. The three legal forms of organisation as evolved for public enterprises are distinguished in terms of different proportion of control, autonomy and accountability and their rationale is explained by the differences in the goal structure in view. The divergence between legal autonomy and operational autonomy is explained in terms of the difference between actual control and legal control arising from changes in the goal structure bound up with the development strategy. The national developmental goals sought to be achieved through the operations of public enterprises are discussed and the trade-offs and incompatibilities are identified. In these reports the basic issues involved in the definition of public enterprises are also briefly discussed in the light of the Indian experience and a qualification is inserted into the definition to suit the Indian conditions. Finally, the contributions of public enterprise sector to the national economy are analysed in terms of gross domestic product, gross domestic capital formation, gross domestic fixed capital formation, gross domestic savings employment and tax revenue. The finding of the reports is that the incremental capital and labour to incremental output has not been as impressive as in private sector. The Report argues that by introducing modern management concepts and techniques appropriate to the individual enterprises and by changing the thinking pattern and introducing technology to suit the pressing social needs and to facilitate the efficient utilisation of all available resources, public enterprises can become not only economically viable but also a potent instrument of development.

Review of the Micro Report

The Volume, Policies, Control and Performance of Public Enterprises in India is a continuation of IDRC Project and it represents the total sample.

This volume, in two parts A & B, demonstrates some approaches towards solving the problems of aggregate level performance evaluation. Part A deals with various functional areas of management. This is based on primary data (replies to the questionnaire) as well as on some published data (reports of BPE).

In part A, the researchers have :

- developed a technique to measure the cohesiveness or otherwise of the objective
- proposed criteria and a method to rank the overall performance of a unit
- shown how macro-level maintenance management can be evaluated
- demonstrated how materials management performance can be checked
- shown how the technique of 'portfolio management' can be used to guide public investment
- studied the market-structure of public undertakings and indicated how export performance can be evaluated
- studied opinions regarding wage policy, trade-unions, participative management, etc.

Part B, which is based on published data (Annual Reports of the BPE) deals first with further aspects of financial performance. A framework for the study of inter-personal performance at various levels; inter-firm, intra-industry and inter-industry has been presented. How a computer based system of performance evaluation and control can be deve-

loped has been pointed out here. Some relatively new techniques of evaluating financial performance such as discriminant analysis, decomposition measures, multivariate regression analysis, etc. have been explored in this section. The relative computer programmes and summary results illustrating the use of these techniques are presented.

Part B, then presents an article by Ranajit Dhar and Elhance Arun, on relative growth of public and private sectors. The aim of this monograph is to construct a consistency model for working out efficient allocation of resources for the balanced growth of the various public and private sectors. The development of this model is based on a detailed analysis of :

- i) the relative roles played by these sectors during the past plan periods
- ii) their expected role in the future, taking into consideration the given development objectives and the nature of their structural inter-dependence.

The present study is undertaken for the national economy as a whole and, therefore, the implications for the development of backward are not covered at this stage. The study, basically, is to work out alternative profiles of consistent growth of public and private sectors based on various assumptions regarding (i) the future pattern of inter-sectoral linkages and (ii) the relative roles of public and private sectors in meeting the final demands for private and public consumption, investments, exports etc. A number of policy issues crop-up here indicating the relative share of public and private sectors in meeting inter-sectoral and final demands. Such policies, essentially, have to be derived after ascertaining the full implications of various strategies. The study, therefore, works out the implications on relative magnitude of (i) output (ii) value added (iii) investment (iv) employment etc. of public and private sectors for alternative roles in meeting inter-sectoral and final demands.

The consistency model consists of the following components :

- i) Construction of macro-economic balances for the base year showing details of aggregate income, consumption, savings, investment etc. with break-up into public and private sectors.
- ii) From the base year data on macro-economic balances, target year projections for similar items have been obtained. A number of alternative projections of the break-up of various macro-aggregates into public and private sectors have been worked out from the estimates for the total of public and private sectors.
- iii) An input-output model has been constructed to work out projections of a consistent set of output levels for various public and private sectors. The model essentially provides alternative sets of output levels based on alternative patterns of allocations for meeting the required final demands.

The year 1973-74 has been used as the base year and the analysis has been conducted for a 10 year planning horizon. Thus 1983-84 is the target year.

The input-output model has been constructed for 7 sectoral groups of the economy (both public and private sectors) as well as imports. The sectors are as follows : agriculture and allied activities, manufacturing, construction, other services, mining, electricity and transport.

The Report "Financial Analysis of Public Enterprises in India" computerises the data for about 140 Central Public Undertakings in India. The report suggests the scheme for computerisation which includes (i) creation of data bank (ii) creation of a statistical bank and (iii) establishment of retrieval/update procedures.

In the second chapter of this report, the financial structure underlying Indian Public Enterprises during 1969-1975 has been identified in terms of a basic factor pattern involving six factors. The factors have been linked with fixed assets, leverage, short and long-term capital intensiveness, sales inventory effectiveness and profitability. Most ratio-factor associations remain stable : significant shifts have been observed only for six ratios. Transient changes in a few ratio-factor associations (loadings were moderate to low) caused some perturbations to the basic factor pattern.

In the third chapter, the financial structure of Indian Public Enterprises, as identified through factor analysis, has been used to set up discriminant functions to distinguish between deficit and non-deficit companies from 1969 through 1975. The financial status of these companies as 'predicted' by discriminant functions have been compared with their actual status. These "predictions" actually constitute a post-mortem validation of the functions since hindsight (in the form of actual values of ratios) has been used. These techniques can be used to foresee, in a more realistic fashion, the financial status of a company, if projected budgets of individual companies are available.

The fourth chapter takes up "Evaluation of Public Sector Financial Performance," in which the technique of performance evaluation has been outlined in the form of a simple and versatile tool that can be used to study an aggregate of organisations. The article has dealt with a very high level of aggregation by the entire centrally owned public sectors. But the technique can also be applied at a lower level of aggregation for example, trends in intra-industry performance can be studied. The use of the technique can be extended to the study of non-financial indices also, if compatible measurements on a wide range of enterprises can be made. The other sections have been furnished with details about programmes on retrieval and financial ratio calculation, factor

analysis, discriminant analysis and multiple lines regression. Ratio table for time frame has also been given at the end.

Case Studies

'Volume I : The Environment' is an analysis of the Environment of Public Enterprises in India. In general it examines the infrastructural facilities in the country and their variations in different regions, the support structure of the economy at the disposal of public enterprises as well as the policy structure. The data provided in volume I is general information and does not indicate the availability or non-availability of facilities to a particular enterprise. It reviews the state of environment under which the enterprise has to operate. Under infrastructure, items such as power and energy, water, transport, communications, education, manpower, health and banking facilities are included. These fall under the traditional concept of infrastructure in an economy. Manpower has been included in order to present a picture of availability.

The support structure includes finance, foreign collaboration, research and development and fiscal incentives. A review of internal finance in public enterprises is included in Annexure to Part II. Policy structure forms a third section, in which an attempt is made to find out how the boundary conditions under which public enterprises operate/originate from; what are conditions of each directive and what their nature; whether it deals with procedural issues, or policy issues or incentives, etc.

A combined treatise of all the above sections gives a background of the environment under which the public enterprises in India are operating. This can be used for cross reference whenever study of a unit as undertaken, to know how environment affects the operation of the unit, whether as constraint or opportunity for the efficiency effectiveness of the given enterprise.

Volume II, provides cases for bilateral comparison viz., pharmaceutical and steel.

Volume III, supplies cases for multilateral comparison viz., refinery and shipyard.

Two case studies of fertiliser and cement industries have been included. Earlier Korea had made case studies of the Fertiliser Industry, and the Sri Lanka, cement industry. It is assumed that these two Indian samples should enable IDRC to compare the methodology and analyse with the other country cases. In these case studies inter-firm or intra-firm comparisons have not been attempted due to lack of adequate samples.

In the Binational Inter-firm Comparison, Volume I and Volume II, two cases of fertiliser and cement have been presented. The objective of the exercise has been to develop methodologies for evaluating public enterprises in any given environment.

The bi-national comparative study of the fertiliser industry concerns two firms from India and four firms from Korea. The first two parts of this study deals with the environment and internal management. The concentration is towards identifying the environment in which these firms are operating and studying the internal efficiency of these companies with a few indicators. In Chapter II, an approach has been suggested to identify the sensitivity of the Government policies in the operational efficiency of Indian firms (using the notion of the inter-action string).

In Part III, three alternative modes of evaluating public enterprises with regard to their external effectiveness have been dealt with. These three methods are effective analysis, cost-benefit analysis and social efficiency audit. This attempt is mostly concerned with adopting the methodology rather than with the evaluation of methodology. But here, the

researchers feel that systems approach along with the said theory of inter-action strings and trade-offs, would be most appropriate from the angle of immediate policy implications.

In this study, 35 propositions in all have been generated, which might be used as hypothesis for further studies, and some of which may be generalised for the totality of public enterprises. Further, an attempt has been made to quantify some of the trade-offs due to either Government or Company policies which have significantly affected performance.

The second volume of the present report is a bi-national comparison of Indian and Sri Lanka firms in the cement industry. Lacunae in the data-base being more for the cement studies than for the fertiliser studies, the report is not as comprehensive as Volume I.

An alternative method of presentation of inter-firm, and inter-country comparison has been introduced here. In the summary of this report a "comparison stream" has been given and the extent of congruence in performance by calculating the convergence co-efficient has been estimated. In chapter 8, a "Diagraphic" method of illustrating the inter-firm comparison has been tried out. Some information about the Indian Private Enterprises vis-a-vis Indian Public Enterprises has been presented in this volume.

The Systems Studies

Systems Approach : The principal objective of the macro study was to evaluate the performance of selected public sector units. To fulfil this requirement, the systems approach was presented by the Indian team which takes into account all environmental factors to determine the conditions under which the enterprises operate. Here the purpose is to identify the constraints and opportunities of an enterprise at a given point of time and to evaluate the enterprises keeping these in mind. For temporal analysis, it has tried to use well

established criteria of internal efficiency in different functional areas. While fulfilling functional ends, it has also tried to find out, if there is any trade-off with other functional divisions of the same company. These trade-offs are not only a factor of the efficiency of the functional groups but also a measure of managerial inter-action with the personnel of the company. So it has tried to evaluate the efficiency from the managerial point of view also. In this field, it has taken a few elements to frame an index which also provides managerial efficiency in relation to its effectiveness, centralisation, process and personnel practices

Evaluation of Public Enterprises, Systems Approach, is a paper prepared by Shivaramu S., which tries to evolve a methodology which can provide a set of inter-related and meaningful parameters to evaluate or appraise the performance of micro-units in the public sector in its entirety. By "entirety" it has been meant, to consider the micro-unit not as an isolated entity but as a part of a system of larger social, and economic values, which implicitly or explicitly define the unit's goal structure.

The goal structure has been studied from three points of view : The motives behind the setting up of public sector units, the set of objectives provided as broad guidelines and the operationalisation of these guidelines to specific corporate objectives of the individual micro-units. In this sense, the goal structure is a continuum, extending from the national objectives to corporate objectives which in turn works up to the operational objectives of the different functional departments of the micro-unit. Any attempt at formulating an integrated appraisal methodology has to appreciate this inter-linkage of objectives.

Secondly, the appraisal of the performance of micro-unit, in its entirety highlights and significance of the influence of environmental factors, in terms of constraints and opportunities, on the efficient operation of the unit. An incisive

analysis of the environmental factors in terms of overall politico-economic control mechanism, the nature of market structure and the governmental policies and directives has also been undertaken.

Finally, the appraisal takes cognisance of the internal constraints and opportunities within the micro-unit in terms of availability of physical, technical, financial and human resources.

The report on "Summary of the Micro Studies" points out in detail the systems and procedures of different aspects of management like production, material, financial, marketing and personnel and gives the analytical framework through which different units can be studied.

Sampling Scheme

In order to ensure that the units studied were representative of the Indian Public Sector, a sampling scheme was drawn up. The sample included central as well as few state run units too. The enterprises chosen fall into various categories, but were taken mainly from manufacturing enterprises. Factors that were considered in selecting the original sample were :

- Capital Employed
- Net Turn-Over/Capital Employed Ratio
- Capital Employed/Worker Ratio
- Capital Employed/Value of Production Ratio
- Capital Employed/Value Added Ratio
- Location in Backward Regions or Otherwise.

The team contacted 121 units and were able to complete analysis of 25 units, from which nearly 19 reports have been published, under the co-ordinatorship of Shivaramu S.

The unit level reports deal with various functional areas of management, production, materials, finance, marketing and personnel. The attempt has been to study the units in a "System" framework, and measures of effectiveness based on social costs and benefits have been computed.

Other Related Studies (Other than IDRC)

An "Approaches to Evaluation of Public Enterprises", Shivaramu S. points out the different approaches used by IDRC teams to study the public enterprises and evaluate their performance. The approaches listed here are : behavioural, politico - economic, financial, social efficiency audit and systems. The following sections present brief descriptions of these various approaches. The last section presents a summary and some comments on the approaches.

Conceptual Framework of Public Sector in India is an unpublished monograph of George P. V.

In Part I of this monograph, the economic rationale of three distinct types of productive activities in which the public authorities at the Central, State and Local Government level are engaged is explained in some detail. In part II, the market operations of public enterprises and the general principles of purchase and sales policies in an efficient economic system are analysed. In Part III, the trade-off between the commercial principles and social benefits in relation to two distinct forms of selling as well as buying, reselling operations of public enterprises vis-a-vis private enterprises is examined. The difficulties involved in resolving this issue are reconciled with the social objectives as dictated by the rationale of an efficient economic system.

Conceptions of Public Sector Management, an unpublished monograph, prepared by Meera Bakhrui and Vatsala Nagarajan, aims at understanding the overall management

conceptions of the top executives in the public sector and comparing them with those of the management educators.

The study has been confined to analyse the managers of six Karnataka State run industrial organisations viz., NGEF Limited, Mysore Papers Limited, Mysore Tobacco Limited, Mysore Acetate Limited and Mysore Minerals Limited. The companies vary in size and operations. Both medium and large scale units are included, with the turnover of capital ranging from Rs. 21.4 million in one company to Rs. 358.8 million in another. In the first section, the management conceptions of managers interviewed have been analysed and then compared with those of the faculty. The conceptions of both have been compared with what the researchers conceive to be the most desirable conceptions of a manager in the public sector. In the next section the educational background of the managers have been examined with the purpose to see how far they met the minimal requirements suggested by the faculty and, second, to examine requirements suggested by the faculty and, third, to examine whether these very conceptions of the practising managers change between managers with different educational backgrounds. An attempt has also been made to determine the extent to which the educational backgrounds have influenced the conceptions of both the faculty and the practising managers, towards the direction of public sector goals.

The following areas have been pointed out by Shivaramu S., for further research in his "Reflections on the IDRC Project" :

- 1) Pursue more intensive studies in each functional area for overall performance indicators
- 2) Questionnaire design to facilitate computer use
- 3) Executive behaviour in public enterprises, with particular reference to interactions with the government

- 4) Studies of trade unions in public enterprises
 - 5) Simulation of performance (continuation of studies in the financial framework of Part B of the "Policies, Control and Performance of Public Enterprises in India" report)
 - 6) Opinion surveys of managerial and other personnel in vital areas of public enterprises functioning
 - 7) Comparative studies of public and private enterprises in specific industry areas
 - 8) Comparison of public enterprises in developed and developing countries
 - 9) "Spread" effects of public enterprises on the area of location of the enterprise
 - 10) Transfer of technology and indigenisation by public enterprises in developing countries
 - 11) Data Bank (computerised) and standard analysis of public enterprises performance
 - 12) Combining primary and secondary data for analysis of public enterprises within the same framework.
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BIBLIOGRAPHY*I Agarwala P. N.*

1. Public Administration and Public Enterprises in the Indian Sub-Continent, Bangalore, IIM-B.
2. Marketing Challenges in Public Sector, Deccan Herald, 3 December, 1977.
3. Public Enterprises in UK and Europe I-III, Deccan Herald, August 6-8, 1978.
4. Hungarian Experience in Public Enterprise Management, Deccan Herald, 18 March, 1979.
5. Control and Autonomy in Public Sector (Unpublished Monograph).
6. Relative Growth of Public and Private Sector, (Unpublished Monograph), October, 1977.

II George P. V.

Conceptual Framework of Public Sector in India, (Unpublished Monograph).

III Mira Bakhru & Vatsala Nagarajan

Conceptions of Public Sector Management, (Unpublished Monograph).

IV Nayar G. K. and Kamath V. G.

Linking Wage and Bonus to Productivity, Deccan Herald, 8 July, 1979.

V *Ramaswamy N. S.*

1. Overview of Public Enterprise Sector in India, A Preliminary Report, (Performance of Public Enterprises in Asia, Project Sponsored by International Development Research Centre, Ottawa, Canada), March, 1976.
 2. Public Enterprises in India—Micro Study, Kathmandu Conference Papers, (Performance of Public Enterprises in Asia, Project Sponsored by IDRC), April, 1976.
 3. Comparative Review of Kathmandu Papers (PPEA), (Performance of Public Enterprises in Asia, Project Sponsored by IDRC), July, 1976.
 4. Case Study on Fertiliser Industry and Cement Industry, Draft Report, Singapore Conference Papers, (Performance of Public Enterprises in Asia, Project Sponsored by IDRC), August, 1976.
 5. Performance of Public Enterprises in Asia, Project Draft Report, January, 1977.
 - Vol. 1 : The Environment
 - Vol. 2 : Bilateral Comparison Cases on :
 1. Pharmaceutical Company
 2. Steel Company
 - Vol. 3 : Multilateral Comparison Cases on :
 1. Oil Refinery
 2. Shipyard

[Pattaya (Thailand) Conference Papers, Sponsored by IDRC].
 6. Bi-National Inter-Firm Comparison on Fertilisers (India and Korea), Vol. 1, Colombo Conference Papers, (Performance of Public Enterprises in Asia, Project Sponsored by IDRC), 1977.
-

7. Bi-National Inter-Firm Comparison on Cement (Indian & Sri Lanka) Vol. II, Colombo Conference Papers, (Performance of Public Enterprises in Asia, Project Sponsored by IDRC), 1977.
8. Overview of Performance of Indian Public Enterprises Sector—A Research Study, (Sponsored by IDRC & Government of India), January, 1977.
9. Policies, Control and Performance of Public Enterprises in India, Colombo Conference Papers, (Performance of Public Enterprises in Asia, Project Sponsored by IDRC), Nov., 1977.
10. Summary of the Micro Study, (Performance of Public Enterprises in Asia, Project Sponsored by IDRC), Nov., 1977.
11. Financial Analysis of Public Enterprises in India, (Performance of Public Enterprises in Asia, Project Sponsored by IDRC), April, 1978.
12. Performance of Indian Public Enterprises—Macro Report, (Sponsored by IDRC & Govt. of India), 1978.
13. Professional Management Content in Public Sector, Lok Udyog, Vol. 9, No. 6, Sept., 1975 and Indian Manager, Vol. 8, No. 3, 1977.
14. Public Sector (Unpublished Monograph).

VI Shivaramu S.

1. A Systems Study of Cement Corporation of India (Kurkunta unit), Draft Report (Sponsored by IDRC), June, 1976.

2. Comparative Study of Kathmandu Papers-A Rejoinder, Singapore Conference Papers (Sponsored by IDRC), Aug., 1976.
 3. A Systems Study of Fertiliser Corporation of India (Trombay Unit), Draft report, (Sponsored by IDRC), August, 1976.
 4. A Systems Study of Modern Bakeries India Ltd., Bangalore Unit, Draft Report, (Sponsored by IDRC), Aug., 1976.
 5. A Systems Study of Viswesaraya Iron and Steel Ltd., Bhadravathi, Draft Report, (Sponsored by IDRC), Sept., 1976.
 6. A Systems Study on Electric Corporation of India Ltd., Bangalore, Darft Report (Sponsored by IDRC), Jan., 1977.
 7. A Systems Study on Hindustan Machine Tools Ltd., Bangalore, Draft Report, (Sponsored by IDRC), Jan., 1977.
 8. A Systems Study on Maharashtra State Road Transport Corporation, Draft Report, (Sponsored by IDRC), January, 1977.
 9. A Systems Study on New Government Electric Factory, Draft Report, (Sponsored by IDRC), January, 1977.
 10. A Systems Study on Coal India Limited, Draft Report, (Sponsored by IDRC), February, 1977.
 11. A Systems Study on Maharashtra Small Scale Industries Development Corporation, Draft Report, (Sponsored by IDRC), Feb., 1977.
-

12. A Systems Study on Neyveli Lignite Corporation, Draft Report, (Sponsored by IDRC), Feb., 1977.
13. A Systems Study on Scooter India Limited, Draft Report, (Sponsored by IDRC), Feb., 1977.
14. A Systems study on Fertiliser and Chemicals Travancore Limited, Draft Report, (Sponsored by IDRC), March, 1977.
15. A Systems Study of Indian Airlines, A Draft Report, (Sponsored by IDRC), March, 1977.
16. A Systems Study on the Shipping Corporation of India Limited, Draft Report, March, 1977.
17. A Systems Study on Gujarat Oil Refinery, Draft Report, (Sponsored by IDRC), April, 1977.
18. A Systems Study on Heavy Engineering Corporation Ltd., Draft Report, (Sponsored by IDRC), April, 1977.
19. A Systems Study on Bharat Heavy Electricals Ltd., Draft Report, (Sponsored by IDRC), May, 1977.
20. A Systems Study on Josephs and Company, Calcutta, Draft report, (Sponsored by IDRC), Aug., 1977.
21. Evaluation of Public Enterprises—Systems Approach, (Presented at IDRC Conference, Kathmandu 1976).
22. Government and Public Enterprises—Policies to the Efficiency, (National Seminar on Management Research by IIM-C), 11-13 January, 1979.
23. The Role of Public and Private Sectors in Indian Economy, (Presented to the Seminar on the Role of Public and Private Sector in Indian Economy, Sponsored by Gokhale Institute of Public Affairs, Bangalore), 28th July, 1979.

24. Approaches to Evaluation of Public Enterprises, (unpublished monograph) 1978.

VII Subramaniam S. and Balasubramaniam R.

Key Strategy Issues for Public Corporations, Long Range Planning, Vol. 7, No. 2, October, 1974.

VIII Vyasulu V.

The Un-organised Sector and Public Enterprises—Some Issues, Towards Continuing Education. Vol. 1, No. 7, October, 1979.

UN-ORGANISED SECTOR

T. V. RAMESH*

The un-organised sector includes all those activities conducted in conventional or informal modes of organisation which are yet to experience the impact of modern management techniques.

The Indian Institute of Management, Bangalore, has been focussing attention not only on the organised segments of activity in various sectors, but also on the un-organised segments of the informal sector, in order to assess the scope for introducing management techniques to the organisation of the informal sector.

The following is a brief review of the work carried out at the Institute in the area of un-organised sector.

Most of the work in this sector has been in the field of animal husbandry and allied areas, including meat and meat products, animal energy, the bullock-cart and agricultural implements. Others include studies on film distribution, marketing of butter and ghee, etc. For the purpose of review, the studies undertaken by the Institute in the area of un-organised sector have been classified as follows :

Un-Organised Sector (Area of Activity)

<i>Livestock and Allied Aspects</i>	<i>Others</i>
Animal Husbandry Development	Film Distribution
Draught Animal Power	Beedi Making Units
Bullock-Cart	Market Study of Butter and Ghee
Agricultural Implements	Socio-Economic Status of Artisans

* Finalised in consultation with Tagat R.G.

Animal Husbandry Development

Programmes and activities that were initiated and implemented in the past for the benefit of rural areas are many. While some of the programmes did help a segment of the population in the areas in which they were executed, they did not pave the way for economic development of the rural areas. Most of the past programmes and activities for development were confined to areas with good natural resources and they left out vast areas in the country which did not have assured rainfall and which were affected by drought periodically.

Till the launching of the Drought-Prone Area Programme (DPAP) in the Fourth Plan, problems arising out of drought were tackled on an adhoc basis, mainly to relieve human suffering after the drought had taken place. There was no systematic effort to develop these rural areas so as to prevent the recurrence of drought and to reduce the impact of drought when it occurs.

Indian agriculture is known to be a gamble. It is all the more so in drought-prone areas which are in arid to sub-humid regions. In these regions, as in the rest of India, agriculture is the predominant occupation. Risks associated with agriculture are of a high magnitude due to poor quality soil, lack of irrigation facilities, unscientific crop rotation, poor management resources etc. Solutions to the problems of drought-prone areas can be approached from many angles, if such areas and the population affected form a small portion of the total. Unfortunately this is not so and all types of solutions are not feasible.

In an attempt to examine the resource endowments and the scope for animal husbandry development in Dharmapuri District in Tamil Nadu, with particular reference to dairying and sheep rearing, the authors note that there are two types of solutions which should be feasible. Under the first would come all programmes to reduce the impact

of drought and risk of crop failure. Under the second would fall programmes to spread the risks. Since these two types of solutions are not mutually exclusive, both could be pursued simultaneously. Programmes to reduce the impact of risk from drought are development of irrigation facilities, soil conservation, afforestation, etc. Programmes to spread the risks would involve diversification of activities in the rural economy. The report deals in detail with this aspect of diversification. In the context of crop husbandry, diversification would mean combining other activities such as animal husbandry, sericulture, horticulture, pisciculture etc., which would be both complementary and supplementary to crop husbandry. The study has examined :

- 1) The present status of dairy development activities in the district with special reference to milk production, marketing, feed and fodder situation, breeding programmes and veterinary services ;
- 2) The economy of the farms engaged in dairy husbandry at present and the optimum herd size of milk cattle farms ;
- 3) The scope for integrated dairy development in the district in relation to the resource endowments on the one hand and the market possibilities for dairy products on the other ;
- 4) Linkages to be established between the operations of the Tamil Nadu Dairy Development Corporation and the dairy development activity in the district ;
- 5) The supply and demand conditions of animal power for farm operations ;
- 6) The economics of sheep farming, including the scope for its future development.

Based on the study findings, the authors have suggested measures for development activity in selected

areas in the district. The plan of action for dairy development in selected taluks in the district with good milk production potential envisages a gradual increase in the number of artificial inseminations carried out over a period of five years, besides increasing production of green fodder through cultivation of high yielding perennial fodder varieties. The authors note that for this purpose, it is essential to devote a small portion of the irrigated area, which will be one per cent of the net irrigated area in the first year. This would subsequently go up to 8.5 per cent in the tenth year and there would be no need to bring more acreage under green fodder for the initial five years of the programme. In addition, it would also be desirable to develop the forest area for grazing and pasture, wherever possible. However, the authors observe that the impact of this action plan will not be felt until the fifth year.

In addition, they have also suggested setting up of dairy co-operative societies, chilling centres and marketing arrangements with the Tamil Nadu Dairy Development Corporation for the overall dairy development programme.

With regard to power inputs into agriculture, the study shows that about 50 per cent of animal labour was derived from cows and the rest from bullocks. There were, cows solely used for work and also those used only when dry conditions prevailed.

Depending on cow's labour was more among farmers owning less than 5 acres, 60 percent of animal power used by them was from cows. Out of the total requirements of animal labour (uniformly for all the size groups) more than 50 per cent was for preparatory cultivation.

The authors have raised a very valid question: Can the cattle of poor quality found in the area meet the requirements of farmers at the time of preparation for cultivation? To solve this they have suggested selective mechanisation. They have cautioned that in view of the

fact that mechanisation would mean huge investments and most machines are beyond the reach of farmers, the question of agricultural mechanisation has to be carefully looked into before coming up with a solution.

In a study commissioned by the Government of India, in pursuance of the recommendation made by the World Bank Review Mission, the authors have analysed the progress of the dairy development project under the IDA assisted DPAP in Bijapur District. This study is diagnostic in nature and the emphasis throughout the report is on problem identification and indication of broad alternatives available to improve the management of the programme rather than working out the minor implications of details of the alternative strategies indicated.

The study has dealt at length with the resource endowments in Bijapur District, salient features of the dairy development programme, present status of the programme, problems and alternatives with respect to marketing, programme planning and programme management, etc.

The dairy development programme has been assigned an important place in the drought-prone areas since it combines the income and employment objectives against the perspectives of a second objective which is not overly economic—the restoration of ecological balance in the areas. More than any other, the dairy programme is immediately and profoundly germane to the ecological objective. But a vicious circle which has a bearing on food supplies and cattle population has been working itself out remorselessly in the drought-prone areas. A closer look at the problem of cattle population, keeping in view the origin of the problem and its present status, is absolutely necessary.

The authors note that a review of programme performance over the last two years and the matching of achievements against targets, both physical and financial,

shows that the implementation has lagged behind plan conception. The fact is a sad commentary on physical performance. While budget grants have been expended eagerly and utilised to the full, the physical performance has been nowhere near commensurate with them.

While discussing the remedial measures, the authors observe that productivity of the animals is the crucial variable. Genetic upgrading will entail long gestation periods and is capital-intensive. In the short term, the feeding of the animal and health management holds out the promise of quicker economic returns and will save working funds besides. The grading of milk animals and genetic manipulation of the quality and strength of young stock are also important though they take time.

Based on the study findings, the authors have suggested a number of measures for dairy development in the region. With respect to the problems of marketing, they observe that the milk price policy should be reviewed and the prices increased. This will make the society's purchase price competitive and the producers in the village will definitely require such incentive. The role of societies as intermediaries in milk collection and the supply of inputs should be emphasised and vigorous efforts should be made to bring all owners of milch animals into the fold of the village co-operative society by emphasising the multi-faceted service contribution made by the society.

With regard to problem in programme planning, the authors have suggested setting up of additional chilling centres at intermediate points along the milk routes, readjustment in milk routes, setting up of stand-by chilling centres to meet any eventuality of a breakdown elsewhere in the milk route, establishment of mobile veterinary clinics, equipping field level technical officers to attend to minor complaints, etc. They opine that the dairy development project should be linked to the calf rearing scheme on the

basis of feed subsidy for ensuring better returns for graded cows under the programme.

With regard to problems in programme management, they have suggested that the roles of members of the spearhead team should be well-defined in terms of field supporting and dual services and the responsibilities of supervisory and technical functionaries of the spearhead team in relation to individual society should also be clarified since definition of their function is crucial in relation to DPAP authority. Dairying and co-operative societies should be organised on the Amul pattern and for proper co-ordination between various sections, the dairy development programme should be linked with agriculture and forestry sectors. They opine that greater flexibility and co-ordination can be introduced in programme implementation, if this is vested as a formal function in an autonomous agency under the overall control of the DPA development authority. Finally the long term objective of the dairy development project should be a balanced use of both the male and female cattle in rural areas by adopting suiting local breeds and the necessary infrastructure for long term development.

A diagnostic study to assess the market potential for sheep products in Ranebennur Taluk was undertaken in order to understand the locus standing of the taluk in a broader perspective. The main emphasis in the study was on the major occupation of the region, namely sheep breeding and the concomitant occupation of weaving, though the study was taken up to assess the market potential for sheep products, it was found that emphasis should be more on production than on marketing.

India's sheep population is 40 million and the country ranks sixth among the countries of the world in sheep population. Income from sheep is around Rs. 140 crores per annum, estimated on the basis of annual production of about 34.5 million kg. wool, 101 million kg. mutton, 14.6 million

pieces of skin, the value of manure and by-products like casings, effals, etc.

With regard to sheep husbandry in Ranebennur Taluk, the study includes extensive information on the economics of sheep breeding, prerequisites for sheep breeding, the popular myths and beliefs about sheep health, management and migration of flock based on such belief, performance of various breeds, sheep development schemes, activities and progress of sheep breeding farms, etc. The study report also includes a detailed note on the project for the development of sheep breeders and wool weavers in Karnataka proposed by the State Government. Details about meat, wool and kambali production, processing, marketing, price structure, etc., have also been included.

Based on the study findings, the author contends that there can be market improvement in income, if marginal improvements in sheep breeding and weaving are undertaken in the short-run and, for a long-run strategy, a proper programme of action with the concurrence of the beneficiaries on their priorities can be worked out.

The study can be summarised as a comparison between the strength and weakness of native cross-breeding and exotic cross-breeding and the opportunities and the threats involved in them. This will provide two distinct alternative development strategies, namely (a) Native x native cross-breeding, and (b) native x exotic cross-breeding available for Ranebennur Taluk.

The first alternative would envisage increased meat production combined with wool production. Marketing will not be a problem since efficient traditional channels of marketing already exist. Such a step would be welcomed by traditional herdsmen since it would not demand any elaborate change in their present system of rearing and management.

The latter alternative would also envisage increased production of meat and wool but on a higher scale than the former. The problems are that with a change in wool quality, there may be a decline in kambali production. Moreover increase in the marketing of wool and not the product is likely to lead to the disappearance of the processing occupation immediately. Exotic breeds would definitely call for a higher degree of health care and management.

However, these two alternatives are only tentative and need to be crosschecked with the proposed beneficiaries since the success or failure of programme depends on the degree of acceptance by the beneficiaries.

Draught Animal Power (DAP)

Draught Animal Power is an outstanding example of mass level application of appropriate technology to the millions of small farmers who have missed the fruits of development in the Third World. For both food and energy, the renewable draught animals integrated with the popular milk and meat systems produced by its own species have no equal. They convert the sun's infinite energy, through plant life, into energy and numerous products and services for man's well-being.

In a global report on DAP prepared for the Food and Agriculture Organisation of the United Nations, the author has highlighted the imminent need to develop DAP as a renewable energy source wherever it is technically feasible, economically viable and ecologically desirable. This can play a crucial role in easing the present energy crisis. The report has dealt at length with draught animals and development, magnitude of DAP, economic considerations of DAP, the role of DAP in farming operations and transportation, harnessing devices, infrastructure for DAP etc.

85 to 90 per cent of Asia and Africa depend on manual labour and DAP and the benefits of mechanisation

reach hardly 10 per cent. Man and beast still share the energy burden between them. 400 million draught animals in the developing countries, valued at 100 billion dollars, make available 150 million h.p., the replacement of which may need 250 million dollars. The modernisation of DAP would amount to strengthening the instruments that would enable the small farmer to make a decent living which he has been unable to do so far, as he has not been able to take part in developmental activities.

During their working life, draught animals provide not only motive power to millions of ploughs and other agricultural implements but also fuel for rural homes and fertiliser for soil. When dead, they yield meat, skin, bone and numerous other by-products useful to man. The important role of work animals, which crucial has been for man's subsistence for thousands of years continues to be so even today in many developing countries which will have to depend on DAP for many more years to come.

The author argues that development of DAP does not mean discouragement and/or discontinuance of mechanisation by petroleum-based power. In fact petroleum-based power can be encouraged wherever it is technically feasible and economically viable. Similarly DAP need be developed only where it is recognised as being inevitable or appropriate. DAP could be considered as complementary to manual labour on one side and petroleum-based power on the other. In most situations, there is no real conflict or competition between DAP and petroleum-based power.

Despite its significant contribution and further potential, DAP continues to be neglected factor in the rural economy in most development countries with the result that there is enormous wastage of its potential. A modernised and well-managed DAP system will certainly benefit man and society.

The report has highlighted the need for filling in information gaps in DAP statistics in terms of numbers, usage pattern, days of employment, etc. The number of people employed directly and indirectly, part-time and full-time in the animal drawn vehicle system in India may be 15 million, close to that of organised industrial employment. At least 3 million carts ply in the urban areas, providing employment and a reasonable return to the owners and cartmen, in fact, to the 6 million and odd people involved in the system. The investment per person employed will be less than 500 dollars and when the system is made more efficient, the return will be much more. Studies show that in urban areas, a hired cart with two animals costing about 700 dollars would bring in a revenue of 7.50 dollars a day to be shared equally by the owner, the cartman and the animal.

Countries inhabited by about 2 billion people depend on DAP for agricultural operations to a varying extent of 20 to 90 per cent.

The author notes that economic evaluation has been attempted from time to time, from various points of view, particular components or situations have been analysed but the DAP system as a whole has never been assessed. Only recently, when the energy crisis reached critical levels, serious reviews of the system's efficiency were attempted in a comprehensive manner. The problem was, no doubt, complex because of the inherent difficulties in measurement and establishing concepts and norms for comparisons. Although economic evaluation of DAP at present can only be tentative and general, rather than conclusive and precise, there is a need to establish more precise evaluation models.

There is evidence that rapid mechanisation has been hindered by technical, infrastructural and maintenance problems which of course have to be remedied quickly. Meanwhile, there are so many conflicting views among

energy experts and economists about DAP's basic efficiency. But whatever the validity of their divergent views, there is no difference of opinion regarding the need for increased power from manual labour and animals, as the total demand for power is more than what can be met by mechanical sources.

The author has recommended a number of measures that could be considered for the development of the DAP system. To mention a few :

Improved agricultural equipment and implements for draught animals will contribute to increase crop yield at reduced cost and effort. More work is necessary not only in designing improved implements but also in making them available to the farmer on a wide scale.

Modernisations of animal drawn vehicles can substantially increase the total freight moved by animal energy in rural areas and also in some urban areas. Animal systems logging can be improved for increased efficiency. Research and testing of improved designed vehicles and implements must be undertaken on a systematic basis.

There is tremendous scope for transfer of technology from the developed to the developing countries and amongst the latter themselves. Immediate documentation and extension of existing technology for transfer can start. Concurrently, R & D has to be launched to improve the existing designs of animal drawn vehicles. Packing and logging are the other two aspects where specific studies are called for. A multi-disciplinary team consisting of engineering designers, ergonomists, animal husbandry specialists and nutritionists should work together on harness design.

Improvement of infrastructural facilities for DAP would include breeding, feeding and health control of draught animals; financing, credit for DAP, hiring systems for draught animals, global programmes for bio-gas develop-

ment, directory of experts on DAP and where the magnitude of DAP activity warrants, the governments should consider the establishment of autonomous Animal Energy Development Boards with adequate financial resources. Such an organisation would be responsible for organising and overseeing the development and management of the DAP system.

A number of suggestions have also to be recommended for action by individual governments, international agencies, organisations, etc., for the development of DAP.

In conclusion, the author observes that DAP will not take-off unless there is deliberate intervention and assistance from the UN system and from the professionals in developed and developing countries. Ofcourse, finally the concerned governments themselves will decide on the importance of DAP.

In a compendium of several related papers on the bullock-cart, its modernisation, the management of animal energy resources in India, increasing animal productivity and reducing cruelty to work animals, including a note on stunning and slaughter, the author has presented statistics to convincingly demonstrate the importance of animal power and carts in Indian economy. Discussing drawbacks in design that need to be overcome, he offers evidence that the improvement of harnessing devices, agricultural implements and carts should be given a high priority by the government. To accomplish these objectives, he proposes the establishment of an Animal Energy Development Corporation and outlines a programme of activities. He also argues for less cruelty to the animals both in general use and through promotion of improved slaughter methods and slaughter house facilities.

Energy available from 80 million work animals is of the order of 40 million h.p., roughly equal to 30,000 mega watts. Investment in the animal energy system,

including implements and carts may be of the order of Rs. 10,000 crores. Assuming that the cost of one kilowatt of electrical energy at the point of application is Rs. 10,000, the replacement of animals would call for an investment of anywhere between Rs. 200 to Rs. 300 billion.

Carts are used to move 15 to 18 billion tonne-km. of freight per year in India. But the traditional cart is defective in design. The draught power of the animal is wasted due to friction resulting from rough bearings and crude and inefficient harnessing, etc. The wobbling rim cuts into the road surface and damages it. Weights run high. Traditional carts can be improved by smooth bearings, lower weight, the use of pneumatic tyres on paved roads and the use of hard rubber tyres in rural areas.

With regard to slaughter, the author has discussed in detail the economic compulsion for slaughter, slaughter methods and the resulting cruelty, economic consideration, losses in the present system, etc. and has made out a case for the modernisation of slaughter houses and slaughter practices. The possible economic gains through modernisation have also been dealt with.

In an exploratory study to assess the scope for export promotion of meat and meat products through modernisation of slaughter houses, the authors have highlighted the disturbing situation existing in slaughter houses in Kerala and Madras, in terms of facilities and equipment for the hygienic handling of meat animals, meat products, utilisation of by-products, facilities for inspection, quality control and transport of meat and meat products.

The report presents a detailed summary of several reports pertaining to the modernisation of the meat industry. The authors have also reviewed the situation with respect to the various components of the system, namely, production of meat animals, meat marketing, procurement and transport of live animals, slaughter house facilities, slaughter methods,

meat inspection practices, slaughter house personnel, transport and sale of meat, by-product utilisation, slaughter houses and slaughter practices, etc. The concept of disease free zones has also been discussed.

The authors have emphasised the urgent need to organise the entire spectrum of activities involved in meat production. A number of suggestions to achieve this objective have been recommended. These include, inclusion of the meat industry in the list of priority industries by the government introduction of "stunning" of animals prior to slaughter, provision of incentives to farmers to undertake rearing and fattening of buffalo calves for slaughter, introduction of transport carriers for meat animals, improvement in basic facilities such as good quality water, lighting, ventilation, drainage, etc. in the slaughter hall organising a veterinary public health service; provision of working clothes and periodic screening of slaughter house personnel for communicable and other diseases, provision of requisite facilities for by-product recovery and storage, constitution of a Slaughter House Advisory Committee under the union ministry of agriculture and irrigation to formulate a national policy for improvement of the meat industry and to advise the government on related problems; a special agency for export promotion of meat products and the setting up of specific disease free zones to promote raising of healthy meat animals and export of disease-free meat and meat products of international standards.

The report concludes that the export demand for meat and meat products has been steadily increasing and in contrast to such a situation, most countries which were previously importing from India have banned any further imports for reasons of quality. This cannot be avoided unless slaughter houses and slaughter practices are modernised in order to ensure production of quality meat and meat products. In addition, modernisation would also ensure

production of wholesome meat and meat products at economical prices, production of better quality hides, skins and other by-products would also cut down import of wool, grease and animal oils, and help the country in attaining self-sufficiency in insulin, pancreatin and other glandular products, improve environmental sanitation, and last but not least, raise the level of employment and ensure better income to a large section of people employed in the slaughter industry.

Bullock-Cart and Agricultural Implement

In the article on the utilisation of animal energy and the development of improved carts, the author has highlighted the role of draught animals in agriculture and rural transportation in India and argues that the country will be compelled to depend on draught animals as a source of energy to cater to the requirements of these sectors.

Data about the number of carts, freight carried, distance travelled and a comparison with other modes of transport such as the railways and trucks have been presented. To demonstrate the comparative cost advantage of "Animal Energy Systems" over "Petroleum Energy Systems" for rural farm transportation, the energy requirements and capital cost for carrying one ton farm load have also been presented.

A brief review of the work done/being carried out by the Indian Institute of Management, Bangalore, with regard to various aspects of the animal energy system including improvement of carts has been included. The author observes that initial studies undertaken at the Institute clearly indicate that the propagation, redesign and development of animal energy systems as well as their utilisation will revitalise rural India.

Dealing with future plans of the improved bullock-cart design programme, the author observes that three more

improved prototypes will be designed in order to suite at least a total of six market requirements by 1982-83. There are also proposals for schemes to establish a resting centre for carts, and undertake mass trials, extension and popularisation of the already evolved improved cart prototypes.

Details of the three improved designs of bullock-carts, namely the yatra cart, malanad cart and kissan cart, including their drawings, have also been presented.

In a paper presented to the Indian Society of Agricultural Engineers, the author notes that the modernisation and improvement of the efficiency of rural transportation system has assumed significance because of two important facts. The first is the poor condition of rural roads and cart tracts which continue to be in the same condition, in the interior parts of the country, as they were about three decades ago without blacktopping and hard surface bottom. The second is the emergence of continued use of bullock-carts, especially after the petroleum price rise for transportation of lighter load goods in the urban areas, for passenger transportation as well besides carrying goods for shorter distances.

The author observes that the "Integrated Rural Development Plans" promise the greatest benefits of employment with comparatively lesser investment by improving the existing hardware, gadgets, implements and transportation. The bullock-cart is one such system where investments on R & D will yield tremendous direct and indirect benefits to both rural and urban employment, besides improving the economic conditions of the village artisans, labourers, cart drivers and farmers. The paper includes a summary of the past work on the development of carts, work carried out by the dunlop rubber and tyre company, reasons for the limited acceptance of pneumatic tyres for carts in rural areas and which information about institutions which have worked on bullock-cart modernisation,

In discussing the improvements to the country type traditional cart, the author says that as an urgent task for improving the estimated 13 million country type bullock-carts, development work for introducing improvements in these existing carts was undertaken. The solutions consist of introducing, replacing and improving some of the vital parts of the carts without altering the basic structure. On preliminary field trials, such minor modifications have shown 25% improvement on the load carrying capacity, besides other benefits. The additional cost incurred is approximately 25% of the improved cart. Improved inserts would include provision of shock absorbers between the yoke and the pull-beam, a brake, bush bearings fixed on either side of the wooden wheel hub including provision of solid rubber capping by vulcanizing on the steel rimmed wheel tyres. Such improvements would facilitate enhanced load carrying capacity, longer working hours for bullocks, reduced neck damage and increased working life of the animals.

Recently, a study on the animal cart system in rural areas has been carried out in India by the Institute for the southern region and the National Council of Applied Economic Research, New Delhi, for the northern region at the instance of the Ministry of Shipping and Transport, Government of India.

The project was undertaken to provide in-depth information on every important aspect of the cart operation to the planners and various other government departments which have some concern or interest in them. Though the study was conducted only in the rural areas, an attempt was made to look at the problem in its totality and to view it as a complete system. The specific aspects which were examined include :

- 1) The pattern of animal cart ownership, by type, with respect to land holding and population size of village.

- 2) Cost of owning and maintenance.
- 3) Sources of finance for the purchase of cart.
- 4) The relative place of animal carts vis-a-vis other modes of transport in rural areas.
- 5) The extent of animal cart utilisation in different farm and non-farm operations.
- 6) The average load for bullock-cart traffic.
- 7) Capability of generating employment in cart manufacturing, usage, repair and maintenance.
- 8) Attitude towards improved versions of the animal carts, factors influencing the introduction of such varieties and the problem likely to be faced.

Methodology and Procedure

The study was carried out with a sample of 400 villages selected from 800 districts spread all over the country. The selection of the sample unit, the households, was carried out in three stages with the district as the first, the villages as the second and the households as the third and final stage of sampling.

At the first stage, all the districts in the country were grouped into 100 homogenous strata on the basis of their property index worked out from such factors as the cultivated area, irrigated area, area under non-food crops, pattern of land holding, rainfall, soil fertility, fertiliser usage, workforce in secondary and tertiary activity, number of carts and work animals. The property index thus developed was expected to indicate the quantum of goods produced in each district and, therefore, considered relevant for the study.

From each one of these 100 strata, two districts were selected, with probability proportionate to the population size. These 200 districts thus formed the first stage of the sample.

At the second stage of the selection, two villages from each of the 200 districts were chosen to constitute the sample villages. This was again carried out on the basis of P.P.S. in order to help control effectively, the selection probabilities at subsequent states and to make the design partially self-weighting.

The third and final stage of sampling was the selection of the households. This was done after listing each and every household in all the 400 sample villages. The stratified random sampling technique was used.

The stratification was made on the basis of characteristics of the household, such as its location, size, income number of earners, landholding, occupation, cart ownership, cart use and the ownership of work animals.

Though there were eleven strata, some of these were very small and it was not possible to use the same sampling fraction uniformly in all strata. Some strata were, therefore, deliberately oversampled and thus a total of 2,200 households were chosen to constitute the sample.

Apart from the households, the data was also collected from the non-household animal cart users such as traders in rural areas, artisans and craftsmen, village and small industrial units, large industrial units like sugar factories, oil mills, textile mill and rice mills.

In order to assess the total employment potential of this sector, necessary data were collected from the cart manufacturers and repairers as well.

Major Findings

According to the findings of the survey, there were about 15.1 million carts in the rural areas of India alone which was approximately 3.1 million more than the 1971 estimate. The rate of growth of the cart stock during 1971-1975 and 1978 was 10%, 6% and 2% respectively.

Most of the carts found in villages were of the traditional type and were being used as the predominant means of transportation in a large number of Indian villages.

It was found that 91% of them were drawn by the bullock, 7% by the male buffaloes and the remaining 2% by the horses, mules, camels, etc.,

Only 9% of these carts were drawn by a single animal, and all the rest were drawn by pairs. It is possible that the majority of a single animal-drawn carts use horses.

At present, the aggregate investment in the system, including that of the animals, is estimated to be in the order of Rs. 30,000 million which provide employment for about 20 million people all over the country. Thus they play an important role in India's rural economy.

In all, there were about 14.6 million households in rural areas who owned at least one animal cart of which only 0.15 million were professional cartmen. All others were owner-users.

In terms of their economic status, a majority of the cart owners were either those, whose annual income was more than Rs. 6,000 or with land holding over 10 hectares.

The survey had indicated that a total of 1,338 million tonnes of goods were transported from the rural households during the reference year (1977-78), of which as much as 1,073 million tonnes were transported within the respective villages and the remaining 263 million tonnes outside the villages. 69 per cent of the goods moving within villages and 72% of the goods taken outside were carried by animal-drawn carts. Of the remaining, 23% of all goods that moved within villages and 2% of those taken outside, were carried by human beings as headload, thus leaving only a small portion of goods to be transported by means of motorised vehicles like trucks, buses, jeeps etc.

On an average, in each trip, a traditional cart carried 0.47 tonne and travelled a distance of 2.1 kms. when it was used within the confines of a village. Where as these averages were 0.62 tonne and 11.6 kms. respectively when they were used for carrying goods outside the villages. However, in the case of an improved cart, the average load carried and the distance travelled within the villages were 0.63 tonne and 2 kms. respectively. During their trip outside the village, the load carried and the distance travelled were 1.60 tonnes and 8 kms. respectively.

On an average, these carts were used for 63 days in a year in the south zone and 106 days in the north zone.

In all, it is estimated that there were 82.9 million work animals in India. Of these, 52 per cent were used exclusively for farming and 1.25 per cent for carting. In other words, 46 per cent of the work animals in India were being utilised for both carting and farming.

On an average, these animals were put to work for 6 hours a day, of which approximately 20 per cent of the time was used for carting.

It is estimated that in India animal carts are providing a total of 1651 million man days of work a year. In terms of rupees it will be atleast 8,255 million which is in no way a small amount.

There were 18.1 million households in India which were prepared to buy the improved carts provided they were given institutional loan. So this interest in the animal cart was further exemplified in their preference for the cart over the mechanised vehicles for transporting sugarcane (89 per cent) foodgrains and commercial crops (70.2 per cent) and fuel and construction material (71.3 per cent).

Such surveys in other developing countries which use animal carts for distance passenger and cargo traffic in rural areas would be of immense use to identify the

areas wherein transfer of technology can take place in TODC groups.

In an article on the need for intensifying research and development on agricultural equipment required for small farms, the author has highlighted the continuing use of out-moded implements and tools of low efficiency in present day agriculture. This would include ploughs, agricultural implements and hand tools, including seed drills, plant protection equipment, equipment for harvesting, threshing, etc.

The author notes that it is an opportune time for pooling every effort on the research and development of farm equipment.

Organising meaningful policies and directions, managing funds towards attaining objectives, easy operational controls without succumbing to red-tapism and bureaucracy are the challenges of the concerned researchers engaged in the management of research and development. The vast technical manpower which is currently available in India for farm machinery research and development in various agricultural institutions, government research organisations, engineering colleges, public undertakings and private establishments, besides self-employed innovations are to be brought together with a goal for redefining the objective for more products research and less of paper research. Recognition and encouragement should be given liberally to adequate release of finances, but with technical control, with an objective of avoiding waste and duplication.

The article includes a summary of work carried out by various research institutions engaged in small farm implement research and deals with the role of private industries in terms of research, design improvements, etc. The role of the Indian Council of Agricultural Research, All-India Coordinated Schemes, the role of State Agricultural

Departments, State Agro-Industries Corporations, Scheme under the Sixth Five Year Plan, etc. are also considered.

The author opines that, if at all we should achieve success in the next 20 years, there should be crash research and development programmes on a war footing to release the small and medium farmer from the clutches of inefficiency and drudgery on the farm front.

Other Sectors

A Pilot Study of the State of the Artisan Community of Gudibande Taluk, Karnataka, was undertaken by the Institute to assess the economic conditions of the artisans and extended market for both raw materials and finished products.

The study includes information on the Gudibande Taluk, the artisan community population, literacy, annual income, nature of occupation, number of days of work per year, production and facilities including products, models and range of products, skill requirements, raw materials, production processes, working space and facilities, finance, infrastructural facilities, credit, etc.

With regard to marketing and the role of middlemen, the authors note that the problem felt is not the presence of exploiting middlemen, merchants and money lenders but the total absence of private and co-operative middle agencies who could have helped to set up activity level through organised marketing, market expansion, widening of product range and models and active promotion and selling. In the absence of middlemen, the much needed management of demand and market is lacking which is unavoidably reflected in the existing un-organised state of production.

The author has reviewed the various Industrialisation and Artisan Development Schemes and noted that except for the sericulture development in recent years, the activities of

development agencies and banking institutions have had little or no impact on the artisan community.

While discussing the development needs of the artisan community, the author opines that the following need to be considered :

- longer periods of remunerative employment and higher level of incomes
- liberalised credit terms and limits
- training for higher skills and in the use of improved implements and tools
- widening of product range without any basic change in product pattern and skill requirement
- vocational training for new entrants from within the artisan families
- preference and priority for craft products to meet the requirements of government offices and agencies
- provision of management through organisation of artisans at panchayat and block levels
- increasing the artisans awareness of the services and facilities offered by various developmental agencies under their projects, programmes and schemes for rural industry and artisan development.

After a careful study of the existing situation, the author has made a number of suggestions for the betterment of the artisan community. To mention a few :

- sympathetic and supportive implementation of existing provisions relating to credit terms and limits and preference and price premium for products of hand-crafts required by government departments
- increase in the field specialist, staff strength and facilities of institutional agencies
- effective implementation of existing schemes and introduction of new schemes on a need basis.

- project feasibility studies for artisan and village industry products
- intensification of R & D and dissemination activities of development agencies
- organisation of training schemes for new entrants and existing craftsmen
- establishment of co-operatives of entrepreneurs and artisans at panchayat and block levels
- creation of the position of an industries promotion officer
- provision of need-based services of industry specialists and master craftsmen
- formation of an agency to undertake non-commercial promotional and service functions and another for commercial functions including the supply of raw materials and marketing
- management of the block level industries centre by professionals
- development and maintenance of effective systems for collection and dissemination of information, and
- introduction of "Management Audit" of the performance of the organisations, projects, policies and activities once in five years and suitable corrective once in five years and suitable corrective action.

Though butter and ghee are the two items which are traditionally accepted as essential components of the normal diet, systematic planning and organisational network for procurement, quality control and distribution of the products is lacking. Both the Producer and the Consumer are exploited by middlemen.

In a pilot study of the Bangalore market for butter and ghee, the authors observe that butter and ghee processed in the country with improved technology cater to

a limited market segment of the upper-income group and a large part of the butter and ghee market is supplied by the un-organised sector which relies on traditional manual process of manufacture without any built-in control for keeping up the quality. Moreover, the organised sector is not primarily in the butter and ghee business as it produces these items as by-products of a predominantly milk distribution business.

The authors note that the adoption of modern technology needs a social marketing concept which is far more comprehensive than the more business oriented concept in terms of safeguarding the interests of both the producers and the consumers.

Social marketing is defined as the design, implementation and control of programmes seeking to increase the acceptabilities of social idea, cause or practice in target groups. It utilises market segmentation, consumer research, concept development, communication, facilitation, incentives and exchange theory to maximise target group response.

The survey was undertaken to examine the problems associated with procurement, preservation, quality control and marketing of butter and ghee ; to assess the extent of exploitation going on in the un-organised sector which is a major component of the butter industry ; to explore the need for and the feasibility of setting up institutional facility for better organisation of the system of production, procurement, quality control and physical distribution and to consider the application of the social marketing concept in the business of white butter (desi butter) and ghee.

The study reports that 75 per cent of the white butter requirements of the Bangalore Market is supplied by the indigenous un-organised sector, 20 per cent by the organised public sector and only 5 per cent by the modern public sector. The report presents detailed information on the

overall consumption of butter in Bangalore, the total turnover per year, existing consumption, relation between the rate of consumption and income levels, manufacturing process, procurement pattern, quality control, etc.

With regard to quality control aspects of butter, the authors note that since a number of middlemen are involved (producer-agent-wholesaler-retailer-consumer), there is no consistency in quality. Most quality control is by agents based on experience and faith. There exists vast scope for adulteration with different types of butter and other foreign material such as rice flour, mutton fat, etc. There is no procedure or method for checking adulteration or high moisture content. More over, the provisions of the PFA Act Desi Butter remain only on paper.

The organised sector usually employs quality control measures for butter, particularly table butter and seeks to maintain customer loyalty through brand image. The authors note that the general public appear to be ignorant of the method of hygienic manufacture and quality control adopted by the State Dairy and this calls for improved communication with the consumers.

The un-organised sector relies mostly on the place and source of supply as an important criterion of product differentiation. With regard to ghee, a deeper analysis is called for to examine customer behaviour towards sources of supply and preferences.

With regard to pricing, they note that there is no scientific method of pricing and there is hardly any price difference between retailers. The large wholesale merchants in Bangalore seem to control the real price by regulating supply. The vendors who supply directly to householders on regular basis offer products at a lower price when compared to prices quoted by the organised retailers. There is a wide fluctuation in prices depending upon seasons and supply constraints.

An exercise covering value added component from the stage of procurement from the farmers till the product arrives at retail points will throw some light on the extent of exploitation by middlemen. Neither the economics of scale nor the level of technology seem to have any impact on pricing.

In conclusion the authors infer that since the un-organised sector controls a large segment of the supply sources, there is considerable scope for exploitation of producer as well as of the consumer. The product being an essential component of the Indian Dietary System, there is an urgent need for organising production, price regulation, physical distribution arrangements and promotion.

The beedi industry holds vast potential for development. The industry does not demand much machinery or equipment, the only major need being adequate facilities, especially for storage, particularly during the rainy season.

In a study on the beedi making units in Karnataka, the author has discussed the various aspects of this industry including the role of beedi making industries in Karnataka, housing facilities and educational status of beedi workers, their family background, recreational facilities, health status, occupational hazards, etc.

Based on the findings of the study the author has recommended action by the various ministries for improvement of the beedi industry. These include provision of tenements for beedi workers, improved infrastructural facilities, creation of a special cell to look after the welfare of workers, formation of co-operatives of beedi workers, assistance and guidance in marketing and distribution, periodic health check-up for beedi workers, and setting up of labour welfare centres for beedi workers and their family members.

An exploratory study on the film distribution network in Karnataka was undertaken to identify areas

requiring in-depth study for improving the working of the film industry, to assess the role of the Government in promoting Kannada Film in Karnataka and understand the profile of the industry in terms of the role of individuals such as the producers, directors, distributors, etc , and the problems faced by them.

As the author points out, in a study of this nature, conventional methods of data collection relevant to market research would not succeed since data collection would be difficult and prone to error because information is money in this industry and parting with information is considered risky and self-destructive. Secondary data, though available, would not be of much help owing to the ever-changing nature of the industry. The personal interview method was adopted for data collection.

The author has rightly pointed out the obvious difficulty in eliciting correct information from the individuals in this industry. The role of each individual is different and therefore, one perceives a given question from his viewpoint depending on whether he is a producer, distributor or exhibitor.

The report represents extensive information on the history and growth of the Karnataka Film Industry, its structure, the role of government, producer, distributors exhibitors, artists, directors, etc., and the extent to which every individual component influences the outcome of a film, the relationship amongst the various components and the nature of operations including the mode of transactions involved, the role of the Karnataka Film Chamber of Commerce, etc. The study has also identified a number of problems in the industry and the scope for further studies.

The role of the government in the film industry consists mainly of collection of taxes and promotion of the Industry within the state. Though about 45 to 70 per cent of the collection at the counters of cinema theatres goes to the

government towards taxes and surcharges, the money spent by the government for development of the industry is not significant.

There is an urgent need to institutionalise financial lending for film production and encourage multiplication of theatres and increase in time. The general feeling in the industry is that the constraint on play time is imposed by stringent legislative requirements which have to be complied with by any exhibitor. Considering the scarcity of theatres and available play time, there is a need for the government to review the rules. There is also a feeling among the people in the industry that the government has not considered films as an art and given the encouragement, an art deserves.

The author notes that despite the low success rate in the film industry as low as 20 percent, it is surprising that there are yet so many producers. The reasons attributable to such a phenomenon could be the glamour attached to this industry, easy dispensability of black money and the quick fame, in case the film is a success.

The author observes that a successful producer is one who is able to gauge the mood of the public at any given point of time and produces a film that appeals to a large segment of the society. This is in consonance with the fundamental concept of marketing: "make what people want". Nowhere else is the success of a product so much dependent on market. Each film is a gamble. The success basically depends on the extent of its marketability. Unlike in other products where the producer has the option to do test marketing and modify his course of action, a film producer has no such options. He is operating in an area of uncertainty and his ability to succeed depends as to how well he judges the market.

The author observes that for a meaningful conclusion to be drawn from such a study, there should have been an

opportunity for the study team to interact with a responding team representing the government. It is therefore, considered expedient to recommend that it would be fruitful, though difficult, to study the reaction of the government at various levels to the problems identified. He concludes that there is a case for further research and in-depth study of the problems facing the industry.

BIBLIOGRAPHY

- 1) Gopaldaswamy T.P. and Radhakrishnan V., *Feasibility of Animal Husbandry Development in Dharmapuri District*, Indian Institute of Management, Bangalore, India, 1978.
- 2) Ratnam N.V. and Gopaldaswamy T.P., *Management of the Dairy Development Project under the IDA-assisted DPAP in Bijapur—A Diagnostic Study*, Indian Institute of Management, Bangalore, India, 1977.
- 3) Shivaramu S., *A Market Study of Sheep Products*, Ranebennur Taluk, IIM-Bangalore, India, 1981.
- 4) Ramaswamy N.S., *Draft Report on Draught Animal Power*, FAO, Rome, 1981.
- 5) Ramaswamy N.S., *The Management of Animal Energy Resources and the Modernisation of the Bullock-Cart System*, Indian Institute of Management, Bangalore, India, 1979.
- 6) Ramaswamy N.S., *Modernising the Bullock Cart : A Case of Appropriate Technology*, Indian Institute of Management, Bangalore, India, 1977.
- 7) Ramaswamy N.S., *Preface to Animal Energy Studies*, Indian Institute of Management, Bangalore, India, 1978.
- 8) Ramaswamy N.S., *The Planning, Development and Management of Animal Energy Resources in India*, Indian Institute of Management, Bangalore, India, 1978.
- 9) Ramaswamy N.S., *Draught Animal System in India—A Position Paper*, Indian Institute of Management, Bangalore, India, 1981.

- 10) Ramaswamy N.S., **Management of Animal Energy Resources—National Need, Science and Society, 1979.**
 - 11) Ramaswamy N.S., **A Note on the Proposed Animal Energy Development Corporation, Indian Institute of Management, Bangalore, India, 1978.**
 - 12) Ramaswamy N.S., **The Bullock-Cart, Indian Institute of Management, Bangalore, India, 1977.**
 - 13) Ramaswamy N.S., **Animal Energy in Agriculture and Transportation, Commerce, Annual Number, 1980.**
 - 14) Ramaswamy N.S., **Draught Animal Power in the Third World, URJA, 1981.**
 - 15) Ramaswamy N.S., **Bullock : Its contribution to Indian Economy—AMRITA, Gopashtami number, 16 Nov. 1980.**
 - 16) Ramaswamy N.S., **Animals and Society—I, Bhavan's Journal, 1979.**
 - 17) Ramaswamy N.S., **Animals and Society—II, Economics of Slaughter, Bhavan's Journal, July 29, 1979.**
 - 18) Ramaswamy N.S., **Animals and Society—III, Bhavan's Journal, Oct. 7, 1979.**
 - 19) Ramaswamy N.S., **Animals and Society—IV, Bhavan's Journal, Dec. 2, 1979.**
 - 20) Ramaswamy N.S., **Slaughter : A Case for Modernisation, Indian Institute of Management, Bangalore, India, 1981.**
 - 21) Ramaswamy N.S., **Slaughter : Sentiment and Sanity, Yojana, Oct. 1, 1979.**
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- 22) Ramaswamy N.S., *The Modernisation of the Bullock-Cart System and the Management of Animal Energy Resources, Background Papers to an Address Delivered at the 39th Annual Meeting of the Indian Roads Congress, Bangalore, India, Jan. 22, 1979.*
- 23) Ramaswamy N.S., *Re-design of Bullock-Cart for Improved Utilisation—An IE Approach, Indian Institute of Management, Bangalore, India, 1979.*
- 24) Ramaswamy N.S., *Reducing Animal Power Wastage and Mitigating Cruelty to Work-Animals, Indian Institute of Management, Bangalore, India, 1977.*
- 25) Tagat Ramesh G., and Ramesh T.V., *Export Promotion of Meat and Meat Products through Modernisation of Slaughter Houses in India—An Exploratory Study, Indian Institute of Management, Bangalore, India, 1981.*
- 26) Naik V.A.P., *Utilisation of Animal Energy and Development of Improved Carts, Paper Presented on the Occasion of 15th Sir. M. Visvesvaraya Memorial Technical Seminar at the Institution of Engineers, Bangalore, 1981.*
- 27) Naik V.A.P., *Improved Inserts for Country Type Bullock-Carts, A Paper Presented to the XVI Annual Convention of the Indian Society of Agricultural Engineers, IIT, Kharagpur, India, 1978.*
- 28) *The Animal Cart in the Rural System-Part I, Indian Institute of Management, Bangalore, India, 1980.*
- 29) *The Animal Cart in the Rural System-Part II, Indian Institute of Management, Bangalore, India, 1980.*
- 30) Naik V.A.P., *A Need for Intensifying Research and Development of Agricultural Equipments Required for Small Farms, AMRITA, Nov. 4, 1979,*

- 31) Warriar R.N., **A Study of the Socio-Economic Status of Artisans and Institutional Support for Development, Gudibande Block, Kolar, Karnataka, Indian Institute of Management, Bangalore, India, 1979.**
 - 32) Jayachandran C. and Tagat Ramesh G., **Need for Social Marketing Approach in Butter and Ghee Industry: A Pilot Study of Bangalore Market, Indian Dairyman, XXXIII (1) Jan. 1981, New Delhi, 1980.**
 - 33) Bijoor S.R., **The Beedi Making Units, Indian Institute of Management, Bangalore, India, 1980.**
 - 34) Tagat Ramesh G., **Film distribution in Karnataka—An Exploratory Study, Indian Institute of Management, Bangalore, India, 1981.**
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ONGOING RESEARCH

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PROJECTS ON DRAUGHT ANIMAL POWER

Proposals for Consideration by Ministry of Agriculture, Government of India

The Indian Institute of Management, Bangalore, has taken up a few projects related to draught animal power sponsored by different ministries of the Government of India. All projects have been pioneering studies in an area which is least researched. However, the results of these studies point towards further in-depth analysis of various aspects of the draught animal system which includes three sub-systems—the draught animal itself, animal-drawn carts and agricultural implements, and the infrastructural facilities such as marketing, credit, extension, etc. Each category has immense research potential for further analysis and understanding of the system which would be meaningful for taking policy decisions in respect of fund allocations to improve the overall productivity of the draught animal system in our country.

The enclosed table shows sufficiently the work taken up by the IIM-B, its present status and the areas of research potential which needs support and funding by the Ministry of Agriculture.

Redesigning of Traditional Bullock-Cart

IIM-B has taken up a project for redesigning of the traditional bullock-cart. The objective of this project funded by the Ministry of Shipping and Transport is to evolve improvements in the bullock-cart to make it more viable for different road conditions in the rural areas as well as increased haulage. The bullock-cart system consists of different sub-systems such as yoke, harness, platform, wheel, axle and brake. Each sub-system needs specialised focus in terms of applied research. IIM-B has already completed designing six prototypes with variations and field testing them. Six more prototypes will be

completed by the end of this year. The next stage after trials, would be to incorporate modifications, if any, then test them before entrusting the manufacture of these carts to village artisans. The next phase in the project would be to disseminate the usage of redesigned carts in rural areas and this would involve intensive extension work. All these require a great deal of research work both exploratory and educative.

IIM-B's endeavours so far have been only a beginning. There are lot more avenues for further research in terms of redesigning of carts for various kinds of uses and terrains. so also, the transference of the results of applied research to commercial use requires much more extension efforts to create awareness and user habit in the rural areas. IIM-B with its expertise and experience in management aspects can take up research projects in the area of applied research for redesigning and in the area of management for extension activities. The Ministry of Agriculture can be of immense help in supporting and funding research activities in these areas. Specific proposals can be formulated by IIM-B.

Socio-Economic Survey

IIM-B has completed, along with the NCAER, an All India Socio-Economic Survey on the Animal Cart in the Rural System. The study, the first of its kind, has revealed interesting features which need further in-depth analysis. The study was based on a sample of 400 villages all over India. Future research in this area points to analysis of specific areas of the draught animal system such as breeding, feed, health services, extent of utilisation, marketing of animals, slaughter practices, employment possibilities and other uses of draught animal power. Here again, the Ministry of Agriculture could be of great help to IIM-B in funding projects in the above mentioned areas.

Documentation Manual

This project has been a unique attempt by IIM-B to document varieties of bullock-carts and animals that exist in different parts of the country in terms of photographs and designs. The resultant manual would consist of 100 photographs and designs selected out of an extensive collection available with the IIM-B. The research team has already completed the field work. Information collected by the research team, apart from the photographs and designs, indicate potential research areas particularly in terms of regional variation in usage pattern in the country and new areas wherein the bullock-cart can be put to use.

The Institute is now in the final stages of choosing the designs and photographs. Printing will be taken up by the end of this year, and the documentation manual will be ready by the middle of next year.

The Institute has collected a wealth of information from this countrywide study including photographs & design which would be used in producing a more comprehensive look on draught animal power. This book will be useful to all departments of the Government, including agriculture and animal husbandry, rural development, rural transport, dairy development corporations, pasture land development banks, etc. Here again, the Ministry of Agriculture could be of help to us.

Exhibition by Directorate of Advertising and Visual Publicity

The Directorate of Advertising and Visual Publicity after seeing the photographs collected for the Documentation Manual, has shown interest in holding exhibitions of about 300 photographs of animals and carts in different parts of the country over the next 3 years.

IIM-B also has a van fitted for audio-visual publicity and two full-time teachers who are experts in the field of

mass communication. The Institute would like to organise material such as posters, slides, enlarged photographs for holding exhibitions in different parts of the country in order to popularise better methods of manufacture and use of ploughs and carts and also various aspects of livestock management. This involves a comprehensive programme of extension work which the Ministry of Agriculture could fund.

National Board for Animal Systems

An elaborate project report for setting up a National Board and an Adjunct Institute for the Study of Animal Systems had been prepared. Dr. M.S. Swaminathan held two meetings to consider the report—as Director-General of ICAR and later on, as a member of the Planning Commission. In both these meetings, there was little opposition to the concept of a separate Institute. Some of the members felt that the existing institutions can take up the work and the balance could be done by IIM, Bangalore. The following functions has been identified :

- a) to redesign carts of various types and sizes, their testing, methods of manufacture, technology transfer to other areas, etc ;
- b) to co-ordinate and disseminate information on work being done by other institutions in the country on draught animal power and bullock-carts ;
- c) to prepare appropriate material for extension work on all aspects of draught animal systems ;
- d) to advise various institutions on projects to be undertaken to upgrade the draught animal systems ;
- e) to function as a Data Centre on all aspects of draught animal system for R & D Institutions, Governments, and so on.

The Ministry of Agriculture could be of great help in initiating and funding these projects.

Meat Production

The IIM-B has done a great deal of work showing the present losses of meat and by-products due to unscientific and crude methods of animal slaughter. A massive campaign is needed to develop public awareness to develop methods, and to instruct slaughter houses on modernised methods of slaughter. The process of modernisation includes the entire spectrum of activity right from the rearing of animals for meat production to their transportation to slaughter houses, the process of slaughter and collection and recovery of meat and by-products. Though a number of project reports have been prepared on modernisation of slaughter and recovery of by-products, not much work has been done in the field. Only one modernised slaughter house has come into being, and that too started by a multinational company (Brooke Bond) in Aurangabad.

The IIM-B has been responsible for a considerable amount of awareness among various institutions and individuals in the country on the need for modernisation of animal slaughter. A number of institutes have shown interest and initiated work, but most of them have not made much headway due to paucity of funds or trained personnel. These are to be activated for which an organisation, such as, the National Board for Animal Systems is required.

What the Ministry Can Do

From the enclosed articles, it can be easily seen that the Draught Animal Power will be the main stay of Indian Agriculture and Rural Transportation (as well as urban transportation of small-scale goods over short distances) for many years to come. Two-thirds of rural transport and two-thirds of rural energy for ploughing are provided by draught animals which has to be seen in the back ground of the existing energy shortage. The National Commission on Agriculture has estimated that the energy input and all other forms of energy will not be able to make up for the

immense requirement. Therefore, Draught Animal Power has to get more attention during the Sixth Plan period in order to improve the instruments of production and livelihood of the farmers and other labour in the rural areas. Therefore, the Ministry should give concentration on this field much more than they have done so far.

The market value of livestock in India may be over Rs. 20,000 crores, which is very close to the investment in large-scale industry. And yet the R & D and extension work done here is relatively small. Millions of people depend on animals for their livelihood. Animals serve as a source of security, income, prestige. By upgrading the animal systems, we will be able to make a big thrust in rural development. Some work is being done for milch animals, but draught animals are totally neglected. This unfortunate situation has to be corrected.

We have over 100 million draught animals, among which 80 million are of working age. The market value of work animals, carts, implements and associated infrastructure may be about Rs. 12,000 crores.

The investment in bullock-carts and the associated animals may be Rs. 3,000 crores. They make available 40 million horse power. There are 15 million carts in the country, and the number is increasing. Animals are under-utilised, carts inefficient. And in total Draught Power is wasted. In fact, there is wastage in the whole system.

In order to upgrade the entire system, it is essential to have a National Board. The Ministry could take the initiative by making provisions in the Current Plan itself by proposing to include the National Board as part of its activities. The Board itself can come under the Council for Alternate Sources of Energy, but the initiative has to come from the Ministry of Agriculture.

Centre for Animal Studies

The Institute would like to establish a Centre for Animal Studies. It could be called Centre for Livestock Management, or Centre for Draught Animal Power, or Centre for Livestock Studies, or some such name depending on the Ministry's Approval. The project report on the National Board for Animal Systems, copies of which are already available with the Ministry, can form the broad basis for this Centre. The Ministry should make available some capital and recurring funds for the establishment of this Centre. The Centre will initiate studies on the socio-economic and managerial aspects of various component parts of the Draught Animal Power Systems, such as,

- a) draught animals breeds, marketing of animals ;
- b) feed pasture land development, commercial feeds, growing of leguminous trees, treatment of straw, etc.
- c) veterinary health care services ;
- d) animal drawn carts and agricultural implements ;
- e) credit, co-operatives, manufacture, insurance, etc.
- f) modernisation of slaughter houses and slaughter practices ;
- g) creation of data centre ;
- h) dissemination, transfer of technology, extension, etc.

The Institute is confident of building up such a Centre associating and collaborating itself with all other research centres in the country. The Institute is also confident of making a real contribution in upgrading the animal power systems in the country.

Since we have already prepared the project report, we have made estimates of the fund requirements. Though we had thought that the National Board for Animal Systems and the Institute together would need a few crores of rupees, the Centre in the Institute would need only about Rs. 10 crores over the next 5 years. It is hoped that this amount can be allocated out of the fund made available for rural development.

TABLE
ANIMAL ENERGY AND RURAL TRANSPORTATION PROJECTS COMPLETED/UNDER PROGRESS
AT IIM - BANGALORE

<i>Project</i>	<i>Sponsoring Authority</i>	<i>Objective</i>	<i>Status</i>	<i>Research Potential for Ministry of Agriculture & IIM-B</i>
1	2	3	4	5
1) Redesign of Bullock-Carts	Ministry of Shipping & Transport, Government of India	To effect improvement in the various sub-systems of the bullock-cart system in order to increase its overall efficiency To design suitable prototypes which after adequate field testing can be put to commercial use	Six prototypes have been designed and are on field trial Six more prototypes will be designed by the end of 1981	a) Redesigning of carts to suit various use-patterns and different terrain b) to field test prototypes on an extensive scale all over the country c) to explore possibilities of manufacturing the suitable prototypes for commercial use by village artisans

<p>IIM-B Facilities Available</p> <ul style="list-style-type: none"> - Research team with engineering experts and management specialists in communication area - a mini-workshop for designing prototypes 	<p>d) to take up extension projects in rural areas to create awareness and acceptability of the successful prototypes in villages</p> <p>e) in-depth analysis of the improvement of each sub-system of the cart system</p>
<p>2) Socio-Economic survey of the Bullock-Cart System</p>	<p>Ministry of Shipping & Transport, Government of India</p>
<p>To document data on nature of cart usage, freight moved, number of days of use per year, nature of ownership, income, etc.</p> <p>The survey covered seven States and Union Territories comprising Andhra Pradesh, Tamil Nadu, Karnataka, Kerala, Maharashtra, Madhya Pradesh, Orissa, Pondichery and Goa</p>	<p>This survey has been completed and the report, "The animal cart in the rural system, Part I", the Analytical Report & Part II, the Statistical Annexures have been submitted to the Ministry</p>
<p>To focus the analysis to specific areas of the draught animal system such as :</p> <ul style="list-style-type: none"> - breeding - livestock feeds & fodder - veterinary health care - extent of utilisation - marketing - employment potential - newer uses of draught animal power - modernisation of meat production 	<p>d) to take up extension projects in rural areas to create awareness and acceptability of the successful prototypes in villages</p> <p>e) in-depth analysis of the improvement of each sub-system of the cart system</p>

1	2	3	4	5
<p>3) Documentation of Bullock-Carts and Animals</p>	<p>Department of Science & Technology, Government of India</p>	<p>Systematic documentation of data on work-animals viz., species and breeds of animals, their types, breed characteristics, work efficiency besides various cart types in use all over India</p> <p>To document photographs of animals and carts and engineering drawings of cart designs</p> <p>To canvass questionnaires on socio-economics of cart and animal usage</p>	<p>The field work has been completed, The documentation manual is likely to be ready by the middle of the comming year</p>	<p>a) To undertake further research on regional variation in usage pattern and newer areas wherein bullock-carts can be employed</p> <p>b) To make use of the available extensive information in order to prepare a comprehensive book on draught animal power that would be useful to all departments of the government, including agriculture and animal husbandry, rural development, rural transport, dairy development corporations, pasture land development banks, etc.</p>

4) Exhibition by the Directorate of Advertising and Visual Publicity (DAVP)	Directorate of Advertising and Visual Publicity, Government of India	To exhibit about 300 photographs on the draught animal power system—breeds, feeding, health care, carts, agricultural implements, other uses of draught animal power. etc., all over the country during the next two to three years in order to highlight the role and importance of draught animal power both in agriculture and rural transportation	Exhibits with appropriate captions have been chosen by the Directorate and preparation for exhibition are afoot	a) To prepare posters, slides and other exhibits for display with a view to popularise improved carts, implements and their manufacture besides better management of draught animals in terms of improved breeding, and health care
5) National Board for Animal Systems	To set up a National Board for Animal Systems with an adjunct Institute for the co-ordinated development, management and utilisation of animal energy resources in the country	The proposal has been submitted to the planning commission, Government of India for consideration	a) The board may be constituted, sponsored by the Council of Alternate Sources of Energy or could be incorporated under the Department of Science and Technology b) To start with a centre for the study of Animal	

1	2	3	4	5
				<p>Systems could be set up at IIM-B to carry out appropriate research of the following nature :</p> <ul style="list-style-type: none"> - redesign of carts, their testing, manufacture, technology transfer, etc. - co-ordinate and disseminate information regarding work being carried out at other institutions on draught animal power - preparation of exhibit materials for extension on all aspects of draught animal power - act as an advisory body to institutions willing to undertake research on upgrading the draught animal power system - function as a Data Centre for information on all aspects of draught animal and associated systems for R & D Institutions, Governments and so on - undertake research on modernisation of slaughter houses and slaughter house practices, including economics of improved by-product utilisation.

ECONOMICS AND SOCIAL SCIENCES

K. RAJALAKSHMI

A number of research studies on a wide range of economics and sociology have been undertaken by the Economics and Social Sciences (ESS) Area members from the inception of the Indian Institute of Management, Bangalore. These studies can be broadly classified into the following categories

1. Methodologies for planning of regional development
2. Sociological problems having implications in regional development
3. Concepts, measurement and models of industrial productivity
4. Management aspects of industrial development
5. Economics of rural development programmes
6. Education, employment and poverty
7. Income distribution and monetary economics.

Studies which come under each category have been summarised below.

1. Methodologies for Planning of Regional Development

Input-output analysis is an extremely valuable technique for planning regional development. Dhar (1979) has rightly emphasised it in his paper, "Applications of Input-output Analysis in Regional Planning".

The study emphasises the need of constructing regional and inter-regional input-output models particularly in big economics like India where regional differences of production, consumption, and trade are highly significant. The introduction of the spatial dimension into an input-output model helps to project the future inter-regional trading patterns and, therefore, has an added significance for transport planning.

The paper explains various input-output models formulated by different persons, viz., W. Israd, who was the first to evolve an analytical model for inter-regional and regional input analysis, W. Leontief, L.N. Moses, Leontief-Strout and others.

Input-out models for regional planning essentially involve the analysis of four components :

- (a) Macro-aggregate balances
- (b) Column vectors of sectoral final demand
- (c) A matrix of inter-sectoral transactions and
- (d) Row vectors of primary inputs.

It is also observed that input-output models used for regional planning may take various forms, depending on the objective of the analysis. Input-output models used for regional, take into account regional pattern of production techniques, consumption habits, trading patterns and provide a useful base for the necessary multi-sectoral, multi-regional and inter-temporal analysis within a general equilibrium framework. The study stresses that one important direction in which input-output models can be integrated with micro-level techniques is the use of network analysis (PERT/CPM) techniques in conjunction with input-output analysis at a regional level. Such an analysis, according to the author, will extend the scope of decision-making and management by offering a wide scope for analysing the extent of inefficiencies due to

faulty resource allocations and implementation of plans and programmes for individual projects.

Another study by Dhar (1978) employing the same technique indicates that construction of input-output tables at the national, state and district levels has been found to be under certain restrictive assumptions, which are immensely useful in a number of ways. It gives a comprehensive statistical picture of the working of the economy and helps to obtain a consistent picture of income. It provides a very useful base for multi-sectoral analysis and future projections for the economy concerned.

In this input-output analysis of Tumkur District, a total of 14 sectors have been considered. In the primary group, four sectors have been considered and six sectors in the industry group. Separate sectors have been considered for fuel and electricity, construction and transport. All services have been put together as a single sector. The data for this analysis have been taken from the Bureau of Economics and Statistics, Government of Karnataka, who have compiled information on state income with district-wise break-up. "Study Report of Tumkur District" compiled by the Industries and Commerce Department, Government of Karnataka, Technical Note on the "Approach to the Fifth Five Year Plan of India", prepared by the Planning Commission of India, National Sample Survey and tables with notes on ASI Sample Sector etc., have also been utilised in the report. This study is important because only a limited number of attempts have been made to construct input-output tables at a district level.

It has been found that in Tumkur district, about 27 percent of the total output on the aggregate is used for intermediate consumption and the rest of 73 percent for final use of which 70 percent is for consumption, 3 percent for investment and about 0.8 percent in net imports. The district is

having a net deficit in its trading relations with the rest of the country and the world.

Emphasising the need for use of better skills and modern techniques including the use of computer methods for project planning, implementation, monitoring and evaluation at the national, state, regional and project levels, Dhar (1980) made a critical appraisal of the project concept. The main views expressed by him are as follows:

A project in the economic development sense is an activity which is undertaken to generate additional production capacity of an economy. Essential components of analysis of the problems of project implementation, monitoring and evaluation are their time-cost relationships. As regards problems internal to the project, the issues are to a great extent managerial. Causes of delays and cost escalations may be attributed to the lack of management skills, motivation and application of appropriate techniques and scarcity of data for analysis and control of the problem. The success of management skills and techniques depend upon the organisational structure chosen. Managerial control becomes more effective with proper information and reporting system. Most of the projects at present are so complicated and vast that it may not be possible to develop and analyse the necessary project management framework without using electronic computer facilities. Library packages are available to provide all necessary solutions when all relevant data are fed to the machine. Immense possibilities have now opened up for using better skills and techniques for project implementation, monitoring and evaluation at the national, state, regional and project levels.

In a critical study on the relative growth of public and private sectors, Dhar and Elhance (1977) have brought out a number of interesting points.

Their study aims to construct a consistency model for working out efficient allocation of resources for the balanced growth of the various public and private sectors of the mixed economy framework of India. For the analysis, macro-economic balances for the base year 1973-74, showing details of aggregate income, consumption, savings, investments, etc., with break-up into public and private sectors have been constructed and then a number of alternative projections of the break-up of various macro aggregates into public and private sectors have been worked out from the estimates for the total of public and private sectors. A static and open type of input-output model is constructed to work out projections of a consistent set of output levels for the various public and private sectors.

Major findings of this analysis show that the private sector depends heavily on the development of the public sector while inter-sectoral and intra-sectoral transactions are more in the case of public sector. Both the public and the private sectors show substantial indirect income generation. It is inferred that the growth of public sectors act as a strong stimulus to the growth of the private sector.

Yet another important contribution in this field is a study by Dhar (1977) on economic dimensions of development and resource allocation models of the Indian economy.

This study is confined primarily to planning problems at national and regional levels and includes discussions on the implications of the objectives such as removal of poverty, reduction of income disparity and associated full employment problems on regional and sectoral targets of development and allocation of resources. The study also provides to the practical planners at various levels a comprehensive idea of the set of techniques to be used to prepare plans at various levels.

The primary, secondary and tertiary activities into which the entire economy is divided are closely interlined through backward and forward linkages among them. Models of simple static and open type dynamic inter-industry models have been constructed. Input-output models for 300-400 sectors are constructed for obtaining output targets consistent with final demands, technology mixture, etc. Material balances are prepared for a large number of sectors to get further break-up of sub-sectors of input-output sectors. Various other models including the inter-regional linear programming model were constructed and utilised in the study. Optimising models for optimum allocation of resources among various regions were also outlined.

In outlining development objectives, the study stresses the need for assigning high priority in the allocation of resources to the problems of removal of poverty, reduction of inequality both among different income groups as well as among the backward and relatively more developed regions. The study also stresses the urgent need for providing full employment as part of the programme of removal of poverty etc. A brief mode of full employment has also been discussed.

As model studies for preparation of plans for developmental programmes at the regional level, the following can be cited :

The Government of Karnataka requested the Indian Institute of management, Bangalore to undertake the work on the preparation of Block Plans for Full Employment for 7 out of 34 blocks to be prepared for the State Government as part of the preparation of Sixth Five Year Plan for the State, In November 1977. The Institute was assigned Nelamangala and Kanakapura Blocks of Bangalore District, Kolar and Gudibande Taluks of Kolar District, Sandur and Kudligi Taluks of Bellary District and Sringeri Taluk of Chikamagalur District.

A team of the following 7 faculty members of the Institute prepared the Block Plans:

Ranajit Dhar	—	Sandur Block
Anantharamaiah K. M.	—	Kanakapura Block
Apte P. G.	—	Sringeri Block
Indira Rajaraman	—	Nelamangala Block
Ranganathan V.	—	Kudligi Block
Shivaramu S.	—	Malur Taluk Plan
Dhruvarajan P. S.	—	Gudibande Block

The major tasks involved in the preparation of these plans were :

- i) To estimate employment and unemployment (seasonal and year around) in the Block.
- ii) To identify feasible projects/programmes based on local resources and demands along with the costs involved and employment potentialities.

Most of the data used are from household survey and data provided by the village accountants. A list of possible investment projects/programmes are given for the areas. The likely effects on employment and costs involved, and on additional income generation in the area were considered. The study can be broadly divided into two parts. In the first part an attempt has been made to compile a detailed inventory of the resources of the taluk including human resources, and the estimation of seasonal and chronic unemployment patterns.

In the second part the focus is on analysis of various projects which will alleviate the unemployment problem relying as far as possible on locally available resources and skills.

The main recommendations are as follows :

1. Effective measures should be taken for the mobilisation of natural, human and financial resources.
 2. The pattern of allocation of resources to various sectors will have to undergo substantial changes, if a policy of full employment is to be pursued. Hence a thorough scrutiny of the pattern of allocation in various sectors is necessary.
 3. Setting - up of small-scale rural public sector undertakings along with lines of large public sector concerns in urban areas is a prime necessity. These will have to be in the form of multipurpose agricultural farms, agro-based and agriculture-related complex of small industries, etc.
 4. Main thrust of the development effort should be on irrigation.
 5. Available public resources should be concentrated on the development of physical infrastructure for educational and health facilities. Development efforts in agriculture, major and medium irrigation projects already underway and small industry should be decentralised with state agencies playing active role in provision of finance, technical assistance and training.
 6. In a scarce resource situation, spreading these resources thinly over the entire gamut of the existing set-ups like agriculture, animal husbandry, horticulture, sericulture, etc., is wrong. It is better to concentrate on a few key areas which will contribute maximum to the objectives.
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7. It is necessary to optimise the utilisation of land and water resources.

The following two case studies also deserve mention in this connection :

- (a) A case study in network-based performance budgeting with crashing by Elhance and Dhar (1976):

The objective of this case study is to prepare implementation planning programme for the ELDAR irrigation project for efficient allocation of resources, under various constraints. The initial implementation plan submitted to the Government for approval was scrutinised and authors were asked to work out an alternative implementation plan based on changed objectives and constraints. Part II of the case study outlines the revisions exercise :

- (b) A case study in network analysis, funds planning and performance budgeting by Dhar (1976).

This study deals with project implementation planning and evaluation. The project is the setting up of a unit or plant to manufacture three-wheeler autorickshaws in the public sector in a relatively backward area. The major emphasis in this case study is on preparing an implementation plan for efficient resource allocation for the project consistent with development priorities and resource availability. Network analysis techniques (PERT/CPM) were utilised here covering the development of a master network, time and resource analysis, performance budgeting and funds planning. An evaluation exercise was also carried out at the end of the first year which revealed a number of useful features highlighting many issues.

Nair, et. al., (1974) have also brought out the importance of new policy perspectives on regional development.

The paper sets forth a viable regional strategy for overall economic development. After an analysis of the situation in a relatively developed state such as Karnataka and a relatively backward state such as Jammu and Kashmir, certain distortions in the pattern of industrialisation in the backward regions have been noticed. It is argued that balanced regional development as a goal has not been explicitly integrated in to the plan strategy. After an analysis of capital and employment in public sector in selected states for the year (1971-72), it is argued that backward regions development through public sector is very much possible, if the necessary orientation to the public sector is given in future and location decisions are taken on the basis of sound technical and economic considerations. In brief, the regional policy should be to increase poverty-eradicating and employment-creating elements and at the same time aim at a balance between the employment and growth objectives. It is suggested in this paper that a modest reorientation of a rationale is required. This is implicit in certain regional trends and industrialisation patterns. There is also a suggestion that more growth centres in backward states should become entitled to central incentives than in the relatively developed areas. A strong initiative from the public sector in the development of the backward regions is also recommended in the paper.

A group of faculty members, Ranajit Dhar, Rammohan Rao M., Indira Rajaraman, Chary S. N. and Arun Elhance and Srinivasan, Research Fellows of IIM-B are engaged in the Institute's research project on the preparation of a full employment model of a regional economy of India with an empirical analysis of Bangalore District. It is proposed to adopt in the model a plan

strategy which would ensure fast availability of basic necessities of life and maximum employment generation.

An attempt is being made to construct a linear programming full employment optimising model under the following constraints for a regional economy in India (Dhar, et. al., 1979):

- (a) Capacity
- (b) Inter-industry demands
- (c) Consumption
- (d) Domestic and foreign exports
- (e) Domestic and foreign imports
- (f) Investment, etc.

The problem is to select an appropriate production basket to be produced which will ensure the achievement of the target of full employment at the earliest time. For this purpose an appropriate objective function is defined.

The model takes into account 13 sectors and 20 time periods. The population and labour force figures were projected for the next 20 years. The following results have been obtained from the model by an empirical study of Bangalore District:

- (1) It is possible to achieve full employment in 13 years from the base year by providing total employment of 19.5 lakhs, the total labour force availability being also 19.5 lakhs.
- (2) The actual growth rates of outputs of the various sectors are provided. The upper limits of growth have

been reached only in food grains and other agricultural products, mining and other industries.

In most of the cases, except for metals, engineering and construction sectors, the growth rates outputs are dictated by the upper limit of consumption fixed for them. In case of metals, engineering and construction sectors, the output levels are guided mainly by the investment limitation and its pattern of allocation among the various sectors, which in turn depends upon their employment potentials.

These results indicate that for maximisation of employment, the pattern of allocation of resources among various sectors would be substantially different from the existing pattern.

For planning of regional development, studies of the past economic history of that region, the inter-linkages of that region with other regions, expectations regarding the future of the regions economy, expectations regarding the regions future inter-linkages with other regions and the likely deviations of the actual situations from the expected situations etc., are important. Krishna Kumar (1981), has suggested a theoretical model for regional impact analysis incorporating all the above features.

Though the basic model developed in the paper for regional economic analysis bears a close resemblance to the dynamic multi-regional multi-sectoral input-output model, it is quite different from the earlier models that have been used to study the regional impact analysis. The present model attempts to bridge the gap in spatial interaction models and the theory of growth poles. This model can be used to analyse the impact of locating a large public sector production unit, such as a fertiliser plant or a steel plant, in a region. It can also be used as a building

block for developing regional economic policy models for industrial location, land use, and comprehensive planning. For analytic simplicity, it is assumed in the model that there are no time lag in production and distribution and that the expectations regarding levels and rates of growth of output are realised. However, for simple aggregate models one can relax this assumption by developing an operational system of difference or differential equations and by describing partial or adaptive expectation models to depict divergence between the two.

The paper describes in detail the potential application of the model by studying the socio-economic and environmental impact of an irrigation project. The sample study carried out in the paper clearly demonstrates that the model is quite useful for studying the inter-sectoral, inter-regional and inter-temporal impacts of the project.

BIBLIOGRAPHY

Methodologies for Planning of Regional Development

1. Dhar Ranajit, Input-output Analysis and its Application in Regional Planning - A Review, IIM-Bangalore Report, 1979.
2. Dhar Ranajit, Input-output Table, Tumkur District, 1974 to 1978, Report of Project Sponsored by Asian and Pacific Development Institute, Bangkok, IIM-Bangalore, 1978.
3. Dhar Ranajit, Project Concept, IIM-Bangalore Report, 1980.
4. Dhar Ranajit and Elhance Arun, Relative Growth of Public and Private Sector, Unpublished Monograph, IIM-Bangalore. 1977.

5. Dhar Ranajit, **Economic Dimensions of Development and Resources Allocation Models of the Indian Economy**, Mysore, Project Report, Institute of Development Studies, Mysore, 1977.
 6. Dhar Ranajit, **Block Development Plan for Full Employment-Karnataka State, Kanakapura Block, Bangalore District, Government of Karnataka, 1978.**
 7. Dhar Ranajit, **Block Development Plan for Full Employment - Karnataka State, Sandur Block, Bellary District, Government of Karnataka, 1978.**
 8. Apte P.G., **Block Development Plan for Full Employment-Karnataka State, Sringeri Block, Chikamagalur District, Government of Karnataka, 1978.**
 9. Indira Rajaraman, **Block Development Plan for Full Employment - Karnataka State, Nelamangala Block, Bangalore District, Government of Karnataka. 1978.**
 10. Ranganathan V., **Block Development Plan for Full Employment - Karnataka State, Kudligi Block, Bellary District, Government of Karnataka, 1978.**
 11. Shivaramu S., **Block Development Plan for Full Employment - Karnataka State, Malur Block, Kolar District Government of Karnataka, 1978.**
 12. Dhruvarajan P. S., **Block Development Plan for Full Employment - Karnataka State, Gudibande Block, Kolar, District, Government of Karnataka, 1978.**
 13. Dhar Ranajit and Elhance Arun, **Elder Irrigation Project - A Case Study in Network Based Performance Budgeting with Crashing, IIM-Bangalore, 1978.**
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14. Dhar Ranajit and Elhance Arun, *Eldar Autorickshaw Project-A Case Study in Network Analysis, Funds Planning and Performance Budgeting*, IIM-Bangalore, 1978.
15. Nair M.N.V. and George P.V., *Some Aspects of Regional Development in India*, Presented at 1st Asian Symposium on Regional Planning and National Development, Institute of Development Studies, University of Mysore, July 1974.
16. Nair M N.V., Srinivasan V., and Kumar S.P., *Need for New Policy Perspectives on Regional Development*, Lok Udyog, August, 1976.
17. Dhar Ranajit, Rao M.R., and Srinivasan V., *Full Model of a Regional Economy of India with an Empirical Analysis of Bangalore District*, Bangalore, Institute Project Report, 1979.
18. Krishna Kumar T., *Theoretical Models for Regional Impact Analysis*, Paper Presented at a Symposium on Economic Theory and Planning, Indian Statistical Institute, Bangalore, December, 1981.

II. Sociological Problems having Implication in Regional Development

A serious problem that hampers development processes in our country is the narrow outlook of a section of the people who insist that jobs should be reserved for local people irrespective of their competence or suitability for the job in question. Nair (1975) has studied this problem in depth and written a paper.

This paper attempts to explain the reasons behind the so-called sons-of-the-soil movement in India, a country of

cultural diversity. The paper observes that the dilemma of the Indian situation is the co-existence of a political framework which gives opportunities for political expression to the masses and an economic system incapable of satisfying their basic needs. The demand for reservation of jobs for sons-of-the-soil is only an ugly manifestation of this malaise. Political parties which are interested in getting votes irrespective of their national commitments, as well as professional groups who face a keen competition for the limited jobs, find the slogan of jobs for the sons-of-the-soil attractive.

Communalism and casteism are two other important social evils that hamper progress in our country. Nair (1975) has carried out a sociological analysis of this aspect and presented the same in his paper entitled "How Real is the RSS Threat?"

The study deals with the strategy of the RSS and the functioning of the RSS. The paper points out that the RSS draws its inspiration from militant Hindu Communalism and that the entire leadership of the RSS is drawn from the upper castes. The upper castes have found in the RSS, an instrument to protect their privileges against the inroads being made by other people as a result of social change. The RSS attempts to provide muscles for the upper class in their attempt to resist social change. The paper states that the RSS is essentially built on a platform of hostility to Muslims and the democratic parties are unknown to the RSS.

The paper says the RSS has a number of internal contradictions and adds that in the present circumstances, it cannot avoid isolation and become irrelevant to the political reality in India. The idealism of the RSS ranks is being eroded.

BIBLIOGRAPHY

1. Nair M.N.V., **The Sons-of-the-Soil Movement - Its Significance**, Indian Manager, Vol. VI, No. 2, 1975.
2. Nair M.N.V., **How Real is the RSS Threat? A Sociological Analysis**, Monograph, IIM-Bangalore, 1975.

III. Industrial Productivity and Economic Issues of Industrial Development

While the process of industrialisation is often considered akin to economic development, not all the regions contribute equally to the pace of development. The contribution of States varies significantly from State to State depending on the natural resources endowment of the region and the level of finance and labour, etc. In this connection, studies on productivity of individual industries as well as comparative performance of different regions in the country in specific industries would be extremely useful.

With these objectives in view, Rajalakshmi (1981) has presented a research paper on the "Productivity Performance of Some Major Industries of Rajasthan as compared to All-India.

Rajalakshmi's paper compares the Total Factor Productivity (TFP) of six major industries of Rajasthan with that of India in the period between 1960 and 1973. The TFP indices have been determined for the six industries by Solow's method based on Cobb-Douglas Production Function under constant returns to scale. It has been noticed that at the all-India level, the overall picture of most of the industries is one of decline of productive efficiency during 1965-70 and recovery thereafter. In the case of Rajasthan, however, decline is noticed towards the end in some industries, especially in the industries of non-metallic mineral products, machinery (except electrical

and electrical machinery). Another notable feature is the high year-to-year fluctuation in the TFP index. This shows that the production of these industries is still in infancy and that it has not completely established.

Since basic industrial chemicals industry is one of the major industries which are growing fast in India, a study on its productivity has been made by Rajalakshmi (1980). This study analyses various productivity parameters like the input factor, elasticity of output, marginal productivity of inputs, rates of neutral technicals in the industry etc., for all India and two states which lead in this industry.

Two types of Cobb-Douglas Production functions including one with an exponential trend variables (t) have been fitted to the time series data of this industry for the analysis. It has been found that labour is the prime input determining the output of this industry and the marginal productivity of labour shows an increase throughout the period 1960-1973. It is also observed that neutral technological progress is nil in this industry. The industry operates under constant returns to scale.

Another important problem that arises during the process of increasing industrial productivity is the possible conflict between two aims viz., higher output and higher employment. For maximising long-run output, a capital-intensive technology may appear to be appropriate, while for greater employment investment, labour-intensive industries may be desirable. Such employment-productivity relationships require information on labour demand functions applicable to individual industries. This aspect has been investigated by Rajalakshmi (1980).

In this study, two models of labour demand functions derived from constant elasticity substitution (CES) production functions have been fitted to each of the mineral and metal based industries of Rajasthan and all-India to study the

employment and productivity relationship in these industries. The first model assumes the condition for maximising of profits by the industry and provides for simultaneous adjustment in the labour market. The second model assumes an increase of labour supply only with time-lag.

The first model of labour demand function reveals low values of elasticity of labour demand for product wage in all regions for all industries except for basic industrial chemicals in Rajasthan, showing thereby that, for this industry, lowering of real wages may lead to an increase in employment in Rajasthan. Since the short-run elasticity of labour demand with respect to product wage in Models I and II are low in all cases, it is inferred that a fall in real wages will not lead to extra employment in these industries. Employment elasticities of output in Models I and II show that an increase in output will result in a considerable increase in employment in all regions for the four groups of industries except in non-metallic mineral and non-ferrous basic metals industries.

Another study completed by Rajalakshmi (1980) compares sources of growth and productivity of the organised manufacturing sector in all India with those of the relatively industrially backward state Rajasthan for the period 1960-1973.

It has been found that labour and capital productivities of all India are higher than those of Rajasthan. But the reverse is true in respect of capital intensity. Rates of return on capital are higher in all India. While unit material cost is slowly and gradually decreasing in case of all India, there is no such trend and values show fluctuations in respect of Rajasthan. Labour is marginally more efficient in the Indian manufacturing sector than in Rajasthan. Both the sectors operate under constant returns to scale.

Technological progress is one of the most important factors responsible for economic growth. Recent empirical studies in

the developed countries suggest that technological progress contributed more than 50 percent of the total increase in national income per person. The knowledge of the nature of bias of the technological progress, viz., whether it is labour-saving or capital-saving or neutral is also important. This aspect has been studied by Rajalakshmi (1981).

In this study, the nature of bias is estimated from the changes in the distribution parameter of the constant elasticity substitution production function. It is found that generally the earlier phase of the study period falls under the category of capital-using technological progress and the latter under labour-using technological progress.

In Karnataka, the electrical goods industry contributes 18 per cent of the industrial output. This is the highest for any single industry. Besides, Karnataka's performance in this industry is rank third at the all-India level. In view of this and the growing domestic demand and the vast export potential, investigation of various aspects of the productivity of this industry is essential.

In view of such a need, Rajalakshmi (1981) has made a study. In it Cobb-Douglas Function, Constant Elasticity of Substitution (CES) and Variable Elasticity of Substitution (VES) models have been used to compare various productivity parameters of this industry in Karnataka during 1961-1975 with those in Maharashtra and West Bengal States which are the foremost producers of electrical goods in India. This study has the following main features.

The percentage increases in fixed capital, net output and employment were higher in Karnataka, Maharashtra and West Bengal during 1961-1975. Karnataka's share in the national output increased from 6.9 per cent to 14.9 per cent, employment from 7.3 per cent to 13.9 per cent and fixed capital from 5.6 per cent to 8.4 per cent during the period.

All the three States reveal positive and statistically significant trend co-efficients as computed from linear and quadratic trend equations. Trend co-efficients are higher in Karnataka than in either Maharashtra or West Bengal. In order to further the comparison, partial productivity and cost ratios were analysed which revealed increasing trends in labour productivity, especially after 1967-68. The total factor productivity index for Karnataka revealed continuous and steady increase during 1966-73 and increase of a smaller magnitude in Maharashtra and a marked decline in West Bengal. The study further shows a higher labour elasticity of output in all States, but the position in respect of the capital elasticity of output was unsatisfactory. The elasticity of substitution, technological trends, and the periods during which non-neutral technological progress was either capital or labour saving were also estimated. There is scope for further development of this industry in Karnataka by suitably stepping up capital investment in real terms. Unless concerted efforts are made in West Bengal, the industry will deteriorate further.

An analysis of trends in the productivity of an industry and the resource use would help in correctly assessing the performance of the industry and in forecasting various productivity parameters for the future years. It is difficult to judge the overall productive efficiency of a firm or an industry by productivity indices of individual inputs alone.

For this purpose, the total factor productivity index which aims at relating the output to the combined use of all inputs would be more appropriate. Rajalakshmi (1981) has made a review of meaning and methodologies of measuring total factor productivity and illustrated the actual calculations of total factor productivity of a business firm from its balance sheet using Divisia Index Method.

This study has been followed up by Rajalakshmi and Gopalakrishnan (1981) who have computed total factor productivity indices during each year of the period from 1975 to 1980 in respect of eight companies, three of the public sector, four of the private sector and one of the joint sector. All computations have been made from the data taken from the firms' annual balance sheets. The trends in the productive efficiencies of the firms during the period under study have been discussed in the paper. This study has clearly brought out the fact that an increase in the partial productivity ratios such as labour productivity and material productivity and efficiency in other crucial capital ratios, does not necessarily mean an increase in the overall productivity of the firm. Only the total factor productivity, which weighs all the factors of production in a proper manner, indicates the correct trend in productivity.

Statistical cost analysis of the Indian cement industry and estimation of returns to scale from the same, have been attempted by Apte and Indira Rajaraman (1980). Production function method has not been used by the authors for determining returns of scale, because according to the authors, the most serious problem with production function exercises is that the least square fits of the single equation give biased and inconsistent estimates of the parameters, unless it is assumed that all inputs are exogenously pre-determined. Simultaneous equation estimates, if there is no variation in factor prices. One of the common ways of avoiding simultaneity problems is through estimation of reduced forms, of which cost function is one; if the objective of the producer is cost minimisation for some exogenously determined output level. In case of the Indian cement industry, the assumption of output exogeneity seems wholly justified. Accordingly, an attempt has been made in the paper to estimate returns to scale in Indian cement manufacturing through a cross-section cost analysis. The annual

cost and output data for 1976-77 on 43 factories manufacturing ordinary port-land cement has been used in this study. Two types of cost functions, one the traditional polynomial of third degree and the other, a Cobb-Douglas type function that permits variable returns to scale have been used for this analysis. Both the formulations tried indicate increasing returns to scale over lower ranges of output per year. The paper observes that there is some evidence of decreasing returns to scale with the dry process beyond an output level of 684 thousand tonnes per year and with the wet process beyond 440 thousand tonnes per year.

The paper brings out a clear policy implication, that the future additions to cement manufacturing capacity in the country should be units larger than those presently existing. It is also observed that the newer dry process is economically preferable and technologically feasible than the already existing wet process plants.

BIBLIOGRAPHY

III. Concepts, Measurements and Models of Industrial Productivity

1. Rajalakshmi K., Productivity Performance of Some Major Industries of Rajasthan as Compared to All-India Martin, A quarterly Journal of National Council of Applied Economic Research, Vol. 3, No. 2, 1981.
2. Rajalakshmi K., Productivity of Basic Industrial Chemicals (including fertilisers), Accepted for Publication in Anvesak, 1980.
3. Rajalakshmi K., Employment and Productivity Relationship in MM Group Industries in Rajasthan and at All-India Level, Monograph, IIM-Bangalore, 1980.

4. Rajalakshmi K., Sources of Growth in the Total Manufacturing Sector in Rajasthan and at All-India Level, Monograph, IIM-Bangalore, 1980.
5. Rajalakshmi K., Non-neutral Technological Progress in MM Group of Industries at All-India Level, 'Productivity' Journal Published by National Productivity Council, July-Sept. 1981.
6. Rajalakshmi K., Productivity of Electrical Machinery Industry-A Comparative Analysis of Karnataka, Maharashtra and West Bengal, Institute Project Report, IIM-Bangalore, 1981.
7. Rajalakshmi K., Meaning and Measuring of Partial Factor Productivity and Total Factor Productivity and a Firm-Level Case Study, Presented at National Seminar by NPC on Productivity, Measurement and Monitoring at Firm Level, Bangalore, June 1981. Published in 'Lok Udyog'.
8. Rajalakshmi K. and Gopalakrishnan R.V., Trends of Changes in Total Factor Productivity - A Sample Study of a few Indian Industries, Institute Project Report IIM-Bangalore, 1981.
9. Apte P.G. and Indira Rajaraman, Estimation of Returns to Scale through Statistical Cost Analysis, The Indian Cement, Institute Project Report, IIM-Bangalore, 1981.

IV. Management Aspects of Industrial Development (With Relevance to Indian Economy)

Nair and Mira Bakhru (1979), in their paper on planning, programming and budgeting system, have reviewed each of these processes and methods to handle each of them.

According to the authors, planning, programming and budgeting system (PPBS) can be perceived as a process within which Government budgetary techniques are evolved. Public expenditure accounts for a large share of the total national expenditure in developing countries. For instance, in India, about 24 per cent of the total national expenditure is on account of the Governments at the Centre, States and Union Territories. The budgetary process ensure public accountability of funds has to be so designed that it does not merely ensure control of expenditure or growth of management efficiency, but it must also become an instrument to help policy makers assign priorities and allocate national resources among competing activities. PPBS is one such approach which constitutes an attempt to integrate policy formulation with budgetary resource, bringing systematic analysis to bear on both policy formulation and budget allocation.

The process of analysing various alternatives and comparing their costs requires a frame work or a model. The process of choosing among various alternatives, those that best satisfy the programme objectives involves analysis of the various costs and benefits derived from each alternative programme. Cost-benefit analysis is a mere superior technique than the "cost effectiveness model" in aiding decision-making because it enables the worth of an output to be determined. In cost-benefit analysis both the input and output of a programme are valued in money terms. In PPBS, the link between planning and budgeting is derived through programme analysis. The monitoring aspect is the key to the success of any budgeting system and applies to PPBS as well. Hence, unless one can ensure that the incremental inputs are directly related to outputs, it would be difficult to assess the work of PPBS as an evolutionary technique in budgeting.

Vyasulu (1977) presented a paper on the "Trans-Nationals and the Small-Industry-Aspects of Industrial Policy".

The paper examines the view of trans-nationals, taking Thomas, former Chairman of Hindustan Lever, as a vocal representative. It is argued that the trans-nationals have a specific approach and the disagreement with them leads to a completely different way of dealing with the small industry question. The paper is a debate on the role of small units in the process of industrial development.

In India, where we have adopted mixed economy in which both the public sectors and the private sectors are allowed to operate, the studies on the public sector activity in a conventional economic theoretical framework is important. Such a study has been made by Vyasulu (1976).

This paper analyses the attainment of an efficiency maximum that is consistent with the socially required solution to the unemployment problems and derives the implications for the operation of the public sector in a mixed economy. For the analysis, a model of Edgeworth Bowely Box Diagram, showing the isoquants of production in the private sector and public sectors with capital and labour inputs are made use of.

It is concluded that the proportion of activity between the private and public sectors is a matter of social choice. It is suggested that the capital intensive industries in a mixed economy may be left to the private sector. The model also shows that the public sector will shift towards greater labour intensity, i.e., rural or agricultural sector of the economy. It is stated that the model, if pursued, may throw light on such crucial issues as land reform and industrialisation policy for the purposes of economic development.

In a developing country like India which is progressing fast in the industrial and technological fields, the need for an alternate technology is extremely important. For instance, the problem of finding alternate sources of energy is a life

and death matter because of soaring oil prices and ever-increasing drain on our meagre foreign exchange resources. Another important point is that the alternate technology should be appropriate to our Indian conditions. Vyasulu (1979) has critically analysed this issue and presented a paper called "Alternate Technology Versus Appropriate Technology".

The paper discusses the issues of appropriate technology (apttech) and alternative technology (altech) in the process of economic development. It is said that public enterprises have a very important role to play in developing alternate technology as altech is, in large part, a process of struggle for solution to problems. Apttech, on the other hand, is viable only in a situation in which market forces are allowed to determine the prices of goods, services and factors of production. It is further stated that apttech of the multinational variety is not appropriate for development because it is not necessarily efficient enough to as a result of the growing strength of the altech view. The paper concludes by observing that it is the struggle of the masses that will determine the line between altech and apttech.

The problem of sick industries is of great concern to the Government since it causes not only loss in production but also unemployment due to lock-outs, etc. Very often, the Government is forced to intervene and take over the management of the industries in the broader national interest. Bijoor (1981) has made a study of the sick industries in and around Bangalore.

The study indicates that industrial units that are classed as sick and are estimated to constitute about 30 per cent of the total of 2000 units in the surveyed area in and around Bangalore. The paper draws attention to the importance of policies and programmes in limiting the achievement of increased industrial production by different sectors and

a more equitable distribution of the benefits of improved production. The paper cites a few cases wherein planned policy/programme changes have accomplished their originally chartered objectives. The major causes of the sickness are broadly attributed to inefficiency and lack of integrity. Various aspects under the two reasons have been discussed in detail in the paper. The paper also gives various non-financial and financial remedies for improving the performance of sick units.

Yet another problem confronting the government is the monopolistic tendencies developed by a few large business houses in India. A number of legislations have been enacted by the Government to curb this tendency. This aspect has been studied in detail by Vaidyanathan and Apte (1981), who have presented a report on large business houses of Indian economy.

This study analyses the role of 20 large business houses (LBH) in the Indian economy based on sales/income of the 80 MRTP house as listed under the Act of 1977-78 and examines the contribution of the 20 houses to the process of income generation. By making use of the data from company level balance sheet and income statement with respect to value added, total assets, etc., LBH are compared with broad sectors of the economy other than the private corporate sector.

It is found that in the factory sector as a whole, the position of LBHs is not dominant, but it is so in the privately-owned factory sector. In terms of financial performance and status, substantial part of their assets expansion seems to have been financed by internal sources. Their contributions to capital formation in the private corporate sector is substantial. The structure of value added of the 20 LBHs is quite similar to that of Registered manufacturing

as a whole with labour incomes constituting 55 to 60 per cent of value added. It is also inferred that within the group of 20 LBHs, there is substantial concentration, with the top two houses, Tatas and Birlas, overshadowing the others.

With the growing importance given to the public sector by the Government, it is important to gain insights into the concept of public sector management. Mira Bhakru and Vatsala Nagarajan (1980) have dealt with it in a paper.

Their study sets out to understand the overall concepts of management in the public sector. It focusses attention on the faculty teaching management and executives in some public sector undertakings in Karnataka. The findings revealed that the concepts of the faculty and the practising managers were not similar. The divergence between these two groups may be considered indicative of the gap between theory and practice. The study revealed that the two concepts were not in consonance with the perspectives of the public sector. Hence, policy-making at the strategic level was no different from that in the private sector. The present form of management education is itself questionable since a large divergence in management concepts exists among different managers of the public sector. It is suggested that an attempt should be made to evolve a consensus on what ought to be the perspective of the public sector itself.

A study on the project appraisal has been carried out by Indira Rajaraman (1981).

The paper examines two anomalous aspects of the Little-Mirrless (LM) approach to project appraisal. The paper states that LM accounting prices becomes exceedingly complex on account of the numerous mutual inter-dependencies that have to be taken care of through either simultaneous or

iterative estimation. One issue relates to the sub-division of goods into tradables and non-tradables and the other relates to the iterative process whereby mutual consistency is sought to be achieved between prices for goods and other accounting prices. The paper is written with reference to the procedure used by Lal to construct a set of accounting prices for India. Three alternatives to the standard LM procedure are suggested in the paper.

It is suggested that goods must be sub-divided into importables and domestically producibles rather than into tradables and non-tradables. A procedure is suggested whereby the accounting prices of importables and domestically producibles can be simultaneously determined. There is also a suggestion for explicit exposure to procedures adopted to achieve mutual consistency between accounting prices for goods and other accounting prices.

Studies on individual industrial management centres are also important because they would throw light on the deficiencies in their working and provide scope for their improvement. Nair, et. al., (1974) presented a paper on the Fertiliser Corporation of India.

The paper gives a detailed account of the functioning of Fertiliser Corporation of India, which is one of the largest five public sector concerns in India. It deals particularly with the working of Trombay Unit and the Trombay's marketing efforts in Andhra Pradesh. It is observed that owing to a number of reasons, the results of Trombay's marketing efforts in Andhra Pradesh had been far from satisfactory. Nair and Banerjee (1979) conducted a system study on the working of the District Industries Centre and presented a paper on the same.

The paper studies the problems of promoting and regulating the growth of small industries with a view to optimising the results. The study analyses the organisational structure of the District Industries Centres (DIC), which were launched in 1978 to decentralise rural development programmes and to initiate programmes which would be in tune with the area planning approach.

After a critical evaluation of the work content of functional managers of DICs, the study makes specific recommendations in detail to change the structure and organisation of a typical DIC as recommended by the Ministry of Industry. It is stated that the suggestions made in the study can be implemented by making new rules or amending the existing ones.

Nair (1976) has also given a critical appraisal of the Government Control System in his paper on the Relevance of Government Controls in Indian Economy.

The study stresses the urgent need for re-examining the entire problem of government controls in the light of economic rationale and objectives of planned development. It says that the ineffective controls that merely direct extra profits from producers to middlemen are inconsistent with a growth-oriented prices and income policy. Ineffective controls swell the unaccounted profits of industry and trade.

The important instruments of government control of industrial development are licensing of industries, import restrictions, regulations of production, prices and distribution incentives and restrictions to achieve a greater spread of industrial development, etc. The prime beneficiary of many of the controls in India is the private sector. A close look at the working of controls would reveal that many of them have lost their economic rationale both from the point of view of production as well as economic justice. The paper adds that the small scale industry and exports are other areas where government controls had bred corruption. The

paper concludes by suggesting that instead of controlling everything, it would be better to control the vital sectors of the economy and leave the rest to private initiative.

Though Indian economy has shown impressive progress in the fields of agriculture, industry, science and technology, the growth in Indian exports in real terms has been only moderate. A higher level of exports enables the country to finance the import of essential mass consumption commodities. Development of exports gives fillip to such economic activities as transport, shipping, banking and insurance, etc. It helps in stabilising the domestic prices also. It is generally noticed that those countries which have a good rate of growth in exports have a higher G.N.P. In view of the above, studies on export potentials as well as its trends are extremely important.

Rajalakshmi (1981) has reviewed the status of exports in Indian Economy during 1961-80 and suggested measures to be included in the framework of our export promotion policies so that the critical nature of the adverse balance of trade position which had occurred mainly due to soaring prices of petroleum products, can be correctly dealt with.

V Economics of Rural Development Programmes

The provision of electricity to every village is a high priority scheme of each State Government in India and any study which would help in planning of this scheme is extremely important. In this connection, the study undertaken by Indira Rajaraman and Subba Rao (1978) may be cited.

The preliminary report of this study brings out the possibility of implementing Janatha Domestic Electric Connection Scheme in rural areas at a capital cost of Rs. 297 per structure with a single light point and a single plug outlet. A field survey of rural areas adjoining Bangalore City was conducted and it was calculated that an expenditure of twenty thousand rupees per village would be

involved in the scheme. It was found that only 26.35 percent of all huts were suitable for electrification under the suggested scheme. The entire capital cost of linking up a household to the grid will be subsidised by the Government. The monthly payment for each household works out to be approximately equivalent to the saving on account of kerosene consumption for lighting.

The bio-gas is becoming one of the important alternate sources of energy in rural India. In view of rising prices of petroleum products, use of bio-gas for lighting and heating purposes would help in conserving our limited foreign exchange resources. Another important point in favour of bio-gas technology is that, cowdung, which is a valuable nutrient source for our agriculture is now being burnt for fuel purposes, thereby depriving our crop fields from getting useful organic manure.

If we adopt the bio-gas technology, we can get organic manure for our crop field, even after meeting the needs for fuel and lighting. So, any study on the feasibility of this technology and its cost is extremely important. Indira Rajaraman et. al (1980) studies the feasibility of community bio-gas plant system for Pura village in Tumkur District.

This study is a preparatory step to the establishment, operation and monitoring of large-scale community bio-gas plants for meeting rural energy needs. The study has focussed attention on a village, Pura, in Kunigal Taluk in Tumkur District where the human/cattle ratio is of the order 2.2 and where total population is 357 distributed among 56 households. After identifying Pura's energy needs, the local energy resources such as cowdung, solar energy, wind energy, energy forests and ethyl alcohol from sugarcane are examined.

A community bio-gas plant system for Pura involves a 42.5 m³/day (1500 cft/day) bio-gas plant with a daily input of about 1 tonne fresh dung and about 1000 litres water.

The capital cost of the entire system is estimated to be Rs. 70,000/-. A cost-benefit analysis which was carried out indicates a clear cut positive returns to society, even without considering the intangible and important benefits of increased local self-reliance, employment generation, saving of imported and non-renewable source of energy such as kerosene etc. Having shown that the community bio-gas plant system is technically feasible, commercially viable, and socially beneficial, a proposal has been presented in the paper for establishment, operation and monitoring of a community bio-gas plant system in Pura village. The proposed project will take two years for completion and will be carried out by a project team from the ASTRA (Application of Science and Technology to Rural Areas).

Another important study on the functioning of the market mechanism, through which manual labourers, who constitute the major component of the poor in rural India, find employment has been undertaken by Indira Rajaraman (1981). Three villages from Nelamangala Taluk were chosen for investigation.

After conducting an initial survey of all households in the three villages to collect information on land holdings and other household characteristics and after identifying the set of labourers in each village, employment and wage statistics of the labourers on the busy monsoon seasons were collected for the purpose of the study. The study is focussed on labourers, both males and females, on the supplier side of the rural labour market.

A detailed analysis of the operational composition of wage and own work by sex and presentation of the details of various wage data gathered have been put forward and discussed extensively in the study before coming to final conclusions.

In an era of shortage in non-renewable energy resources, aqua-culture development would be a promising

path for rural development, especially for a labour surplus and predominantly rural economy, such as India. Further; in India, which has a coastal line of 5689 km., a river flow of 1682 billion cubic metres and a man-made reservoir capacity of 122 billion cubic metres, offers good scope for the development of aqua-culture.

Krishna Kumar (1979) has presented a paper on the economics of aqua-culture. The aims of this paper are to :

- a) identify certain issues on economics of aqua-culture
- b) describe the fragmentary data on economics of aqua-culture and
- c) suggest topics for further econometric research.

Aqua-culture consists mainly of two types, viz., coastal and brackish water fish culture and Inland or fresh water fish culture. After discussing the currently available data on determinants of demand for fish and determinants of supply of fish in length, the paper presents cost and earnings information acquired from a shrimp farm owner in Cochin.

The author suggests that due to shortcomings of the cost and earnings data and due to the importance of examining the commercial viability of aqua-culture operations, a detailed analysis of economics of production and production function estimation requires the top priority for further research. The author also opined that investigation must cover both the aqua-culture technology that is currently used in India and the new aqua-culture technologies that one could introduce in future. Production and cost function should be estimated using the cross-section data provided by a sample survey of a large number of aqua-culture farms from West Bengal, Kerala, Orissa, Andhra Pradesh and Jammu and Kashmir.

The study recommends the utilisation of fallow lands and cultivable waste land for aqua-culture. It is stressed that on the basis of available estimates, aqua-culture has the

potential of generating 74 billion rupees (7,400 crores of rupees) of rural income and of generating a rural employment of 74 million man-years. The paper concludes by saying that it is time, development economists and applied econometricians establish some claims on the academic and policy making territories dealing with aqua-culture.

The concept of welfare has received a varied treatment in social sciences. On the one hand, we have the abstract definitions of economic theory revolving around the concept of paerto optimality and the welfare functions, and on the other hand, we have the case of governmental policies which are supposed to benefit the poor, being termed as welfare measures. Mira Bhakru (1981) has completed a detailed study on one of the welfare scheme in Karnataka State. This study examines the working of the People's Housing Scheme in an over-all context. It examines the criteria for eligibility for sanctioning the loan under the Housing Scheme and the dynamics of the schemes' implementation. The study mainly aims at finding out whether the welfare objective of the Housing Scheme of the Government does meet the needs of the poorest in the rural areas and whether the process of implementation does mitigate inequalities in social structure.

Two villages named Halli and Bhavi in the Taluks of Bangalore North and Magadi in Bangalore District have been chosen for the study. Personal interviews with two different samples and in-depth interviews with officials at various levels were held to get an insight into the operational dynamics of the scheme.

After an extensive analysis of the various aspects of the scheme including the amounts sanctioned since inception (1973-74), description and socio-economic status of both the villages, the number of allocated Janata HUDCO assisted houses in the two villages, time taken for completion of the construction etc., by presenting numerous

statistical tables, the study observes that the Housing Scheme has failed as a public welfare measure, as a relief in terms of subsidised houses to the poorest sections of society in the rural areas. It is also noted that the socio-political forces at the local level influence the implementation of the scheme. The paper further illustrates the various procedures in the scheme to show that the people's scheme has been used effectively to reinforce the inequalities within the rural social structure rather than to mitigate them. The paper states that since both the allocators and implementors of the scheme come from a class that is politically, socially and economically dominant, it is inevitable that the implementation process will benefit their interests rather than those of the poorest.

Having analysed in detail the socio-economic forces that have contributed to the failure of the scheme and the manner of their implementation, the paper concludes by presenting a package of suggestions and recommendations for the proper implementation and for the real success of the welfare scheme with its noble objective of reducing the inequality and raising the living standards of the poorest rural population.

BIBLIOGRAPHY

V Economics of Rural Development Programme

- 1) Indira Rajaraman and Subba Rao S., Costs of Providing Electric Connections to Rural Households, URJA, 1978.
- 2) Indira Rajaraman, Subramaniam D.K., Rajappaiah P. and Reddy A. K. N., A Community Bio-gas Plant System for Pura Village—Feasibility Study, Mimeographed Report, Indian Institute of Science, Bangalore 1980.

- 3) Indira Rajaraman, *A Micro Study of the Operation of Rural Labour Markets in Karnataka*, IIM, Bangalore, 1981.
- 4) Krishna Kumar T., *Economics of Aqua-Culture*, PROC. Annual Conference of Indian Econometric Society, Srinagar, May 1979.
- 5) Mira Bhakru, *Distribution of Welfare—The People's Housing Scheme in Karnataka*, Institute Project Report, IIM, Bangalore, 1981.

VI Education, Employment and Poverty

A project on education and unemployment in selected urban and rural areas in Karnataka was undertaken by Dhruvarajan and Dhar (1980).

The aim of this project was to study the attitude of rural population towards :

- a) purpose of education
- b) causes for dropping out of school
- c) the content of the present education system and the need to modify the contents, and
- d) family planning, adult education and its relationship with education.

For the above purpose, a field survey was conducted in Bangalore and in two big villages (Population greater than 1000), two medium villages (Population between 500 and 1000) and two small villages (less than 500) in each of Shimoga, Hassan and Kolar districts by way of questionnaires and personal interviews. The target group included registrants in employment exchange, managers of firms in Bangalore, officials at the state level, teachers, village elders and other officials at the district/village level. For household survey, 24 percent of the total households in the villages were surveyed.

Agriculture is the occupation of the majority of the people in the villages surveyed and their employment and unemployment periods depend mainly on the timing and quantity of rainfall. It is suggested that the villages should be made to realise that agriculture as a profession is worth pursuing and the development in agriculture would be achieved mainly through education. It is suggested in the study that in order to make our rural education more meaningful and practical, some radical changes in course content, timing of the school, vacation, etc., are needed. The curriculum should be changed since most of what is taught at present is meaningless and irrelevant to a rural child. Gardening, building, and other agricultural operations, and lessons about hybrid seeds, fertilisers, pesticides, pattern of land use, scientific methods of production, marketing, co-operatives, etc., could be taught in school.

It is noted that quite a few students dropped out during agricultural season. This can be minimised, if the vacation periods were changed from winter, summer, etc., to harvest, sowing and weeding periods, etc. At present, adult education classes are not quite effective. In order to make these classes more interesting and useful, other techniques like reading out news from newspapers and giving them both local and international news etc., should be introduced. The family planning programme also, in order to be successful, should ensure proper follow-up treatment. Arrangements should be made for the villagers to be treated in their own villages and no money should be charged for the treatment. A package of recommendations has been compiled by the authors.

A study on the socio-economic condition of women, who constitute more than 45 per cent of our population and form the bulk of the labour force in agricultural sector in rural areas and who work in factories and construction activities also, etc., has been carried out by Indira

Rajaraman (1977). A critical review of National Sample Surveys (NSS) and Labour Ministry Surveys conducted on rural labour has been made in this paper. Under various sections, the paper analyses in detail the pattern, coverage of data, uniformity and conceptual approach of the two surveys, the general considerations affecting the comparability of all NSS surveys, evaluation of surveys conducted by the labour ministry in agriculture, etc. The paper ends with a number of observations and recommendations which are broadly as follows :

- i) Though these surveys are a rich source of information on Women's work participation and fertility, these surveys are conceptually non-uniform or unreliable, limiting the data for comparison.
- ii) In urban India, the percentage of female unemployment to total female population seems to have been higher in the early seventies than in the late fifties. On the other hand, in the rural sector percentage of female unemployment is lower in the early seventies than late fifties.
- iii) As for future surveys, there will have to be a re-orientation so as to provide a better understanding of seasonal shifts in employment in the rural sector.
- iv) Employing female investigators to conduct the surveys, will provide invaluable data on socio-economic conditions of women.
- v) In order to identify priority areas, there is a need for quantitative information on Women's non-gainful but essential maintenance activities of a demanding nature like fetching water etc., done by both employed women and by women not in the labour force, so that relief may be provided.

BIBLIOGRAPHY**VI Education, Employment and Poverty**

- 1) Dhruvarajan P. S. and Dhar Ranajit, Education and Unemployment in Selected Urban and Rural Areas in Karnataka, Project Report, IIM, Bangalore, 1980.
- 2) Indira Rajaraman, On the Socio-Economic Conditions of Women: National Sample Survey and Labour Ministry Surveys, ICSSR Sponsored Project Report, 1977.

VII Monetary Economics and Income Distribution

India has made considerable progress in agriculture and industrialisation through the operation of a series of five year plans. Self sufficiency has been nearly reached in agriculture and self-reliance has been achieved in the production of many industrial goods. But still income distribution in the country is far from satisfactory. Large disparities exist and are growing gradually. It is the case with many developing countries also. In view of this critical studies on income distribution and regional and sectoral imbalances in the distribution of wealth are extremely important.

Indira Rajaraman (1976) wrote a paper on an evaluation of data sources of income distribution in the developing countries of Bangladesh, India, Pakistan and Sri Lanka.

The paper examines the data base of available report of surveys in four South Asian countries viz., India, Pakistan, Bangladesh and Sri Lanka for the examination of trends in real inequality and poverty. It is observed that though the officially published tabulated data are comprehensive with plenty of details, their usefulness is limited by the uncertain reliability of the income figures. Besides, the figures of inequality are provided in nominal terms and not in real terms. Though the availability of the consumer price index is better in india than in the other three countries, the

coverage of these indices are still inadequate. The suggestions given in the paper include a redesigning of published tabulations, use of per capita rather than total house-hold income and consumption, better coverage of regions and occupations, exploration of price data implicit in the survey data collected, overhauling of the surveys themselves with regard to timing of interviews etc. Lastly, the paper suggests to make use of Quaker Arm Circumference Method (the QUAC Stick) developed by the Quaker Service Committee in Nigeria for identifying nutritional deficiencies.

Yet another detailed study has also been made by Indira Rajaraman (1977) on the growth and poverty in the rural areas of Punjab (1960-61 to 1970-71).

This is the third chapter of a book entitled "Poverty and Landlessness in Rural Asia" published under the rural component of the International Labour Organisation's (ILO) World Employment Programme.

The book mainly attempts to document the assertion that during the past quarter of a century the standard of living of the poorest groups in rural areas has declined in many parts of Asia.

The chapter presents the results of the study aimed at determining the extent to which the benefits of the rapid growth in Punjab, the most advanced state of India, trickles down to the poorer sections, especially rural poor of the population of Punjab.

Primary data were obtained from the consumer expenditure surveys of the sixteenth (1960-61), Seventeenth (1961-1962) and twenty-fifth (1970-71) rounds of the N.S.S.

After ranking the households by per capita consumption, Lorenz curves were constructed in order to find out whether inequality in the distribution of consumption changed between 1961 and 1971. It was found that during the period studied, there was a significant rise in the level

of average real per capital consumption. However, despite the rise in the average level, the data indicate an absolute decline in consumption levels of the three poorest deciles of the population. The deterioration in the absolute standard of living was quite widespread.

The calculations of the least cost diet were carried out by suitable cost functions in which the availability of nutrients as well as its requirement were taken into account. Various adjustments were also made to allow for seasonal food habits of the region under study. It is found that during a decade of rapid growth, there was a significant rise in the percentage of those unable to obtain an adequate diet and lift themselves above poverty. In absolute terms, the number of rural poor increased by 51.6 per cent.

Based on the NSS data, occupational composition of the population in 1960–1961 and 1970–71 were analysed and it was found that there was a significant rise in number of agricultural workers and this increase was found to be more among those households living below the poverty line. The other findings are the significant fall in the artisan class in the decade due to industrialisation and an improvement during the period in the absolute levels of even the poorest among the cultivators. Lorenz curves of consumption inequality among the cultivator population and in land holdings were also drawn keeping total consumption in the Y-axis and deciles of population in X-axis. It was found that the inequality in land holdings appeared to have increased.

Nair (1975) has also brought out the distortions and severe contradictions created in our economy during our planned development in his paper entitled "Sociology of Economic Conflicts in India".

The paper explains the economic development in India through planning after Independence. It is observed that in India, the development process has generated enormous

tensions. Though industrial and agricultural sectors have registered considerable progress since Independence, these developments in turn have created severe contradictions in the economy. Rich peasants, rich entrepreneurs and professional managerial classes are the major beneficiaries of the planned development.

The dynamics of the development process has resulted in a highly skewed distribution of incomes which in turn has distorted the pattern of production. Neither industry nor agriculture provide employment to the vast masses of growing population. The plans have failed to make available, the goods and services needed by the majority of the people at reasonable prices. Meanwhile the process of political mobilisation since Independence has resulted in a continuously increasing pressure on the central political system.

The crisis that faces the economy today is the worst since Independence. There is no obvious and ready solution within the present frame-work. The paper emphasises that the only possible way-out is that the super powers, who have an obvious stake in the preservation of the existing system, should extend help to ease the prevailing difficulties.

The global scale study on the demand for money and liquidity preference, especially their comparison between developed and developing nations, is also extremely important from the point of view of monetary economics. Such a study has been completed by Krishna Kumar and Solomon Kenea. The study attempts to estimate the demand for money and the interest elasticity of demand for money for five developing and five developed countries. After a brief survey of selected works on the demand for money and liquidity trap, alternate specifications of the money demand functions that clearly allow the possibility of a liquidity trap are discussed in the paper. The

authors have attempted a new specification for the liquidity preference schedule based on Keynesian Notion of Liquidity Trap and used the new form to estimate the demand for money or the liquidity preference for five developed countries (Canada, Sweden, Switzerland, the U.K. & The U.S.A) and five developing countries (Argentina, Chile, India, Peru and Portugal).

It is suggested that the specification of the model stipulated in this paper can be used in building macro economic models for the real and monetary sectors and the new specification may also be used in other asset demand functions and for estimating econometric models. It has been found that the interest elasticity varied between -0.13 and -0.86 for the developed countries and between -0.0386 to -1.1098 for the developing countries. In view of the extent of variations observed in the interest elasticity of demand, it is suggested that it is not desirable to rely on the success of monetary policy in some country and advocate the same policy in another country. Because of the slightly higher value of the interest elasticity of demand noted in developing countries, it is indicated that monetary policies may not be as effective in controlling cyclical fluctuations in income in developing countries as in developed countries.

Yet another review was presented by Indira Rajaraman (1978) on Long-Term Projection of Non-Renewable Resources.

The article reviews available estimates of long-term future demand for major resources like non-ferrous, ferrous, and ferro-alloys, non-metallic minerals, natural gas, fossil-fuels and nuclear fission fuels etc., together with estimates of the total world endowment of each. The article provides an adequate basis for an initial look into the crucial question of the resource base for future world economic growth. After the review of the three major studies, on the potentials of non-renewable resources, it is concluded that the global outlook is reasonably optimistic till 2,000 A.D.

and the demand for energy producing minerals may rise at much higher rates. It has been pointed out that future availability of both energy and non-energy materials will be constrained by political, social and biological limits to the tolerance of environmental damage. There may be further political and instrumental constraints to the recovery of minerals from the sea and other areas where the issues of territorial rights may arise. The paper concludes by saying that much will depend on the success of International Regulation and Co-operation.

BIBLIOGRAPHY

VII Monetary Economics and Income Distribution

- 1) Indira Rajaraman, **Data Sources of Income Distribution in Bangladesh, India, Pakistan and Sri Lanka—An Evaluation, Review of Income and Wealth, Series No. 22, No. 3, 1976.**
 - 2) Indira Rajaraman, **Growth and Poverty in the Rural Areas of the Indian State of Punjab 1960-61 to 1970-71, Chapter 3 of the Book "Poverty and Landlessness in Rural Asia", Published by International Labour Organisation, Geneva, 1977.**
 - 3) Nair M. N. V., **Sociology of Economic Conflicts in India, Monograph, IIM-Bangalore.**
 - 4) Krishna Kumar T. and Solomon Kenea, **Demand for Money and Liquidity Preference—A Cross-Country Comparison, PROC, Annual Conference of the Indian Econometric Society, Srinagar, May, 1979.**
 - 5) Indira Rajaraman, **Non-Renewable Resources—A Review to Long-Term Projections, Future, Vol. 8, No. 3, 1978.**
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VIII Suggestions for Future Research in ESS Area**I Methodologies for Planning of Regional Development**

Many model studies have been completed for planning of developmental programmes at the regional level. In this connection, it may be stated that in case of application of models for regional planning, the policy goals have to be clearly specified. For instance, a just income distribution may be one of the policy goals or it may be other agricultural policy goals such as keeping up a minimum production for the region, minimisation of cost of cultivation or establishing low consumer prices for basic food stuff. These goals are inter-dependent and so we have a complex goal measure system.

Models are justified only if they bring additional knowledge compared with simple techniques of analysis. They should be available to deal with the complexity of the problems. The structure of the model has to be adapted to the reality of the region in order to use the same for solving different questions within the same complex goal measure systems.

Therefore, some investigation on the examination of the adequacies of the models used in earlier studies in simulating realistically the actual conditions of the region under study can be undertaken. Further in order to evolve a suitable methodology for use in future investigations, comparisons of different model systems such as linear programming models, input-output analysis model and different types of simulation models can be made.

In the theory of rational consumer choice in which the consume is assumed to maximise his utility subject to the budget constraint given by his income and the prices of goods and services, it is necessary to specify an utility function, a budget constraint function and a conditional maximisation procedure. In the same way for planning purposes,

a preference function of the decision-maker, a model of the economy setting forth the constraints facing the decision-maker and a conditional maximisation procedure are required.

Theil specified such an approach by using linear econometric model of the economy and a quadratic preference function. The econometric model describes the quantitative relationships estimated to exist between the economic variables under the control of the decision-maker (tax rates, government expenditure and central bank holdings of government securities) and the non controlled variables which he is interested in affecting by policy actions (employment, consumer price level and the balance of payments). Tinbergen (1963) called these controlled and non-controlled variables as instruments and targets and evolved an econometric model similar to the above with some slight modifications.

A number of research suggestions have been given by Bert Hickman (1965) for conducting researches on preference functions and appropriate model building. Conducting investigations along these lines on regional planning as well as the trial of other models introduced by perspective planning division of Indian Planning Commission would be useful.

II Productivity, Management and Employment Generation Aspects of Industrial Development

a) Productivity Studies in Industrial Sector

Productivity indices are increasingly used as objective and scientific indicators of the changes in the economic and industrial organisation of the nation. They are used as objective measures for forecasting the possible trends in the major sectors of the economy. They are also used at the governmental level for estimating the quantum of protection to be granted to each industry against internal and external competition, in the formulation of appropriate

taxation and fiscal policies and in the extension of social insurance and labour welfare schemes. So the study of the trends of changes in these indices pertaining to labour, capital, raw materials and fuel etc., for principal industries of different regions of the country is important.

Productivity studies should be undertaken at micro and macro levels for key industries in different states, while the total productivity index concept would provide a base for inter-regional, inter-firm, and inter-temporal comparisons, the factor productivity concept would provide information for establishing proper control for efficient utilisation of labour, raw materials, energy and both fixed and working capital.

Such studies now initiated in ESS Area of IIM, Bangalore, should be extended to as many industries as possible. The IIM-B should under take such studies in collaboration with individual public sector, private sector and joint sector firms. Short-term monitoring over a monthly interval of various productivity indices and estimation of their trends and seasonal cycles (if any) and random fluctuations would be extremely useful for managerial functions. The productive efficiencies of the newly introduced product diversification and the acquisition of new capital assets can also be studied by collecting necessary long-term data. Industrial engineering techniques have been accepted as a sound system for establishing proper productivity standards/norms in the industry which should be based on standard costing and financial ratios. Many other productivity cost ratios are also important viz., capital intensity as represented by capital/labour or capital/net output ratios, rate of return of capital, wage rate, the unit material cost, share of wages. Many earlier studies by eminent economists in India indicate that most of the increases noticed in the labour productivity of the Indian manufacturing sector can be attributed to capital deepening. So information on trends in capital intensity would be

valuable. Similarly the rate of return to capital would be a good indicator of reinvestment potential. Unit material cost would throw light on the efficiency with which the raw materials are used in production processes. According to Hicks Theory of Wages, the share of wages in total output would tend to fall, when the value of elasticity of substitution of capital for labour exceeds unity. Thus knowledge of this parameter is also important.

One of the most important parameters to be looked into in productivity studies in India which has so far been given comparatively less attention is capacity utilisation. For it is an indicator of the efficiency with which the scarcest resource in developing nations viz., capital, is utilised and hence, to some extent, would reflect upon the efficiency of the total system. Further this measure of capital productivity is free from variations in the level of price of both inputs and outputs and also from the well known capital accumulation problems like aggregation errors depreciation, vintage properties, etc.

The study of the trends of the above mentioned production efficiency and cost ratios which has been completed for mineral and metal based industries and electrical machinery industries of certain states of India should be extended to many other key industries utilising up-to-date data.

A better approach to productivity analysis is through the production function approach. This would help in determination of marginal productivities and relative share of input factors which would help in inferring the factor that is to be encouraged for industry's expansion. Estimation of returns to scale would help in deciding whether industry should be expanded or not.

Thus study of these parameters for key industries by fitting Cobb-Douglas Production Function and determination of technological parameters is important.

In India, right from the period of II Five Year Plan, considerable stress has been given to industrial development. Government has been pursuing a policy of providing incentives to newly started industries, such as cheaper credit, tax rebates and tax holidays, liberal import permits for machineries and spare parts and foreign exchange for importing capital equipment and technical know-how etc. These incentives have led to the building of large industrial capacities. It has been pointed out by economists that the growth of capacity in the industrial sector has been faster than the growth of output. The import controls and huge governmental expenditure under Five Year Plans have boosted the domestic demand for goods considerably. All these have induced the industrialists to build up their industrial capacity. Considerable capital expansion has taken place without attention being given to its proper utilisation. Under the situation, capital/labour ratio would change rapidly either through substitution, capital/labour ratio would change rapidly either through the substitution of capital for labour (given the production function) or/ due to application of labour saving techniques under new production function. This type of change would not only affect labour share but also would make the intensity of capital to vary from industry to industry. These problems would require a most crucial parameter viz., elasticity of substitution, which is a measure of the ease with which the factor substitution can take place. For this purpose, studies using CES production function which allows for non-unitary elasticity of substitution become important. When the relationship between labour productivity and wage rate is not independent of capital/labour ratio, the usual CES function ceases to be valid. This has led to VES Production function, obtained by a statistical model relating labour productivity with wage rate, as well as capital/labour ratio.

Thus studies in respect of key industries in India using Cobb-Douglas, CES and VES Production Function/ models would bring out many new facts regarding the productivity status of these industries and help in effective improvements in industrial management. As already stated, technological progress is one of the most important factors responsible for economic growth and can be ascertained from the shifts in the production function. The neutral technological change is neutral with respect to the relative use of factors like labour and capital. Non-neutral or biased technological change may be either labour saving (capital using) or capital saving (labour using). It alters the capital intensity and ease of substitution between factors. Thus study on the determination of nature of bias in respect of the non-neutral technological change in key industries is also extremely important.

Another crucial problem that arises during the process of increasing industrial productivity is the possible conflict between the two aims of higher employment. For maximising long-run output, a capital-intensive technology may appear to be appropriate while for greater employment, investment in labour-intensive industries may be desirable. Most of these analyses have been carried out at the level of national aggregates. But it would be more useful to consider these issues at the individual industry level. When we consider the above problem industry-wise, markets for the products of different individual industries, their market imperfections and price behaviour etc., would have also to be taken into account. The dynamic influences of economic variables in terms of lags and leads have also to be considered.

Study of such employment productivity relationship by deriving labour demand functions for the key industries is also extremely important.

b) Identification for the Fuller Utilisation of Potentials in the Industrial Sector

For efficient management of the industrial sector and improving industrial productivity, identification of important constraints is very vital. It is well known that the major constraints in fuller utilisation of our material, human, capital or the technology resources are fastly growing population with ever increasing consumption requirements, expanding labour force, and an inherited mass poverty base level with high concentrations of income and assets in a fewer hands. Thus, with low purchasing power, the size of the domestic market become limited especially for consumer products and also we are left with limited real surpluses for reinvestments. Further a significant share of intermediate and capital goods industries is financed by the Governmental sources through deficit induced public spending. This inevitably allows the inflationary pressure to set in.

Thus it may be summarised that the industrial sector in spite of its vast diversified nature, is unable to utilise its full potential in the short-run on account of crucial economical balances like inadequate growth in actual demand as compared to projected demand, infrastructural inadequacies, international monetary and energy crises and trade barriers imposed by developed countries. Economic studies can be initiated for the identification of each of the above mentioned constraints. The industrial sector in India, is confined to four major sector, viz., private corporate sector, public sector, joint sector and small scale sector.

The private corporate sector with little competition among their constituent units is dominated by a few large business houses. In spite of their good entrepreneurial talents, this sector seems to have objectives of deriving quick profits rather than achieving steady survival and growth. A trend is established in this sector in diversifying

and expanding in newer and more prosperous activities even at the risk of sickness in the well established activities.

A growing public sector which has its major aim as establishment of self-reliance for our country, enjoys a virtual monopoly in a few crucial and sensitive areas like power, steel, metals, minerals, rail and air transport etc. But their management and operational efficiency require a lot of improvement. They suffer from managerial limitations including inadequate pricing techniques and above all excess employment, and inadequate autonomy. Both managers and workers in this sector seem to display under-fulfilment of their commitment and projected objectives of maximising social welfare. One of the reasons quoted for their not functioning with high efficiency is that at present the relationship between these public sector units and the Government and Parliament comprises not only a post audit examination of the working of the enterprises, but a system of continuous decision-making outside these units in the course of their management. So the better system would be to have only the stipulation by the Government of working guidelines which would deal with broad areas of labour policy, investment policy and rate of return etc., and once the guidelines are laid down, the public sector units should have complete autonomy in their management and should be discouraged from referring by matter outside the unit's decision-making system. Similarly the audit system would ensure the observance of the guidelines without day-to-day interference in working of the unit. In case of deviations, the same should be judged by the advantage it yielded. Another factor is that the management of the public sector units should be wholly professionalised so that it would have expertise in the fulfilment of a particular function and ability to take decision can have as wide a repercussion as a positive decision and so the managers of public sector should be

responsible not only for the decisions positively taken by them but also for the decisions they fail to take.

In order to minimise the drawbacks of the public sector, a number of joint sector enterprises have been initiated. This sector would allow the initiative of private sector projects to initiate, execute and manage the projects and funds would be derived from public sources, viz., public financial agencies and the general investing public. The financing agencies would be required to play a greater role in identifying and promoting projects for the joint sector.

It would be worthwhile to initiate comparative studies of the working of selected enterprises under public sector and joint sector and obtain quantitative data on the deficiencies of public sector enumerated above and whether some improvements have been achieved by joint sector or not.

The enterprises under small-scale sector are generally concentrated in and around thickly populated urban areas. Most of them deal with product lines, the exclusive rights of which are entrusted to them and as such enjoy a monopoly status. They survive largely as a result of either the protected market on the preferential treatments extended to them with regard to purchase by public authorities or the quotas of scarce inputs allotted to them at concessional charges. Most of the units work with outdated methodologies and are almost insulated from the developments occurring outside their own systems. They have little resources to invest in R & D work.

Detailed studies of the functioning of these units, the economy of their working and the contributions made by them to increase the general industrial productivity of the country are very important.

At the particular industry level, for identification of constraint factors like adequacy of available technical know-how, availability of quality input materials in sufficient quantities and adequacy of provision of infrastructural

facilities like power, transport facilities have to be examined. Very often the power cuts, voltage fluctuations and inadequacy of availability and quality of cooling water and waste disposal facilities etc., become growth inhibiting factors. The problem of obsolete and outdated machinery is also important in case of old industries like cotton textiles industry etc. As for labour and management, the main inhibiting factors are inadequate skills and know-how, unhealthy attitudes, large scale absenteeism, inter-trade union rivalries and industrial disputes, etc.

All these factors which act as constraints to growth have to be examined at the individual industry level. For instance, in case of power and fertiliser industries, it is reported that inadequate technical know-how is a major bottleneck, which arises due to import of processes unsuited to local conditions, including the properties of locally available material inputs. Considerable R & D efforts are therefore required in this connection. Because of India's inability to purchase most efficient technology from world market dominated by advanced industrial powers and multi-national corporations in view of foreign exchange constraint, most of our industries build up experience over years by adopting the approach of "learning by doing". Of-course this approach is a right one since it would in course of time help not only in tackling the day-to-day problems of running the enterprises but also in evolving new designs and processes suited to our conditions. A systematic investigation on the economic aspects of R & D efforts in respect of key industries would be useful.

Very often decision have to be taken on the pattern of growth strategies in the industrial sector. For instance, we may have to answer the question as to whether we should continue the strategy of creating fresh capacities in a particular industry or concentrate on fully utilising the already installed capacities. It may be useful to create fresh capacities in crucial industries like power generation and

transmission and other energy inputs like coal, oil and gas, etc. mass transportation, cement and other construction items and basic metals and minerals etc. For the rest of the economy, fuller utilisation of existing capacities may be given greater priority than the expansion of capacities. All these aspects can be examined by conducting surveys by the appropriate areas of IIM-B.

The environmental problems of industries, particularly those of chemical and metallurgical industries, and the technology for controlling the adverse changes in the environmental situations, are also important. In this connection, studies on recycling of the waste not only from the point of view of economy but also for safe-guarding the environment should be undertaken.

By conducting suitable surveys, the extent of unemployment and under-employment among skilled and unskilled industrial workers can be determined and the adequacy of pre-employment training and post-employment training of labour at firm level, industry level, and at national level by the government can also be assessed.

In spite of the above mentioned constraints, our industrial economy was not stagnating. Considerable progress has been achieved in many sectors. In power sectors, India had only a capacity of 2,300 MW in 1950-51. Through massive outlays in five year plans, it has risen to 25,519 MW in 1977-78, i.e., an increase of 11 times. The production of nitrogen fertilisers have increased to 20 lakh tons in 1978 as compared to 28,700 tons in 1951. Similarly, in cement industry also, the installed capacity has increased from 3.28 million tons in 1950-51 to 21.92 million tons in 1977-78, i.e., an increase of 6 times.

A study of the stochastic time series of the production in key industries for 30 years or so by auto-regressive or moving average approaches or a combination of both would help in forecasting of their future trends. Study of the auto-correlation functions of the time series would reveal

information about its stationarity and would help in selection of suitable time series model. Seasonality of the series model can also be determined. Such a study is very useful and can be undertaken in collaboration with energy and agriculture sectors.

The above suggestions for carrying out various economic and sociological studies on industrial development of our country and improving our industrial productivity have been made by me keeping IIM-B's basic research objectives in view, especially in vital sectors like energy, power, transportation and environment. Ofcourse our country being mainly an agricultural one, considerable importance has to be attached to the agriculture and rural development. Thanks to the Green Revolution, a considerable improvement in our grains production has been achieved. It has increased from 55 million tons in 1951 to 131 million tons in 1978. However, production fell considerably during drought years like 1965-66, 1966-67, 1972-73, 1974-75 and 1978-79. So considerable expansion in our irrigated areas have to be achieved, if we are to avoid in future such instability in our agricultural production due to the vagaries of nature. Further, most of our rural people are poor, and quite a few of them are either unemployed or under-employed. So possible economic and sociological studies on rural employment, improvement of agriculture and eradication of rural poverty have been listed by me in the next section. In view of the fact that Agriculture and Rural Development is one of the important sectors in IIM-B. I have dealt with the same a bit elaborately.

References

- 1) Bert G. Hickman, *Quantitative Planning of Economic Policy, Comparative Economic Planning, Ed., M.E. Rozen, D. C. Heath & Co., 1967.*
- 2) Tinbergen J., *Theory of Economic Policy, 2nd Edition, North Holland, 1963.*

III Employment Expansion and Eradication of Poverty in Agriculture Sector

In dealing with unemployment and poverty in the rural sector, one has to consider the technological possibilities for increasing labour input without reducing marginal productivity of labour and also identify the institutional factors that induce or discourage utilisation of more labour.

Before the 1960s, the technological options available to Indian farmers were limited and labour absorption per unit area cultivated remained low owing to the cultivation of low value crops but the recent technological changes and particularly the adoption of high yielding varieties, hybrids and improved packages of practices in terms of manure and water use etc., have led to an increase in total output of wage goods and employment, particularly in the regions which have experienced upward shifts, in production functions. So long as technological change effects a continuous upward shift of the supply curve and expansion path hits a higher isoquant, the elasticity of employment can remain fairly high with regard to output. Under the circumstances the introduction of high yielding varieties or any other improved technology would invariably bring about a high elasticity of employment with respect to output, as it happened in agricultural situations of Punjab and Haryana. So a study of technological changes and elasticity of employment with respect to output of different agricultural zones of the country is extremely important.

Diversification of agriculture through the development of animal husbandry, sericulture, fishery, forestry and other small-scale agro-based industries is also important as a major technological possibility in increasing labour absorption. In this connection, it is necessary to define and develop appropriate technology for each of the distinct agro-ecological and socio-economic setting. It is well known that the skewed distribution of land ownership, insecurity of

tenancy and fragmentation and sub-division of land in India have given rise to both low productivity of land and low labour absorption. Further, there is a growing tendency on the part of big farmers to move away from more labour intensive techniques to less labour intensive ones. All these institutional factors require careful study for finding their effects on rural employment. Studies should be conducted to identify the irrigation method, cropping pattern and other diversification techniques which would improve employment most for a given amount of investment and under a given institutional set up. Evaluation of different types of tenurial arrangements on labour absorption is also important.

Many developmental programmes have been initiated by the Government for the benefit of small and marginal farmers and the landless labourers such as Small Farmer Development Agency, Draught-Prone Area Programme, Special Livestock Production Programme, Soil Conservation and Forestry Programme and Desert Area Programmes. Studies can be initiated at selected regions by organising surveys in order to critically examine these programmes and assess their impact on target groups of people. There is also need to explore live stock development (both dairy and poultry). This is considered as a practical way of diversifying activities away from the conventional employment expansion through crop husbandry, because of the less skewness in distribution in respect of cattle as compared to land ownership, availability of experience in running dairy co-operatives in various parts of the country and possibility of improving cattle breeds by artificial insemination even under village conditions. Problems like quantification of these advantages, finding out the proper way of arranging cattle feeds for such a large-scale dairy development and solving of their marketing problem in view of the low purchasing power of the rural population are also worth investigating.

Another constraint in increasing rural employment is the gradual introduction of farm mechanisation in different

regions. Studies conducted in India indicate that mechanisation of major operations in agriculture is likely to result in creating unemployment unless it is accompanied by adoption of new technology and multiple cropping. For instance bullock power with improved implements is the most efficient and labour intensive technique for land preparation and showing in respect of farms upto 4 hectares, and the use of tractor power for this operation is highly labour displacing. However, if multiple cropping is achieved and technological level is high, labour displacement would be reduced. Persian wheel is the most labour-intensive means of irrigation for small farms but for medium and large farms, tube wells are the most efficient and productive. Similarly use of combines and threshers reduce labour requirements considerably, if their use is not accompanied by an increase in cropping intensity. All these aspects could be examined by undertaking suitable investigations. At present only meagre information is available on power requirements for various agricultural operations and the impact on selective basis adoption of mechanisation which by facilitating timely operations can increase cropping intensity and crop productivity, and which has become a necessity for certain area and under certain conditions (dry farming areas).

Some of the important development activities for rural areas are the creation of irrigation facilities by construction of small reservoirs for storing the water obtained by water harvesting technique and by renovating existing storage reservoirs. The existing irrigation works, especially canals and field channels can be improved by lining them and maintaining them properly. Wherever water logging is problem, development of suitable drainage systems is important. Introduction of efficient water management and soil conservation are also extremely vital. The economics of these developmental activities in improving agricultural productivity and increasing labour absorptions can be studied.

Another aspect of this problem is that from the investment in public irrigation systems, in India, only the large land-owners generally derive the maximum benefits and the benefit derived by small and marginal farmers is quite small. This aspect as well as the socio-economic aspects of introducing some sort of collecting action on irrigation development, water management, drainage and soil conservation and the requirements of infrastructure to be provided by the Government for the same, etc., can be investigated.

Experience of various rural development programmes in the earlier plans has shown that a mere project approach is not adequate to lead an over all development of the area and distribution of benefits to local population, particularly the weaker sections of the society. The distribution of unemployment and poverty and the potential for development of agriculture and related activities vary widely from region to region and also within regions. Different areas in the country are at different levels of development and have varying degrees of potential depending on local endowments. The current approach is to make the programme area specific through an integration of various programmes and establishment of appropriate linkages for optimal utilisation of local endowments consistent with the plan objectives, local needs and environmental balance. The full employment aimed at, should be on the basis of a fair remuneration for the work done and effort made so that a fully employed family can go above the poverty line. The strategy of integrated rural development specially focusses on the marginal farmers, agricultural labourers and rural artisans whose economic improvement is an important concern of rural development. The ongoing rural development programmes have the twin objectives of generating employment opportunities and increasing production. So studies on inter-regional, and inter-temporal and variation in labour absorption and agricultural productivity on the above

line would go a long way in planning future rural development activities and improving the ongoing programmes.

BIBLIOGRAPHY

Management Aspects of Industrial Development

- 1) Nair M.N.V. and Mira Bhakru, Planning, Programming and Budgeting Systems, Monograph, IIM, Bangalore, 1979.
- 2) Vyasulu V., The Trans-national and the Small Industry-Aspects of Industrial Policy, Monograph, IIM, Bangalore, 1977.
- 3) Vyasulu V., Public Sector Activity in a Conventional Economic Theoretical Framework, Indian Economic Journal, Vol. 24, No. 1, 1976.
- 4) Vyasulu V., Aptech Versus Altech, Towards Continuing Education, Vol. I, No. 7, 1979.
- 5) Bijoor S. R., A Study of Sick Industries in and around Bangalore, Project Report, IIM, Bangalore, 1981.
- 6) Vaidyanathan S. and Apte P.G., Large Business Houses in Indian Economy, Project Report, IIM-Bangalore, 1981.
- 7) Mira Bhakru and Vatsala Nagarajan, Concepts of Public Sector Management, Monograph, IIM, Bangalore, 1980.

- 8) Indira Rajaraman, **Little Mirrless Accounting Prices—Some Anomalous Aspects**, Monograph, IIM-Bangalore, 1981.
 - 9) Nair M.N.V., Sharma C. K. and Mira Bhakru, **Fertiliser Corporation of India, Case Report**, IIM, Bangalore.
 - 10) Nair M.N.V., and Bannerjee M.K., **District Industries Centre—A Systems Study Report**, Project Sponsored by Government of India, IIM, Bangalore, 1980.
 - 11) Nair M.N.V., **The Relevance of Controls in the Indian Economy**, Monograph, IIM, Bangalore, 1975.
 - 12) Rajalakshmi K., **Present Status of Export in Indian Economy**, *Southern Economist*, June 15, 1981.
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ONGOING RESEARCH**1**

Title : Managerial Aspects of 20 Point Programme.

Project Leader : Bijoor S. R.

Objectives :

To study the pros and cons of the 20-point programme, since it was appreciated as well as criticised. The study wants to assess the usefulness of the programme. Application of management science to 20-point Economic Programme is carried out with regard to its Implementation and evaluation. This is in accordance with the recashed 20-point Economic Programme.

Methodology :

Based on the secondary data, as performance evaluation has been carried out in the implementation of Twenty Point Economic Programme in the various sectors of development. Some case studies are presented as to how Management Science can be applied for this kind of Economic Activity. The various schemes and involvement of development agencies of State and Central Governments including public sector banks in the implementation of the Programme.

Findings :

- 1) Administrative machinery should be geared up for effective implementation of each of these programmes.
- 2) Sectoral orientation of Economic Activities to be differentiated for follow-up action.
- 3) Removal of legal impediments through legislation.
- 4) Attitudinal range of human factor and helping the lot of the weaker sections.
- 5) State Development Agencies have slacken the progress of the implementation,

2

Title : Life Style of Executives in State Owned Banks.

Project Leader : Bijoor S. R.

Objectives :

The objectives of the study are to detail the influence of the type of working of executives both professional and personal, in performing their duties to advance the policies and programmes of the banks, in respect of promoting of an egalitarian society. The work involvement and changing pattern after nationalisation of banks.

Methodology :

Survey was conducted for bank executives in a structured questionnaire format. Selection of banks will be made on their specialised professional service like agricultural, industrial, both urban and rural based, secured or unsecured basis, government aided or on their own. Based on the responses of the executives in assessment of behavioural aspects and their leadership styles in the implementation of priority sector lending are some of the salient features brought out in the report.

Findings :

- 1) Bank as a development institution can help weaker sections to climb up from the clutches of poverty.
- 2) There is need for an attitudinal change in the lending policy.
- 3) Transfer of bank officials from the lower cadre upto the top executives shall be made more purposive and compulsory.
- 4) There is no need to have separate entity of nationalised banks to avoid unhealthy competition among bank branches.

- 5) New areas of training—effort oriented towards office management, entrepreneurial development, customary education and public relations.

3

Title : Effectiveness of Women as Managers — A Bangalore Study.

Project Leader : Bijoor S. R.

Objectives :

Fuller utilisation of women managers will depend upon the acceptance of authority in female managed organisational positions. If women are to gain equal status with males in managerial positions their authority must be accepted by subordinates, peers and superiors. This is all the more relevant in the Indian context where the role of women managers contradicts the traditional role of women which is generally associated with the family and home. Other women oriented occupations such as teachers, nurses, etc. are accepted because they somehow seem to be an extension of the women's role played at home. A women manager deviates from this stereotype and therefore, perhaps, has more problems at work than her male counterpart. This study seeks answers to issue related to women managers, their problems at work, particularly their relationship with peers, subordinates and superiors.

Methodology :

The study uses data gathered from various public sectors in Bangalore. The sample consists of women managers, their peers, subordinates of both, and their superiors. Structured questionnaires for each of these groups were prepared and each subject was interviewed separately at their respective place of work. The

data collection is almost complete but for one public sector. The data will be treated separately so as to demonstrate the difference between groups particularly between female managers (experimental group) and male managers (control group).

4

Title : Market Study—Coir Board.

Project Leader : Tagat R. G.

Sponsors : Coir Board, Ernakulam, Kerala.

Objectives : To assess the demand potential, product pattern, marketing structure and organisation for the promotion of coir and coir products in the interval market.

Methodology : All India market survey of :

- Dealers
- Consumers and
- Manufacturers

based on selective sampling.

5

Title : Exploratory Marketing Audit.

Project Leader : Thirunarayana P. N.

Sponsors : Bharat Heavy Electricals Ltd., Bangalore

Objectives :

The audit may highlight some areas about which the BHEL (Bangalore Operations) should develop serious concern. The audit also examines the marketing decision, marketing processes at BHEL.

Methodology :

The data that is "available" plus discussion with BHEL Managers.

6

Title : Marketing of Cattle in Southern India.

Project Leaders : Ramesh T. V. and Tagat R. G.

Sponsors : Indian Institute of Management, Bangalore.

Objectives :

To appraise and assess the various aspects of marketing structure of cattle in four States of South India, with reference to :

- 1) Traditional structure of the market
- 2) The transaction behaviour
- 3) Magnitude and end uses of sales
- 4) Improvement of market structure.

Study will concentrate on the shandies held in Rural Areas.

Methodology :

Study is based on four selected shandies. Information will be collected through personal, on the spot observation, discussion with farmers.

SCIENCE AND TECHNOLOGY

S. T. SOMASHEKHARA REDDY

Some amount of work has been undertaken in the emerging area of management science at IIM-B. Science and Technology as it exists in the third world countries, especially in India is borrowed directly or indirectly from the west which is in that sense, these norms are based on the so-called myth of production, which in its applications in a totally different cultural milieu like ours becomes significant. It is also important to observe how the borrowed norms affect to lives not only of the recipient beneficiaries, but also of those who are involved in making the product of alien culture, their own. This is the kernel of the efforts of individuals working in this field at IIM-B.

The impact of Science & Technology on the beneficiaries is studied to isolate and specify important issues that are necessary to make hard technological choices in India. On the other hand, a study has to examine the alternatives that are available to the highly recommended and prescribed western technologies. The former draws its flesh and blood from various theories on economic development; right from Gunnar Myrdal to AKN Reddy, but fails to identify the lacuna between theoretical and applied aspects of Reddy A.K.N. No doubt, the technological models of the west are bigger in size and capital output and have no cultural relevance to India, but how does reducing western technology to a small size help overcome imperialistic and exploitative tendencies. The imperialistic and exploitative character is inherent in western technology, as they were the products of a philosophy which laid emphasis on increasing production

and extending more leisure and material comfort to human beings, and which are genetically coded to travel to the orient to bring back massive wealth by striking and destroying those infrastructural facilities on which the natives of that country are depending. Hence, reducing the large scale plant to a small one cannot eliminate the negative aspects of that technology. For example, A.K.N. Reddy's favourite proposal for a gobar gas plant at Pura, does not take into consideration many of the negative impacts, the plant may have. Once the plant is ready, not only will it dictate hours of cooking to maximise the utilisation within the hours of supply, it may now go to an extent of dictating what is to be cooked and what not to be cooked, cook only thor dal, not **avare** dal, cook only chicken or fish not pork or beef, as they take much time to become palatable. The plant may dictate sleeping hours, reading hours and bathing hours. How can this be a relief to the cattleless families who cannot get dung unlike the rich in the village, with the number of cattle owned by each family decreasing every year, how can the supply of dung be met in future. Besides it will have wider ramifications on the environment. The poor are not allowed to pick dung fully from the streets. Even today in villages, each family has an informal right over that part of the street that lies in front and sides of its house. On the other hand, as stated by the author, if the ruling class wants to transfer technology, be it intermediate or not, it is probably because, it sees a profit in such a transfer. This should be borne in mind, one should see how far the attempts in the line of appropriate or intermediate technologies fall in line with the capitalists planning. Take for example, the gobar gas plants, why so much propaganda about it. Do they not create a big market, if every farmer takes to gobar gas - for massive steel drums, steel pipes, and stoves, this profiting those who own the means of production and the technological know-how of these

essential parts of gobar gas plants? Why has Chinese model of bio-gas plants not been propagated instead of gobar - gas plants with lot of steel inputs? Is it because the Chinese model does not create any market for steel or is it because of the simple technological inputs the Chinese model has which can be acquired easily by a village masonry.

The second aim of these studies is to explore the inter and counteractions between technological choice and class relations and to prepare a curriculum for a course in 'Indian Industrial Scene and Choice of Technology' (IISCOT). Towards this goal a seminar was organised and a village "Hobli" was adopted for technological diffusion in non-land based economic activities through co-operative forms...." The seminar, apart from its normal exercise of presenting papers has not only identified the existing political set up, but also held the opinion that "given private property and the freedom on initiative of entrepreneurs, technical choices are to be made by the firms and organisations concerned on the basis of cost calculations, which merely helps in shipment of western class oriented, imperialist technology to India than helping in the development of a technology suited to Indian culture. Therefore, the question of technical choice...boils down to the demand for a new social order".

The other question which the seminar addressed was involvement of people in questions of technological choice. The seminar called for a change in the style of functioning of intellectuals and proper appreciation of the cultural milieu. But another study very well chalks out the method of bringing about people's participation in the choice of technology. The paper considers participating research as the best tool to predict in advance the possible impact of a developmental programme on the recipients and also a tool to "establish more democratic decision making in resource utilisation around which most serious class conflicts are taking place." The authors, taking into consideration one

of the problems faced by the above seminar, i.e., the political set up and the restricted nature of expert knowledge in the selection of technologies for 'development' argue that participatory research can add strength to the people's struggles by taking their arguments to a level of theoretical sophistication that can demand serious attention and cannot be dubbed political propaganda or anti-developmental moves. 'The Anti-Bedthi Programme' and the involvement of various scientists in it is cited as an example to strengthen their argument. Taking the same example as a clue, the authors argue that the scientists in their attempt to work-out a social-cost benefit analysis of the Bedthi Dam, came to know that what is newly proposed as energy farming by the UN has been in practice in and around Bedthi for many centuries. Hence, the argument is that participatory research can make the macro researchers aware of the tremendous amount of knowledge resources existing with the people who are considered ignorant. The exercise done by the scientists concerned with the 'Anti - Bedthi Programme' can provide a solution to what has been considered the biggest obstacle cost calculations of big plant firms. The question of effective management of knowledge and skills available with the local population for productive purposes and greater application has not been examined. In the same way, means to encourage the growth of knowledge and skills available with the local community and the ways in which scientists can utilise these have to be thought of.

The impact of technology has been examined from the point of view of various economic theories and also from the point of view of their contribution towards developmental programme as such. Here development is treated as a dual process; firstly, as mentioned earlier 'improving socio-economic conditions with the help of isolated technologies borrowed from a set-up where they originated in a systematic and integrated fashion. Secondly, develop-

ment that permanently destroys resource bases that need thousands of years to grow either in terms of knowledge system or natural resources'. It is to the latter part of the developmental process that greater attention has been paid. The paper "Western or Indigenous Science" discusses how in every sphere of development, the belief in western science has crushed the growth of indigenous technology, and how such a crushing blow has not only contributed to increase in the size of the population below poverty line, but has also exposed the myths about the contribution of western science and technology and the personnel connected with it, who have become irrelevant. Taking the examples of health care, and mechanisation of fishing and agriculture they have proved how with every attempt at industrialisation, there is an increase in the poverty stricken families.

Examining the technological choice for alternate energy resources especially for the rural people, a study on social forestry proves, that the selection of eucalyptus for propagation is reducing cultivation of the poor man's food-ragi. On the same lines another study proves how the neglect of an existing irrigational system, thanks, is going to destroy the resource base of poor farmers for irrigation.

Examining whether the location of big industries in a backward region will be beneficial for the local population or not, a study done on the aluminium plant at Koraput proves that the plant is detrimental to the interests of the local people rather than beneficial.

Much more has to be done in this sphere, before basing a judgement on western science and technology, and before its impact on other spheres like sericulture, dairying, animal husbandry, chemical fertilisers, handicrafts etc. is realised.

Coming to the status of science and technology as such, the individuals concerned have done sufficient work

on persons engaged in scientific activity and the training provided to the industrialists by the institutes dedicated to science. Examining the scientific community as a whole, the researchers have come to the conclusion that the scientists in India are without a specific programme for the development of their own country. The factor responsible is the "science and technology plans", which takes no account of the interior life of science and its growth. They do not take into account the intellectual requirements of the scientific disciplines in which Indian scientists have been trained or the intellectual requirements of practicable programme of research that could be taken up by scientists. The goals laid down by Indian "science planners" are usually incapable of being transformed into research programmes. They are either so broad, e.g. the elimination of poverty, that they cannot be tackled directly through specific programmes of scientific research, or they are so narrow that they merely define very specific tasks without generating research programmes.

The study on scientists also reveals that scientists in India depend on literature, especially, western journals for selecting the problems to work on. Many a time due to their prolonged attachment to projects, they are not in a position to select problems on their own. Even while selecting their problems the availability of instruments and funds play a decisive role. Hence, the study says that many scientists, though capable of doing good work, are handicapped either by the non-availability of funds or instruments. Many are not in a position to work with the available instruments. An interesting outcome of the work is that Indian Scientists are familiar with the scholars of the same field in western countries, but may not be aware of the Indian Scientists in the same field, even if they happen to be in the same Institution.

The study also throws light on the irrational allocation of funds for R & D, the aspiration of scientists to become administrators etc.

With regard to training, a study on the 'Impact of CEDT' has brought out successfully how the training given by the institute has been found useful at application level. CEDT was planned as a Indo-Swiss collaboration to create new design for electronic and electro-mechanical equipment and suggest practical solutions to the problems of Indian Industrials. The study finds that the one year training programme has been undoubtedly a great boon for engineer entrepreneurs in the small scale sector. The Indian staff members have fully assimilated the knowledge about PCB fabrication, panel design, fabrication techniques etc. But the CEDT has failed in its goal of "satisfaction of the minimum needs of the most disadvantaged groups.

The overall picture that emerges is that the individuals concerned have tried to cover almost all aspects of Science and Technology.

References

- 1) Shiva V. and Bandyopadhyay J., *Western or Indigenous Science, Science for the People*, Vol. 13, No. 2, March/April 1981.
 - 2) Vyasulu V. (Ed), *Technological Choice in the Indian Environment*, Sterling Publishers, 1980. See also Padaki V. and Vyasulu V., *Teaching About Technology, Towards Continuing Education*, Vol. IV, No. 1, April 1982.
 - 3) Seetharam K., Shiva V. and Bandyopadhyay J., *Science and Technology in India*, IFDA Dossier, November/December 1980.
 - 4) Vyasulu V., *Op.cit.*
-

- 5) Vyasulu V., *Technology and Change in Under-Developed Societies*, *Economic and Political Weekly*, Vol. XI, No. 35, *Review of Management*, August 28, 1976.
- 6) Vyasulu V. and Bernadet Glasser, *The obsolence of Eco-Development*, IIES, Berlin, June 1979.
- 7) Vyasulu V., 1980
- 8) Vyasulu V., 1980
- 9) Vyasulu V., 1980
- 10) Vyasulu V., 1980
- 11) Shiva V. and Bandyopadhyay J., *Participating Research and Technology, Assessment by the 'People'*, Rajesh Tandon (Ed), *Participatory Research as a Process of Liberation*, Indian Social Institute, 1981, and also 'Social Action', Vol. 31, October/December 1981.
- 12) Ibid.
- 13) Ibid.
- 14) Ibid.
- 15) Shiva V. and Bandyopadhyay J., *op cit*, ed. 1981.
- 16) Seetharam K., Shiva V. and Bandyopadhyay J., *Op cit*.
- 17) Shiva V., Sharatchandra H. C. and Bandyopadhyay J., *Social Economic and Ecological Impact of Social Forestry in Kolar*.
- 18) Somashekhara Reddy S. T., *Silt as Organic Manure*, 1981, Kannan Srinivasan et. al.

- 19) The Orissa Aluminum Complex Points for Debate, *Economic & Political Weekly*, December 5, 1981. Also D. K. Subramaniam et. al., Memorandum to the Bedthi Committee, Karnataka Power Corporation, Bangalore 1981.
 - 20) Shiva V. and Bandyopadhyay J., *Science in India, Research without Programmes—Scientists without a Community*, 1980 and *The large and Fragile Community of Scientists in India*, *Minerva* Winter, 1981.
 - 21) Bandyopadhyay J., et. al., *Report on the Survey of the Centre for Electronics Design and Technology in Iisc., Bangalore.*
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**INSTITUTE RESEARCH (COMPLETED)
1980-81**

<i>Title</i>	<i>Faculty</i>
Cost-behaviour—Selected manufacturing units	Indira Rajaraman P. G. Apte
Management of nursery schools	Malathi Somaiah
Financing for medical education	Malathi Somaiah Vatsala Nagarajan
Management in small business	S. Shiva Ramu (Co-ordinator)
Interference : Government and small scale industry in India	S. Shiva Ramu (Co-ordinator)
Consumer motivation—Dairy and Pharmaceutical industry	R. K. Vijayasathy
Marketing system—chemical industry	R.K. Vijayasathy
Technological change—printing industry	R. G. Tagat
Socio-cultural influence—Hotel industry	A. Y. Narasimham
Skill-formation—tailoring	R. G. Tagat
Value system—Indian scientists	J. Bandyopadhyay
State intervention—slum clearance	K. Ramakrishnan
Budgetary process of Governmental programme	M. K. Bannerjee
Expenditure on education	Malathi Somaiah
Analysis of mixed traffic stream parameters	T. V. Ramanayya
Marketing of sheep products—Ranibennur Taluk	S. Shiva Ramu

INSTITUTE RESEARCH (COMPLETED)**1981-82**

<i>Title</i>	<i>Faculty</i>
Analysis of transport organisations	V. B. Kaujalgi K.M. Anantharamaiah
Rural labour markets	Indira Rajaraman
Janatha housing scheme	Mira Bakhru
Land reforms in Karnataka	Narendra Pani
Rural energy consumption	V. Ranganathan
Productivity studies of key Industries of Karnataka	K. Rajalakshmi P. B. Dhruvarajan
Institutional buses in metropolitan city of Bangalore	Mahesh Chand
Evaluation of film distribution network in Karnataka (Kannada films)	R. G. Tagat
To determine the optimum land use in Karnataka for Ecological stable resources utilisation in the Energy Sector	J. Bandyopadhyay V. Shiva
Study of sick industries in and around Bangalore	S. R. Bijoor
Inter-dependence between appraisal/Evaluation techniques and industrial projects performance	Kumudini Shetty
6 cases-General management area	C. Jayachandran

<i>Title</i>	<i>Faculty</i>
Population patterns and settlement hierarchy in the Malnad region	Nira Ramachandran
Tourism development plan for Mysore region	Prakash Adnur
Education and unemployment in selected urban and rural areas in Karnataka	P. S. Dhruvarajan
Industrialisation and social change	Vinod Vyasulu
Inter-relationship between officers and clerical union—Canara Bank	Kalyani Gandhi
Case study of Bangalore AIR station	A. V. Shanmugam
Entrepreneurship in total factor productivity (A sample study of a few Indian industries)	K. Rajalakshmi R. V. Gopalakrishnan
A Study of intermediate public transport system in Indian cities	Mahesh Chand
A study of life styles of executives in banks	S. R. Bijoor
The empov modal	Ranajit Dhar M. R. Rao
Distribution of meat and meat products in Karnataka	R. G. Tagat T. V. Ramesh

**INSTITUTE RESEARCH (COMPLETED)
1982-83**

<i>Title</i>	<i>Faculty</i>
Demand for housing	T. Krishna Kumar
Application of behavioural Sciences concepts in technical in public sector organisation	Ashok Sahni
Technical institution-industry co-operation	L. S. Chandrakant M. K. Bannerjee M. N. V. Nair
Organisational variables on the personal value systems of Indian Managers and their perception of effective managerial behaviour	Freida N. Soares
Role conflict and role ambiguity among Indian managers	Freida N. Soares
Diversification in Agriculture— An empirical Study	Y. K. Viswanadham
Utility of 20 point programme	S. R. Bijoor
Indian industries and inputs for communication media development	A. V. Shanmugam
Large business houses in Indian Economy - Product/market concentration Phase I	R. Vaidyanathan P. G. Apte

**INSTITUTE RESEARCH (ON-GOING)
1982-83**

<i>Title</i>	<i>Faculty</i>
Condition of working women	B. K. Chandrashekar
Bottlenecks-Cashflow forecasting	R. P. Iyer
Governance of universities	Malathi Somaiah
Relevance of education job market	Malathi Somaiah
Social cost benefit implications of Hosur Industrial Complex	R. G. Tagat C. Jayachandran
Educational aspirations of Harijan parents	Malathi Venugopal
Identification of inhibiting factors in the development of agricultural organisation	S. T. S. Reddy
3 Cases in industrial disputes settlement	N. Krishnaswamy
Study of judicial delay in Karnataka	B. K. Chandrashekar
A study of organisations engaged in rural development in Karnataka	P. Bhaskaran
Development of design vehicle standards	T. V. Ramanayya
Futuriatic energy demand on consumption by 2025 in India	N.S.S. Arokiaswamy
A study on newspaper advertise- ment	H. Kala C. L. Narasimhan

<i>Title</i>	<i>Faculty</i>
Social audit of selected public sector units - ITI & HMT	Vinod Vyasulu T. Krishna Kumar
Psychosomatic diseases in rural population	Ashok Sahni
Economic and political aspects of farmer's movement	B. K. Chandrasekhar
Land use policy - Tamil Nadu state I & II	N. V. Ratnam
Transfers of teachers dose not serve an educational end	Malathi Venugopal
Health manpower planning for PHC - A methodological investigation	B. Ghosh
Drug price control policy	R. K. Vijayasarathy
Indian Managers as meant by their colleagues	G. K. Valecha
Operational procedures of SFCs and SIDSCs, industrial project performance	Kumudini Shetty
Acceptance of authority in female manager	Kalyani Gandhi
Assessment of primary health care needs of rural communities	J. C. Bhatia
Inspect of environment on rural land use	Nira Ramachandran
Role of R & D management	J. Bandyopadhyay

<i>Title</i>	<i>Faculty</i>
Requirement of external information for a firm	V. T. D. Balaraman
Vegetable vendors	N. S. Ramaswamy S. R. Bijoor
Socio-economic conditions of construction workers	N. S. Ramaswamy S. R. Bijoor
Psychological and political implications of chronic unemployment among young Indians	S. K. Roy
India's food import policy and management of foodgrain supplies	Shyamal Roy
Annotated bibliography of planning and management of metropolitan cities	V. K. Bawa
Marketing of cattle in southern India	T. V. Ramesh R. G. Tagat
Analysis of input substitution in selected manufacturing industries	P. G. Apte
Management style in Indian enterprises	Vatsala Nagarajan Mira Bhakru
The district health survey	P. Bhaskaran
Theoretical models for regional impact analysis	T. Krishna Kumar
Proposed survey of animals and carts	P. Bhaskaran N. S. Ramaswamy A. V. Shanmugam V. A. P. Naik

<i>Title</i>	<i>Faculty</i>
Management graduates as entrepreneurs	L. S. Chandrakant M. N. V. Nair Mira Bhakru
Structure of economic developments and its impact on transport in India	K. Naganna T. V. Ramanayya
Study of the paper flow in the High Court of Karnataka	T. S. Nagabushana S. N. Chary B. K. Chandrashekar
A systems analysis of information/communication infrastructure	A. V. Shanmugam
Inferior food grains in India on Statewise analysis	Shyamal Roy
A bureaucrat in a princely Mysore	Narendra Pani
Model for pricing and income policies	Ranajit Dhar M. R. Rao
Modification and testing of vasp package	M. R. Rao V. Ranganathan
Replacement policy for BTS vehicles	A. K. Rao
Marketing of re-cycled product	K. L. K. Rao R. G. Tāgat

**CONSULTANCY SPONSORED RESEARCH
(COMPLETED)
1981-82**

<i>Title</i>	<i>Faculty</i>
Pop-case Project	B. Ghosh
St. Martha's hospital	Ashok Sahni
A study on attitudinal change-Karnataka	Ashok Sahni
AIR : Commercial broadcasting	A. V. Shanmugam
DHO's (training) Govt. of Karnataka	Ashok Sahni M. K. Bannerjee
Rural electrification	N. S. S. Arokiaswamy V. Ranganathan
Vikrant Tyres Ltd. (Training)	K. L. K. Rao P. N. Thirunarayana R. G. Tagat S. Ramaswamy S. K. Roy
VISL, Bhadravathi (Training)	N. Krishnaswamy G. K. Valecha S. Sampangiramaiah Kalyani Gandhi S. K. Roy S. G. Lele R. V. Gopalakrishnan S. N. Chary N. S. S. Arokiaswamy M. R. Gopalan H. S. K. Murthy S. Jagadish A. Sundar & C. Jayachandran

<i>Title</i>	<i>Faculty</i>
Social cost benefit analysis of Nhava-Sheva port project— Interim report	K. S. Pillai K.M. Anantharamaiah
Flood modernisation control	A. Sundar
Bajaj electricals	S. K. Roy P. N. Thirunarayana
Madura Coats (Training programme)	R. V. Gopalakrishnan
IBRD—A study of coconut as a vegetable oil	Shyamal Roy

EXTERNAL SPONSORED RESEARCH (COMPLETED)**1981-82**

<i>Title</i>	<i>Faculty</i>
Secondary Educational Institutions	B. Bhaskara Rao N. Naganna K.M. Anantharamaiah C. L. Narasimhan
Functional analysis of the PHCs for Family Planning and welfare activities (Karnataka State)	Ashok Sahni

1982-83

“Role of economic analysis in policy on housing in India”	T. Krishna Kumar
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1980-81

Draught animal power (for FAO and presented in Inter-Regional conference sponsored by UN on New and Renewable source of energy)	N. S. Ramaswamy
Health manpower in selected specialities and super-specialities—A long term perspective for Karnataka	Late Dr. S. Krishnaswamy Rao B. Ghosh ICMR Sponsored
Identification of backward areas in Andhra Pradesh	V. K. Tewari
Farmers participation in tank irrigation projects (draft report)	A. Sundar P. S. Rao
Techno-economic feasibility survey in computer line in Nhava-Sheva sub-region	K. S. Pillai

<i>Title</i>	<i>Faculty</i>
BHEL—Demand assessment in energy Meters—Phase I	C. Jayachandran
Aluminium industries	R. K. Vijayasarathy
ITI—Training programme	M. R. Gopalan
Working of COIR Board show-room and sales depots	R. G. Tagat R. Vaidyanathan
TCC Consultancy	S. K. Roy
KSRTC (II Training programme)	S. R. Bijoor
1982-83	
Report on the survey of the performance of the centre for electronics design and technology in IISc, Bangalore	J. Bandyopadhyay V. Shiva S. Krishnan
TRYSEM	N. V. Ratnam
Market potential for coir and coir products in India *(associated with implementation as a member of marketing and propaganda committee)	*R. G. Tagat R. Vaidyanathan
Beijer institute : integrated electricity grid system in Southern India (outline paper)	S. Subba Rao K. S. Subramanyam P. G. Apte K. B. Nair

**CONSULTANCY SPONSORED RESEARCH (ON-GOING)
1982-83**

<i>Title</i>	<i>Faculty</i>
BMRDA—Nhava-Sheva project	K. S. Pillai
All India Handicrafts Board	P. Bhaskaran
Rural roads study, Ratnagiri	T. V. Ramanayya
Water use management	N. V. Rathnam V. Nagadevara
Location-Allocation-Algo	V. K. Tewari
Haricrupa industries	V. A. P. Naik
IDBI	V. K. Tewari
Sundaram Clayton Limited	P. N. Thirunarayana
BGML, KGF	G. K. Valecha
BHEL – Phase II	C. Jayachandran
BHEL – Marketing audit	P. N. Thirunarayana
ARDC – Bombay	T. P. Gopaldaswamy V. Nagadevara
VUDA	K. S. Pillai
TISCO consultancy	P. N. Thirunarayana
DANIDA Project	P. Bhaskaran
UNESCO	J. Bandyopadhyay
Ahmedabad suburban railway studies (MTPR) Bombay	K. S. Pillai

<i>Title</i>	<i>Faculty</i>
Feasibility study of hotels (Raj consultants)	Ashok Sahni
OD work at CSG (ECIL— OD consultancy)	S. K. Roy
Selection of engineering personnel (BEML)	S. K. Roy
Selection of management trainee (HAL)	S. K. Roy
Beijer Institute	S. Subba Rao K. S. Subramanyam P. G. Apte K. B. Nair

**EXTERNAL SPONSORED RESEARCH (ONGOING)
1982-83**

<i>Title</i>	<i>Faculty</i>
Ganga-Brahmaputra link canal project	T. Krishna Kumar
ICSSR—Koraput	Vinod Vyasulu
National institute of health and family planning	J. C. Bhatia
Title : Evaluation of dais-training in the states of Karnataka and Maharashtra	
Extension lectures on futurology	B. Bhaskara Rao
Health management training	A. V. Shanmugam
Design and development of information system and related procedures for season demands for seeds in Karnataka	V. T. D. Balaraman
Personality characteristics of successful entrepreneurs in India	Ashok Sahni
Proposal for a comparative study of metropolitan development authorities in South India	B. Bhaskara Rao
Self image of KSFC (Phase III)	G. K. Valecha
3 Improved bullock carts	V. A. P. Naik

<i>Title</i>	<i>Faculty</i>
MDPC : I. O. G.	R. G. Tagat
A study of rehabilitation project for the benefit of SC & ST	S. R. Bijoor Malathi Somaiah V. T. D. Balaraman
IDBI : Entrepreneurship : literature survey	Ashok Sahni
Locational efficiency in rural services	V. K. Tewari
Bullock cart design project	V. A. P. Naik N. S. Ramaswamy
Documentation manual project	C. L. Narasimhan
