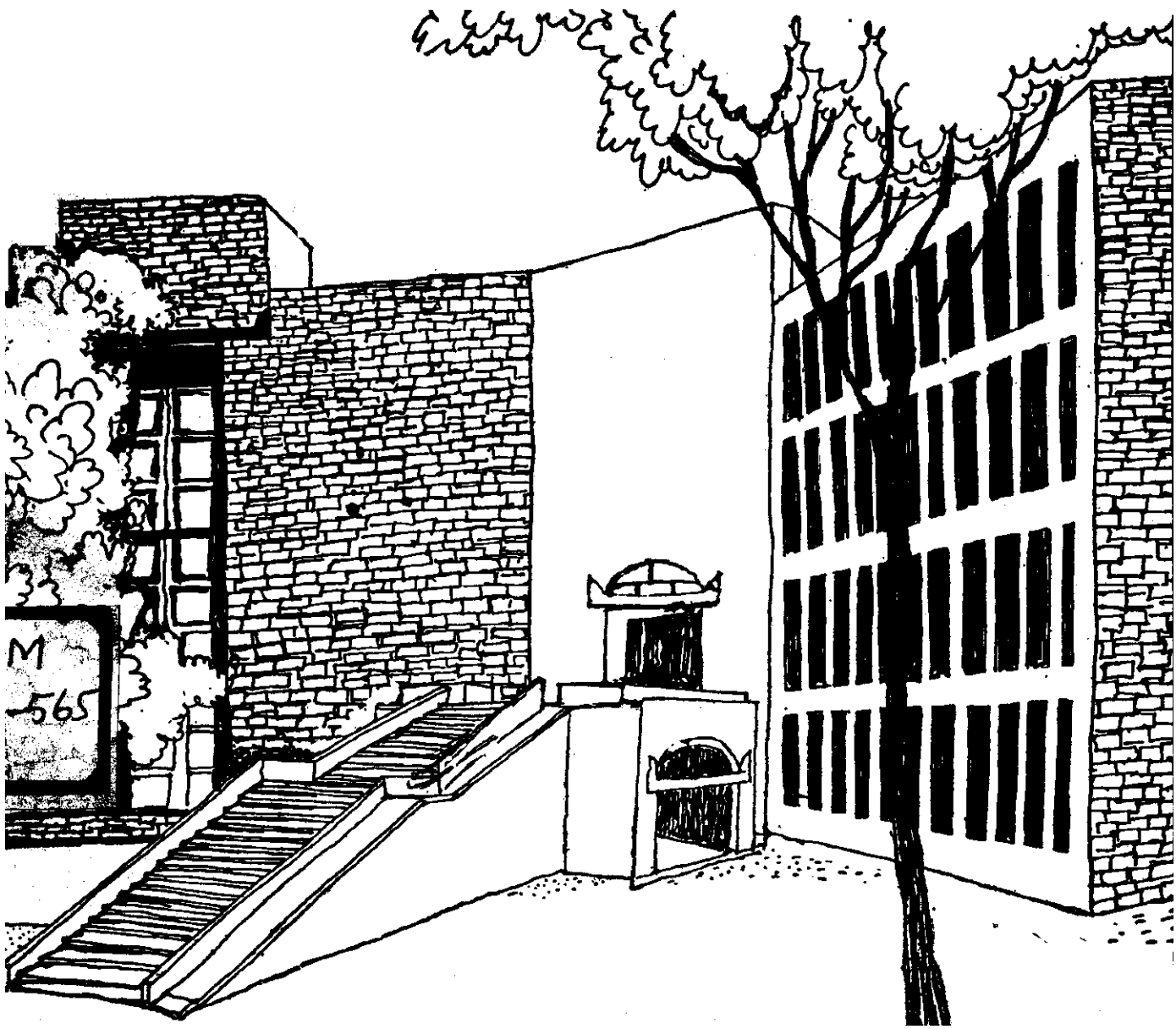
Working Paper



ORGANISATIONAL DESIGNS FOR TECHNOLOGY ORIENTED INTEGRATED RURAL DEVELOPMENT

by

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W P No. 565
June, 1985

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1 Foundation

The strategies for planned economic development followed during the last 35 years gave the country a fairly sound agricultural, industrial and technological base, human resources in science, technology, administration and management, and physical and institutional infrastructure, as well as political stability through democratic institutions. These first generation results of planned development provide foundation for rapid economic growth in future. Country has now to take the fruits of science, technology and industrial development to the rural masses whose hopes and aspiration and faith in democratic institutions were kept alive all these years through various comparatively low-cost, conventional, basic need oriented welfare programmes. Towards this, policies, programmes and organisations for dynamic farm-industry linkages integrated with welfare activities are needed.

Prepared by Professor V.R. Gaikwad, Centre for Management in Agriculture, Indian Institute of Management, Ahmedabad, for Workshop organised by High Level Committee to Review the Existing Administrative Arrangements for Rural Development and Poverty Alleviation Programmes, held at NIRD, Hyderabad, July 9-12, 1985.

2. Second Generation Tasks and Organisational Designs

Indian agriculture is predominantly small farm agriculture and increasingly going to be so in future. Over the years, land reforms, breaking of joint families under economic compulsions, and population increase affected an increasing atomisation of Indian agriculture with corresponding decrease in the unit of management of land. On the other hand there is lack of integrating institutions and organisational arrangements for optimum use of land and water resources and agricultural produce.

Increasing atomisation correspondingly increases managerial and administrative efforts and costs of providing each of the literally millions of small and marginal farmers with knowledge of modern agricultural practices, credit and inputs, and procurement and/or marketing of his produce. It also increases the efforts and costs of providing him and his family members and that of landless and artisan households income generating activities and welfare facilities (sanitation, nutrition and health, family planning, drinking water, medical, housing, education, recreation etc.). Research and evaluation studies indicate that in the absence of

integrative mechanisms, even the multiple institutional arrangements and programme administrations have not been able to cope with these tasks satisfactorily. Effective and efficient monitoring of all these activities was also practically unmanageable due to sheer number of potential beneficiaries and multiplicity of institutions and programmes.

To overcome these problems, designs of future organisations for technology oriented integrated rural development have to be such that these develop capacity (a) to respond to new technologies and process of industrialisation, (b) to provide various economic and welfare benefits (shown in Figure 1) in an integrated manner, (c) to make optimum use of land and water resources, and of produce from these. Furthermore, the designs should develop organisations sufficiently sensitive to planning, monitoring and controls by higher levels of administration.

3. Earlier Efforts for Integration

India has experience of a variety of models of integrative organisations which were tried and tested during the 35 years. Important ones are presented here in brief.

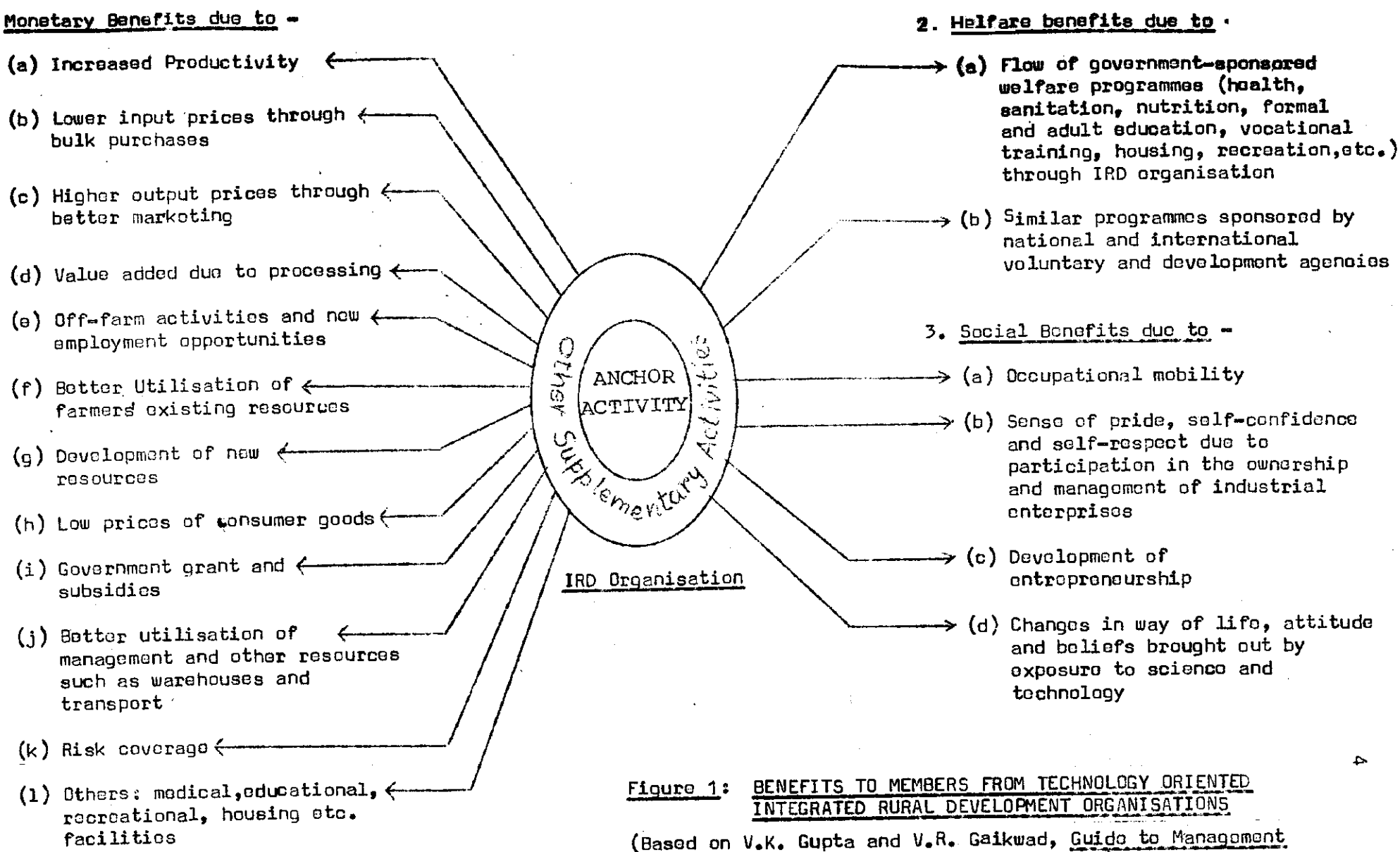

Figure 1: BENEFITS TO MEMBERS FROM TECHNOLOGY ORIENTED INTEGRATED RURAL DEVELOPMENT ORGANISATIONS

(Based on V.K. Gupta and V.R. Gaikwad, Guide to Management of Small Farmers' Cooperatives, FAO, 1982)

The Nilokheri Township model tried immediately after independence had many features of integrative organisation. The basic concept here was to stop the one way traffic of labour, material, skills and culture from villages to town. Emphasis was on a decentralised administration and decentralised economy that would eventually lead to an agro-industrial economy as the future economic pattern of the country. The scheme envisaged a nucleus township housing a population of about five thousand. The township was linked with the surrounding villages with the idea that the township with the surrounding villages would not only be an economic unit but a unit of administration as well. Within the township various social welfare, and recreational facilities were planned.[1/]

Pandit Nehru impressed by this model, at one stage observed, "I want 9999 Nilokheries to implement the message of Nilokheri," and appointed a committee (Mr. Narielwala as chairman, and S.K. Dey and Konisberger as members) to study Nilokheri project and examine the possibility of its duplication. This Committee

strongly recommended adoption of agro-industrial economy for the development of rural areas. It seems this model somehow did not fit into the overall strategies then formulated, and as such could not be replecated. Instead a low cost, non-industry oriented Community Development Programme model for rural development was adopted.

Still, the farm-industry linkage model was very much in the minds of policy makers, and certain commodity based agro-industrial cooperatives were encouraged from the beginning. Cooperative sugar factors and milk processing cooperatives of Amul type were basically integrative organisations following the farm-industry linkage concept. These provided many benefits presented in Figure 1. Due to different nature of commodity, the sugar and milk cooperatives followed different types of organisational design.[3/] The command area of an average size sugar cooperative is generally a compact block of 15 to 20 thousand hectares spread over closely situated 30-50 villages. On the other hand, the command area of a milk cooperative of Amul type is generally a whole district covering about 1000 villages each supply_a little /ing quantity of milk. Both these models have been highly successful and provided a variety of benefits to rural population, particularly to producer farmers.

The fourth model was FSCS* introduced in 1973 on the recommendation of the National Commission on Agriculture. FSCS was designed to take care of, in an integrated manner, timely availability of credit, package of inputs and custom services, along with technical advice and supportive services for storage transportation, processing and marketing preferably through a single contact point.

4. Importance of "Anchore" Activity

Earlier experiences in developing integrative organisations for rural development indicate the importance of a dynamic, anchore activity around which organisations for integrated agriculture/rural development can be evolved.

In case of sugar and milk cooperatives, the central or anchore activity was modern processing industry around which all other activities/tasks were organised. The success of these organisations was due to this anchore activity. The follow-up of Nilokheri model was also to be on the same line. On the other hand, while implementing FSCS importance of such anchore activity was completely missed, and FSCS operated like any other

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*FSCS - Farmers' Service Cooperative Society.

loosely organised, conventional, mercantile cooperatives dealing with credit and fertiliser distribution. In the absence of anchore activity no FSCS could provide the anticipated benefits.[4/] The cooperative farming, another integrative organisation, established in a few places, also suffered from similar weakness.*

How this concept of central, anchore activity operates is illustrated by the cooperative sugar factories.

Many farmers, especially small and marginal, are often reluctant to join conventional, mercantile cooperatives. The same farmers, when hear about a cooperative sugar factory, and see concrete, physical structure of factory, godowns, offices raising before them, do everything possible to become share holders of the cooperative sugar factory. Thus, about 175 cooperative sugar factories have been established in India which produce nearly 50 per cent of total sugar production in the country. More than 1.3 million sugarcane producer farmers own and participate directly or through their representatives in the management of these agro-processing industrial activities. About thousand million rupees of share capital is raised by these members which is about

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*The current rural development and poverty alleviation programmes and their administration also suffer for the absence of any dynamic, anchore activities around which self-supporting sustainable organisations for integrated R.D. could develop and prosper.

40 per cent of the total paid-up capital of these factories. Many societies have even paid back the entire state contributions to share capital as loans. Most of them have been paying year after year sugar cane price higher than the private sugar factories as well as the floor price fixed by the government. Thus, these enterprises contribute to the income of more than 1.4 million farmer members. Almost all assist farmer members by providing extension service, good variety of seed, development of irrigation facilities, supply of inputs and credits in collaboration with village level primary cooperative societies, arrangements for harvesting and transport of sugar cane, and so on. Many have utilised part of surplus for expansion/diversification, and part in social welfare activities such as schools, colleges, hospitals, as well as in developing off-farm activities such as cooperative poultry and dairy.

These enterprises are located in rural areas surrounded by sugarcane farms so as to minimise transport cost. Each has developed a small township of its own. These are labour intensive enterprises. For example, an average size of factory with 2500 MT/day capacity and a

command area of about 10-12 thousand hectares spread over 30-40 villages employs about 700-800 persons on permanent basis (office and supervisory staff, and skilled and unskilled workers). In addition, it provides employment to about 2500 persons (for harvesting and transport of cane) for about 150-180 days (harvesting/crushing period) per year. Besides, it generates secondary employment in business, transport and service sectors in the region.

The value of annual output of sugar alone of a single factory of 2500 MT/day capacity is about Rs. 20 crores. This is many times the budget of the average district local government body like Zilla Panchayat. The industrial activity of these societies is not limited to production of sugar. Many have established by-product/ waste matter processing plants such as alcohol and other derivatives from molasses, liquour from alcohol, paper from bagasse. These by-product/waste matter processing add further value to the agricultural produce of the farmer, and consequently (a) add to their net income, (b) support further expansion of industrial and other economic activities, (c) generate further employment, and (d) contribute to more sophisticated welfare activities.

One of the most important contributions of these agro-industrial cooperatives is human resource development. In backward, often barren/or newly developed rural areas, these enterprises have exposed the illiterate, poor, rural people to modern science and technologies, management systems and industrial culture. Various categories of farmer members and others participate in this dynamic economic activity generated in a compact area of 30-40 villages. Due to employment opportunities new skills are taught and learnt.

These agro-industrial organisations are the outcome of rural entrepreneurship. The entrepreneurial achievements of local persons, the political processes generated at the local level in a compact area of 30-40 villages, and the managerial activities pertaining to running of a modern industrial plant, all created an educational environment for the local backward, illiterate rural community. In the process, base for entrepreneurship and creative leadership was expanded, and over the years, second generation entrepreneurs, leaders and managers emerged from the rural community.

This process of rural transformation with local participation started some 30 years back with the establishment of Prawaranagar Cooperative Sugar Factory by Shri Vikhe Patil and Professor D.R. Gadgil. The contribution of the entrepreneur was nationally recognised when the Government awarded Padmashri to Sri Vikhe Patil.

Somewhat similar is the story of cooperative dairy. The path breaking contribution of Shri T.K. Patel and Padmashri Dr. V. Kurien in developing Amul at Anand some 35 years back is well-known. As early as 1955 Pandit Nehru observed, "Of all the many types of assistance India is receiving from many friendly countries and bilateral aid agencies this type of help that has enabled the building of this type of farmers cooperative institution is the one India will most value." In 1982, Indira Gandhi said, "This is one of our success stories of which we are all proud. May the spirit of AMUL spread far and wide in our country to help, instruct and inspire our farmers."

These sugar and milk cooperative organisations provide a model, a new approach to technology oriented

rural development. These emphasise the importance of an anchore activity in development of integrated rural development organisations. The lesson is:

Wherever possible, depending upon the available local agricultural and other natural resources, bio-mass handling processing industry/activity should be the central or anchore activity of organisations for integrated rural development. Around this anchore activity should be developed backward linkages (credit, inputs, extension, support services and procurement etc.), forward linkages (marketing of produce and finished products), infrastructure (roads, electricity, irrigation,etc.), social welfare facilities (housing, medical, education, recreational), and supplementary economic activities. The command area of each such organisation should depend upon the capacity and nature of the central, anchore activity. The population outside the command area of these enterprises should continue to be served by the current rural development programmes. The model that emerges from the above is presented diagrammatically in Figure 2.

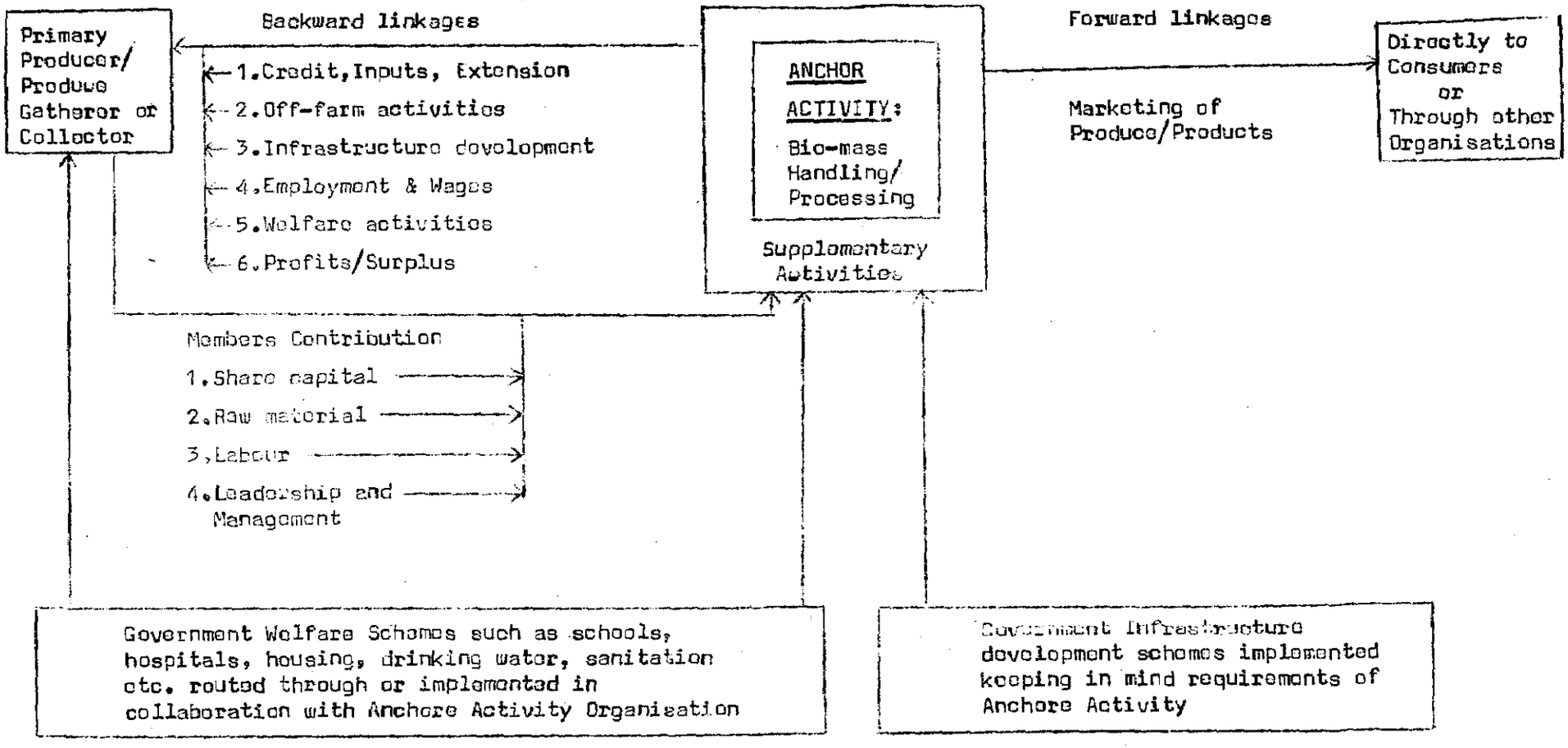


Figure 2: INTEGRATION OF RURAL DEVELOPMENT PROGRAMMES THROUGH ORGANISATION EVOLVED AROUND AN ANCHORE ACTIVITY

To illustrate the "anchore activity" concept further, a simple exercise on Paddy-Rice By-Product system could be attempted.

A farmer does not produce rice; he cultivates paddy plants. These plants produce:

Straw (about 50 per cent by weight)

Husk (about 10.5 per cent vy weight)

Bran (about 3.5 per cent by weight)

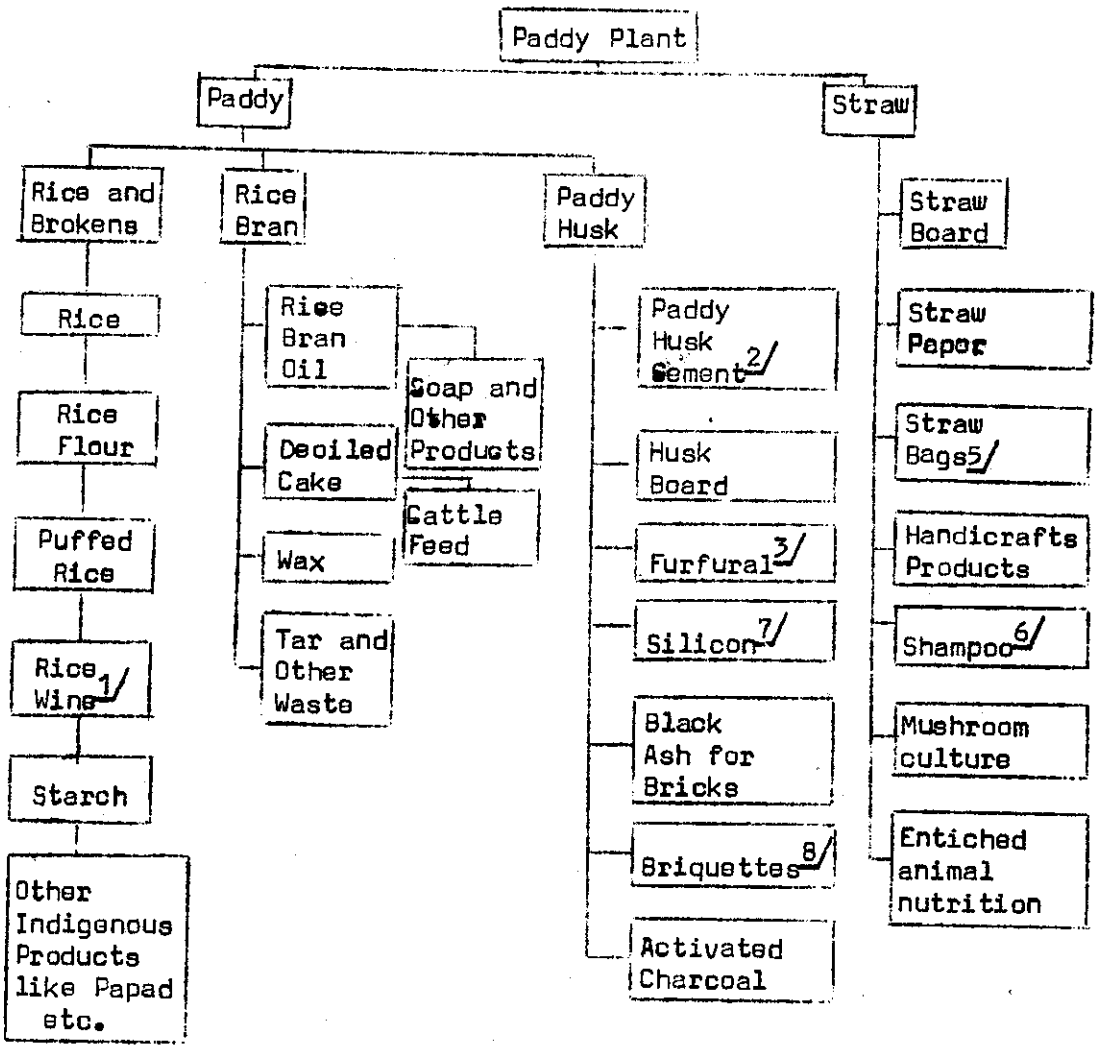
Rice Carnel (about 36 per cent by weight)

From Figures 3 and 4 it could be seen that a paddy plant could be converted into a number of products. Each block of about 10 thousand hectares under paddy crop with two paddy seasons in a year and 4 MT/ha production has a potential of supporting a complex of processing industries (rice mills, solvant extraction plant for rice bran oil, processing of husk for a variety of products, and straw paper mills). Crude estimates, indicate that for reasonable exploitation of the economic potential of paddy in 10,000 hectares an initial investment of the order of Rs. 2-3 crores would be needed, i.e., about Rs. 2000-3000 per hectare. It is this complex of industries that could be the anchore activity that would

provide the local paddy farmers worthwhile avenues for participation in terms of contribution of capital and management of enterprise. Organisation evolved around such anchore activity could then undertake a variety of development and welfare activities in an integrated manner in the villages falling under the command area of the factory.

Potential for developing such anchore activity is very high in case of many other commodities such as sugarcane (Figure 5), maize, casava, coconut, cotton, jute and various plantation crops etc., as discussed in Section 5.

Figure 3 PADDY BY-PRODUCT SYSTEM



1/ Rice Wine is commonly produced in many South-East Asian Countries, such as South Korea, Japan and India.

2/ Cement from paddy husk has been recently recommended by Central Building Research Institute, Roorkee, India.

3/ Furfural is a chemical produced from rice husk. This is used as a catalytic agent in petrochemical industries as well as for many chemical products. There are a number of Furfural plants in India; one of the largest, integrated project has been recently approved by the GOI; It is by Punjab State Industrial Development Corporation with collaboration with Ballestra S.A. of Switzerland. It is hundred per cent export oriented project for manufacturing Furfural; capacity - 6000 MT/annum; investment Rs.40 crores; By-products - rice, edible oil, deoiled cake, and boiler mill ash. For manufacturing Furfural, no raw material cost as husk available from rice mill which is part of the integrated project (as reported in The Economic Times, 30 September 1983).

(contd.)

4/ Paper from paddy straw is produced in many places. A Cooperative paper factory using paddy straw has been recently established in Surat district, India

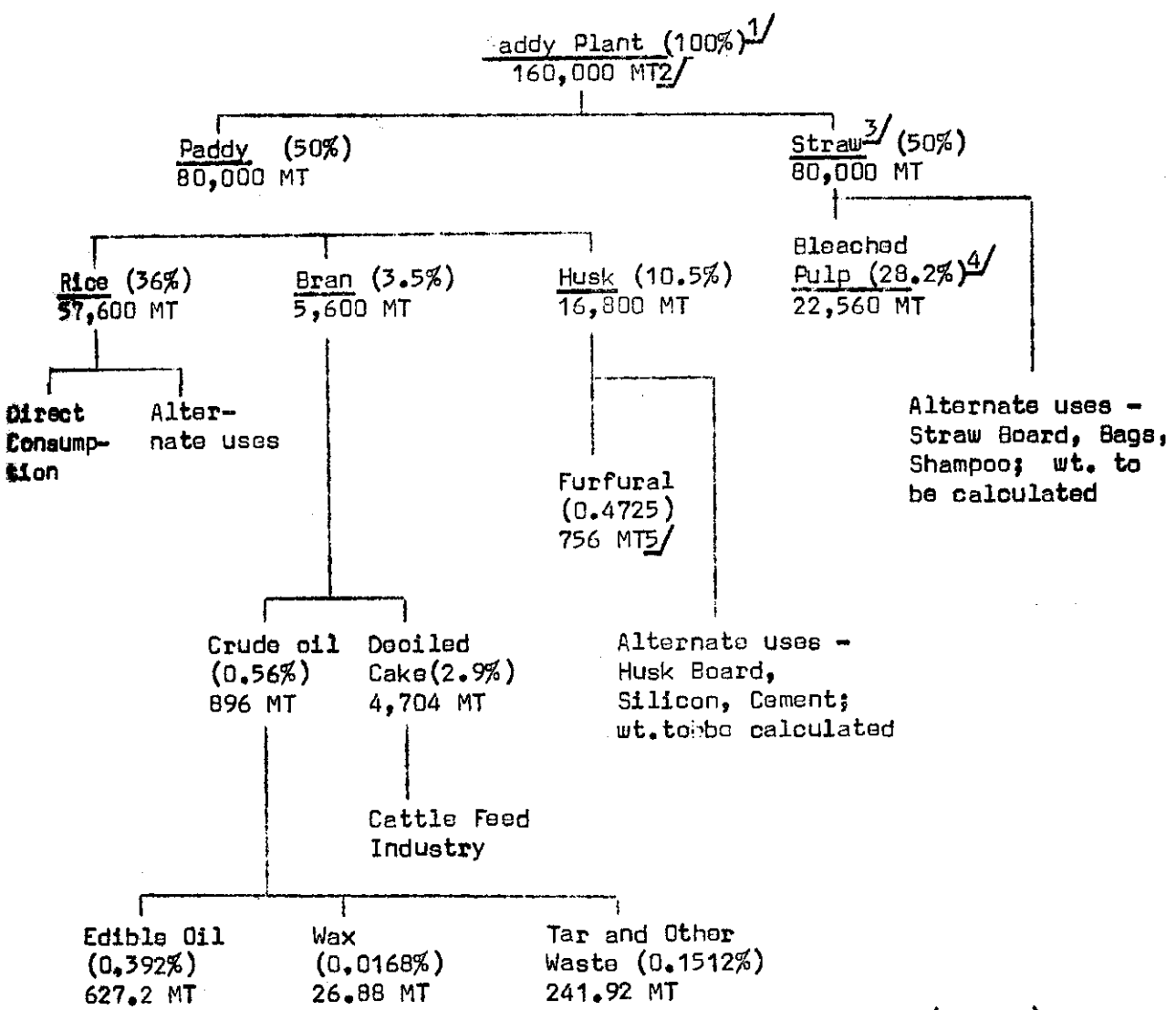
5/ With the help of a binding chemical, paddy straw has been used for manufacturing bags in S.Korea.

6/ Hair Shampoo manufactured from paddy straw in Indonesia is a popular products.

7/ Rice Husk generally used as a fuel and as a source of cellulose, also provides a cheap source of high purity silicon for solar cells and electronic industry. Cheap silicon is produced by a metallurgical process where silica and carbon are heated together. Rice husk which contains 15 per cent silica can provide pure silicon (as reported in Science Today, Vol.16, No.8, August 1982, p.12).

8/ There are many plants in India manufacturing briquettes from carbonised husk as a substitute for coal.

Figure 4 PERCENTAGE BY WEIGHT OF VARIOUS COMPONENTS OF PADDY PLANT



(contd.)

Note: 1/ Figures in bracket are approximate weight (in percentage) out of the total weight of paddy plant.

2/ Figures given below each component are derived on the following assumption:

a) Paddy area under cultivation - 10,000 hectares

b) Cropping intensity - two paddy crops per year

c) Paddy yield per hectare for one season - 4 MT/hectare of paddy

d) Paddy straw yield/hectare (at 1:1 paddy: straw) 4 MT/hectare of straw.

e) Total paddy production = 10,000 x 4 x 2
= 80,000 MT

Total straw production = 10,000 x 4 x 2
80,000 MT

Total weight of paddy plant = 160,000 MT

f) Entire paddy and straw produced is processed; seed and other requirements not considered.

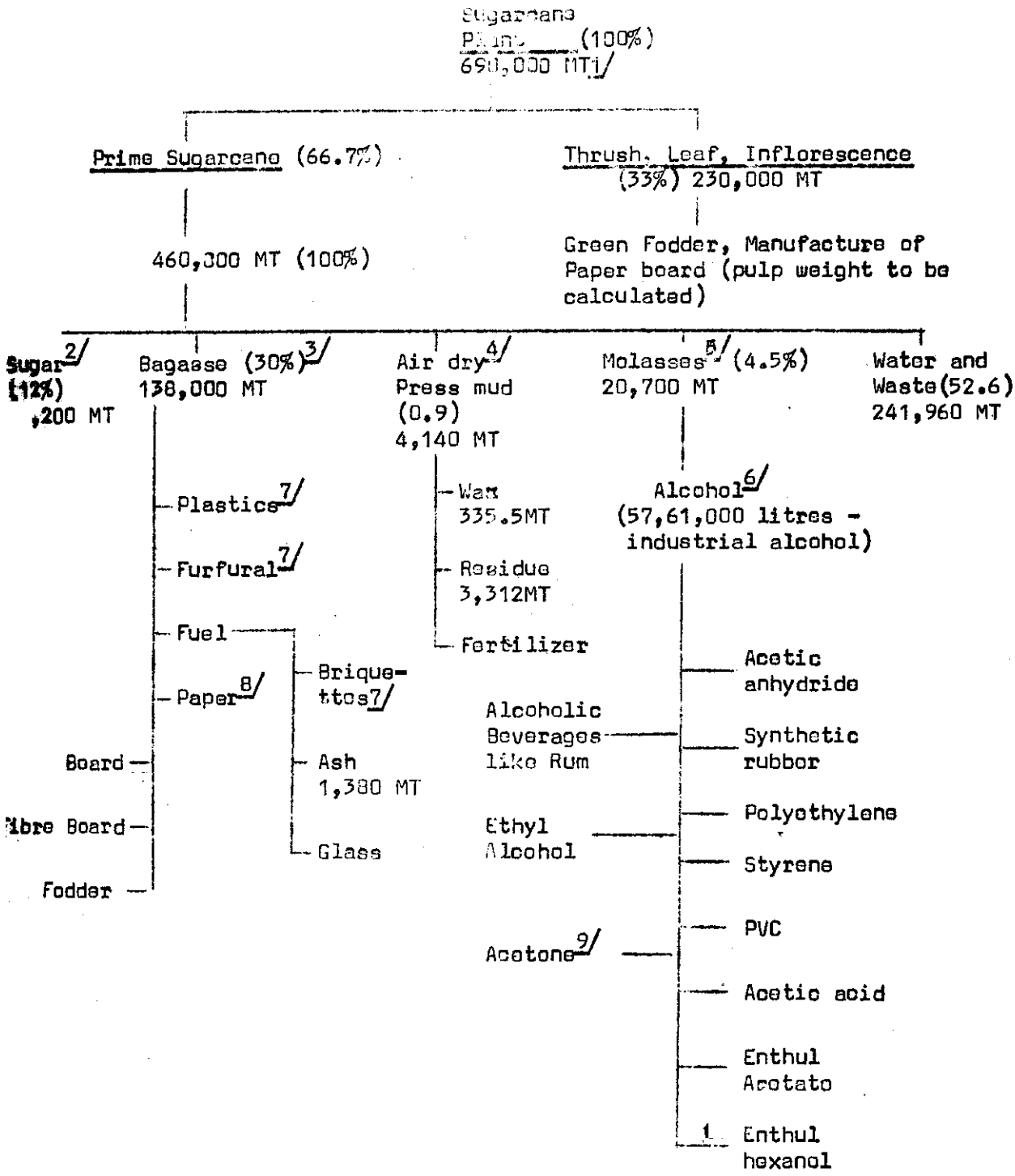
3/ The paddy straw ratio for most of the common varieties varies between 1:0.7 to 1:1.5. Here we have assumed the ratio of 1:1.

4/ Based on the figures given by V. Podder, Paper Industry in India, Oxford and IBH Publishing Co., Bombay, 1979, pp.60-63.

5/ At 4.5 recovery rate from husk against possible 6 per cent.

Source: V.R. Gaikwad and V.K. Gupta, A Guide to Management of Small Farmers' Integrated Rice Cooperatives in Asia, (Report submitted to FFAO of UN, 1981), under publication with Oxford and IBH Publishing Company, New Delhi.

Figure 5: WEIGHT OF DIFFERENT COMPONENTS OF SUGARCANE PLANT



1/ Sugar cane production (including tops) from 5000 hectares @ 92 MT per hectare of prime sugarcane i.e., 66.7% of the total weight of plant. At this yield rate, production from 5000 ha of prime cane would be sufficient for sugar factory with 2500 MT per day capacity with crushing period of 180 days.

2/ Theoretically sugar contain inprime sugar could be as high as 15%. However, sugar yield varies from 8 to 13% of cane crushed. We have taken 12% as it is repeatedly achieved by many co-operative sugar mills in Maharashtra.

3/ Bagasse would be about 30.35% by weight of cane crushed. If this bagasse is burnt for power generation, it gives about 10% ash. One of the alternate uses of bagasse would be for paper making. In such paper makingplants bagasse is supplemented by other raw materials such as cotton waste/rags.

4/ Filter press mud is about 2.5 to 3.5% by weight of cane crushed. From 1000 MT cane-crushed about 9 MT of press cake (mud) on air drying is available. On extraction with solvent 725 kg of wax is obtained and residual is about 7.2 tonnes (Ref.A.R. Patel, "Agro-based Industries - Approach to Problems of Agricultural Wastes", in A.V. Bhuleshkar (ed.) Indian Economic Structure and Policy, Dhaval Prakashan,Ahmedabad, 1982, p.94.

5/ The world famous Tate and Lyle Industries has demonstrated that anything and everything that is produced from petrochemicals can be manufactured out of molasses.

6/ Alcohol could be used as fuel especially for the automative industry. With some modifications petrol blended with alcohol upto 20% (gasohol) could be used as motor fuel, and with major modifications of the carburettor and injection systems, alcohol could replace petrol.

7/ For details, see A.R. Upadhyay, Handbook of Sugar Factory Management, Rajic, 'Rajiv Sadan', New Road,Ratlam, M.P., 1969, pp.467-527.

8/ There are many paper factories using bagasse as raw material. The largest project in the country for the manufacture of newsprint and writing and printing paper from bagasse is to be set up in joint sector at Parbhani, Maharashtra State; Capacity 300 MT/day; investment Rs.225 crores (as reported in The Economic Times, October 13, 1983)

5. Potential for Developing Integrated R.D. Organisations

The vast canvas of agriculture covers practically entire bio-mass - plants, animals, insects, and micro-organisms, each covering millions of species and sub-species.

This bio-mass, through various physical and chemical processes, provides organic and inorganic matter which could be further converted into numerous products through technological and industrial interventions. Seen in its wider perspective, this bio-mass, besides providing food, fibre, energy and other natural products, provides numerous opportunities for commercial and industrial exploitation, which contribute to economic development.

Indian sub-continent, with its diverse physiographic and geographic condition, supports a vast variety of bio-mass. In the early stages of economic development, thinking about agriculture and rural development is bound to be limited to a few plant and animal species which provide food, fibre, energy, timber and some directly usable primary products. While food production has to be a continuous, high priority activity at all phases of country's development, as the country advances on economic and industrial front

procurement/production of bio-mass for commercial and industrial purposes become increasingly important. It is this aspect of agriculture/rural development that generally gets low priority in early stages of economic development.

More than hundred years back the British administration very systematically and meticulously collected detailed information about economic, commercial and industrial potential of practically entire flora and fauna of the Indian sub-continent. Every single cultivated and wild plant was systematically studied to find out utilisation of each of them.

The first systematic compilation of such information was byDr. George Watt who, between 1882-1896, brought out A Dictionary of the Economic Products of India, in six volumes.[5] This dictionary was up-dated during 1940-1976 by Council for Scientific and Industrial Research (CSIR) which brought out a twenty volume series entitled, The Wealth of India: A Dictionary of Indian Raw Materials and Industrial Products.[6] Eleven volumes were brought out to cover 'Raw Materials' (of plant, animal and mineral origin) in addition to nine

volumes covering, 'Industrial Products' and 'Animal and Marine Products'. The 'Raw materials' and 'Animal and Marine Products' series provide detailed accounts of the raw materials, their chemical compositions and various products that could be manufactured. These eleven volumes alone covered over 5000 plant species available in India.

In the West scientific information about agricultural raw materials and their commercial and industrial potential lead to development of processing technologies, machinery and plant designs, and establishment of agro-processing enterprises.

Available scientific information and experience of industrially advanced countries indicate that almost every primary agricultural commodity (raw material)has potential for developing a series of industries if primary commodity, its by-products and waste matter are scientifically processed. Similarly, animal by-products all have high potential for developing a series of industries.

Bio-mass processing industries directly or indirectly provide food (e.g. ingredients of cattle feed for meat

and poultry, coconut oil as ingredient for margarin, sugar, beverages, edible oil etc.), consumer goods (e.g. cloth, leather goods, soap, cosmetics, etc.), and other goods (e.g., paper, resins, oil-paints, varnishes, various chemical derivatives, starch, medicines from medicinal plants, perfume and so on). The list is long.

The bio-product processing chain provides a variety of products even from common food crops. For example, paddy plant provides rice, bran, husk and straw. These four when further processed provide a variety of products such as rice products, starch, rice wine (all from rice), rice-bran oil, de-oiled cake, cattle feed, wax and tar (from rice bran), paddy husk cement, coal bricquettes, husk board, furfural oil, silica etc. (from husk), and straw board, straw paper (from rice straw) (see Figure 3). Similarly, various products could be produced from other commodities like sugarcane (see Figure 4), groundnut, coconut, casava, maize, cotton, medicinal plants, horticulture crops forest products, and animal and fish. Commercial enterprises could also be developed for cultivation/procurement of wild plants (especially medicinal plants), and rearing/procurement of wild animals (such as rabbit, snake, crocodile, butterfly)*.

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*Farms on experimental basis are already being established in India in recent years.

In India, while scientific information about agricultural raw materials was available all these years, its application so far was limited. However, today India has reached a stage of development where it can seriously think of application of science and technology for processing of bio-mass. This would provide many anchore activities for organisations for technology oriented integrated rural development. This process is already on in the country in response to demand for various agro-based industrial products for direct consumption, further industrial use, and exports.

6. Implications

Systematically formulated farm-industry linkages have far-reaching effect on agricultural productivity as well as social and economic development. Some of these are brieflydescribed below:

Such industries provide opportunities for investments and consequently help in mobilisation of local capital for productive purposes in rural areas; generate employment opportunities, especially, for surplus labour and landless; employ technical, skilled and semi-skilled workers and managerial staff and thus

develop human resources; support growth of new townships thereby reducing pressure created by rural migrants on existing urban centres.

Farm-industry linkage helps agricultural development in many ways. For its own survival and growth an industry has to payattention to backward and forward linkages. For getting raw materials of suitable quality/specification, sufficient quantity, and in time, it has to take care of backward linkages (such as supply of inputs, extension work, development and optimum use of water resources and other facilities, purchase of commodities at proper prices, transport, storage, etc.); and forward linkages (such as marketing of commodities and finished products to consumers at proper prices); add value to farmers' produce and increase their net income which in turn motivates them for higher productivity and achieving better quality.

Modern industry and technologies introduce new culture, attitudes, orientation, and behaviour in stagnant rural society thereby helping rural transformation; provide opportunities for development of leadership and entrepreneurship, thereby introducing a sense of

dynamism; direct people's energies towards exploitation of local, natural resources through commercial/ industrial enterprises (rather than one class/group/ caste exploiting another class/group/caste using land based, traditional agricultural resources--a scene common today); encourage people to organise, not against each other (as happens today) but around feasible economic activities for individual and common economic and social gains; further encourage participation of local people in development and management of commercial and industrial enterprises, and through such participation encourage proper sharing of profits/surplus among primary producers and workers as well as use of profits/surplus for local community's welfare (education, health services, recreation, etc.)

Around each such agro-industrial-commercial enterprise economic, social and welfare activities of thousands of small and marginal farmers, landless and artisans living in the command area of the enterprise can be effectively and efficiently integrated. The enterprise organisation becomes an anchore, a centre for effective integration of various service, welfare and

supplementary production functions. Many agricultural/ rural development programmes and schemes of the government (production, conservation, welfare related) could be implemented through/ in collaboration with such organisations.

Thus, such organisations would help local government bodies and administration in many ways. By performing many of the conventional development and welfare functions these organisations would reduce the load on local bodies and administrative systems. The local bodies would then be able to devote more time to systematic regional planning--resource surveys, identification and formulation of anchore activities in the region, help local people in developing organisations around such activities, development of infrastructure to support such activities, and better monitoring and control of these organisations. They would also be able to pay better attention to development and welfare of population lying beyond the command areas of such organisation. These new functions would help in changing the traditional orientation and approach to rural development of the local bodies and administrative systems, and also help in more effective decentralisation of functions.7/

Collaboration between these organisations and existing primary cooperative societies in supply of credit and inputs (as done by cooperative sugar factories would strengthen the primary societies especially by greater volume of business and better repayments of loans.

Development of such integrated R.D. organisations in the command areas of major irrigation projects would be beneficial in solving the problem of coordination of various activities (land development, lay-out and maintenance of field channels, supply of inputs and services, development of infrastructure and support services, etc.), optimum use of water resources and increasing productivity. Under this approach, the total command area would be composed of a number of sub-command areas. Size of each sub-command area would depend upon the optimum size (capacity) of the anchore activity (industrial/commercial complex), and all development and welfare activities would be managed by the integrated R.D. organisation evolved around the anchore activity. The total Command Area Development Authorities would then be a higher level organisation, with overall functions of planning, monitoring and

controls in relation to each of the sub-command area integrated R.D. organisation, and development of common facilities, infrastructure, township etc., needed by all sub-command areas.

All the above implications are, in essence, reflect the underlying objectives of the existing agricultural and rural development policies and programmes. In addition, these take care of many economic, political and administrative problems currently faced in implementation of agricultural/rural development and poverty alleviation programmes. The other positive implications of this approach are as follows:

Farm-industry linkages reinforce composit nature of national planning since development of large number of agro-industrial enterprises would generate demand for industrial plants and machineries thus supporting second generation activities for industrial sector.

Integrated plant designs and lay-out is a new concept under which plants are designed to process not merely a single product but the entire chain of by-products. For example, at present a sugar factory is designed to

produce only one product, namely sugar. By-product processing is generally added as an after-thought. On the other hand a modern, integrated sugar factory complex would have a number of inter-linked and balanced modules (plants) to produce, in addition to sugar, alcohol and its derivatives, paper, etc. The line-balancing of various by-product modules (plants) and proper lay-out of entire complex (in which modules can be added as and when needed) would reduce substantially investments and costs of handling, transport, storage, energy and management. Only by such plant designs and layout, India would be able to compete with industrially advanced countries. Farm-industry linkages would provide opportunities for introducing modern concepts of plant designs and layouts in industrial sector.

Political implications of such organisations are many. Such organisations can deliberately and fruitfully divert energies of young members of the society, and especially of the members of traditionally dominant families/groups/castes/class in rural areas from traditional ways of satisfying their urge and desire for power and maintaining higher socio-economic status.

In many areas, today, in the absence of any alternative channel, their major pre-occupation is dominating and exploiting the weak by using force and the one and only instrument for exercise of power in rural areas, namely, ownership of land. It seems, use of force on the weak has increased in proportion to loss of power derived from land. This urge for power and status could be effectively channelled into development of entrepreneurship, as has happened in many instances. Thus, the direct attack on poverty and exploitative forces through poverty alleviation programmes is supplemented by simultaneously channelling the energies of otherwise exploitative forces intosocially constructive activities.

Panchayati raj bodies, introduced some 25 years back, to a great extent served, among other things, the same purpose of satisfying the urge of power of the dominant groups in rural areas. These bodies also helped in diffusing power at lower levels, thereby reducing pressure) competition at higher echelons of political structure. However, over the years, this channel has become, more or less, saturated. Also many of the younger generation, especially socially oriented ones,

are disenchanted with these and other rural institutions. Their experience of conventional, general welfare oriented rural development approach has also been not very satisfying. Technology oriented integrated rural development provides an attractive alternative to them.

Whether such an organisation should be under cooperative, private or public sector or a combination of these, has to be decided on some rational basis. So far little thinking has been done on this subject. Tentatively, it could be said that not only the size and structure of such organisations but also their ownership structure would depend on a variety of inter-related factors mainly related to nature of commodity (degree of perishability, seasonality, crop cycle, complexity in processing, complexity in quality control, nature of technology, nature of by-products, etc.), magnitude of investment and cost structure, and nature of markets (including potential for speculation in purchase and sales). All these vary from commodity to commodity. A thorough study of all such factors would help in evolving some norms for determining the kind of ownership. For example, a cursory study of

cost structure leads to the following: If in the total cost of a product, cost of raw material supplied by farmers is 50 percent or more then the organisation producing such products may be owned and managed by producer farmers' cooperative. This norm fits very well to sugar and milk cooperatives, as well as to ginning and spinning cooperatives. Such norms need to be developed considering other components of costs, namely, other raw materials, labour and capital.[8/]

Financial and economic implications also need to be considered carefully. An anchore industrial/commercial activity has to be decided only after a thorough feasibility study. Financial and economical viability is essential for the success of the enterprise. An anchore industrial activity for a command area of 10-15 thousand hectares may initially require an investment of Rs. 2-3 crores. While it may be possible to raise about 40 per cent of the capital as share capital primarily from the producer farmers/other locals, the balance has to come from other sources, especially from financial institutions. Ten to twenty such technology oriented integrated rural development

organisations in each district if introduced in about 300 districts in India in the next 15 years in a planned manner may require on a rough estimate an investment of the order of Rs. 12000 crores (at present prices) or on an average Rs. 800 crores per year (about Rs. 2.5 crores per year per district). These, however, are very crude, generalised estimates and need to be worked out much more systematically.

References

1. Government of India, Ministry of Agriculture, "The Nilokheri Experiment" in Evolution of Community Development Programme in India, 1973, pp.82-89.

2. Contrary to popular belief Dey's Nilokheri model has practically nothing common with CDP model which was designed by Mr. Chester Bowles, the then Ambassador of USA in India and funded by USA. For details see Ensminger, D., Rural India in Transition, New Delhi, All India Panchayat Parishad, 1972; Chester Bowles, Ambassador's Report, London, Collins, 1954; V.R. Gaikwad, "Evolution of Rural Development Strategies: Evaluation of Some Early Experiments", presented in Asian Seminar on Rural Development: Evaluation of Indian Experience, IIMA, Dec. 10-14, 1984.

3. The nature of commodity determines the organisational design. Factors such as size of command area, degree of perishability, seasonality, crop cycle, complexities in processing and quality control, nature of technology, nature of by-products, etc.) as well as magnitude of investment and nature of markets (including potential for speculation in purchase and sales), all vary from commodity to commodity, and hence affect the organisational designs.

4. V.R. Gaikwad and D.S. Parmar, Serving Small Farmers: A Study of the Farmers' Service Cooperative Society, Bidadi, (CMA Monograph 94), CMA, IIMA, 1983.

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5. George Watt, A Dictionary of the Economic Products of India (six volumes), Periodical Experts 42D, Vivek Vihar, Shahdara, Delhi, India; First published 1889; Second Reprint 1972.

6. Council for Scientific and Industrial Research, The Wealth of India: A Dictionary of Indian Raw Materials and Industrial Products, (in 11 volumes of Raw Materials and 9 volumes of Industrial Products), Publication and Information Directorate, CSIR, Hillside Road, New Delhi, India, 1940-1976.

7. For analytical study of functions performed by local bodies and administration see V.R. Gaikwad and D.S. Parmar, Rural Development Administration Under Democratic Decentralisation, Wiley Eastern Limited, New Delhi, 1980.

8. Author is currently working on this topic.