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APPROPRIATE TECHNOLOGY FOR RURAL INDUSTRIALISATION : THE LEADING ISSUES.

B. Sahoo.

Voices have been raised against the misuse of science and technology from time to time. To place one's faith in science and technology has been characterised as making a pact, like Faust with the devil. Oswald Spengler in his book "Decline of the West" predicted that 'Faustian man will be dragged to death by his own machine'; Aldous Huxley sketched the blue print of his nightmarish Brave New World during the depression of the early 1930s; George Orwell's Nineteen Eighty Four contained a damning indictment of the totalitarian possibilities entailed in advance technology. The publication of the Massachusetts Institute's "Limit to Growth" foreboded the dire consequences of the reckless and thoughtless consumption of natural resources of the world with the aid of science. All these observations urge us to consider the appropriateness of a technology or method of production based on science not only from the point of view of its capacity to raise productivity but also from the point of view of its impact on social relations, ecology and mind of the people for whom increased production is intended.

The Devil in Advanced Technology :

Even technology applied to agriculture has produced counter-ecological effect. The increasing use of pastics and non-degradable synthetic detergents, writes Prof Barry Commer, may be an economic success "but only because it is an ecological failure"¹. The success of technology leading to ecological failures, he contends can be attributed to the fault in aims. This failure is perpetuated because the producers do not take the social cost of production into account.

From a broader point of view technology may be defined as "an abstract concept embracing both the tools and machines used by a society and the relations between them implied by their use".² A major Italian chemical company states that the basic objective of industrial research is "the transformation of an idea or intuition into a new improved or less costly product, rather than the immediate desire to tackle urgent social problems". In fact, the two factors-economic growth and technological changes, are

inextricably intertwined. The emphasis on growth measured by aggregative factors such as G. N. P. and "primary import substitution" was caused the massive transfer of advanced industrialised techniques from the developed to the under-developed countries. This transfer of technology has adverse repercussions on social, political and employment situations of the developing countries. As Prof. Hans Singer pointed out "the under developed countries are now importing what is called modern technology though the word modern, like the word progress means what is modern what is progress, for the richer countries".³ The benefits of the technological change at present accrues only to a very small section of the population in developing countries. "The contrast of wealth and poverty in many developing countries probably exceed those of any other civilisation at any other time of history" observed Judeth Hart, a U. K. Minister. Equally important are the effects that technology has on the individual in society. Individuals living in industrialised society find themselves further and further removed from many of the major decisions taken by the society. Anthony Wedg Wood Benn writes "a paradox of modern technological society is revealed; the society creates problems so complex that they can be handled only by those with specialist skill and intricate knowledge and at the same time, it produces people who are more highly educated and inquiring than previous generations. It centralises decision making but spreads the desire to make decisions". Woodrow Wilson is alleged to have remarked in 1912 presidential election "what I fear is a Government of experts. What are we for if we are to be scientifically taken care of by a small number of gentlemen who are the only men who understand the job? Because if we do not understand the job, then we are not free people". Ralph Lapp thinks this process to have happened. Democracy now faces most severe test in preserving its traditions in an age of scientific revolution during which the nation becomes more and more dependent for its welfare upon the even fewer people who form a scientific and technical elite".⁴ The fear may be far fetched, yet, there has been a desire to strengthen and institutionalise the links of techno-structure in which Government, Industry and Universities combine to form a large corporate consensus.

The development in Cybernetics- the Science of controlling information and communication - has raised the possibility of centralised control. Depoliticization has been associated with advanced technology and has appeared a "rational" economic necessity lying outside the field of political considerations. The British society for Social responsibility in science points out that "scientific and technical knowledge is an important source of power but only large institutions have the resources needed to explore

it. Thus, science is use directly to increase the power of the already powerful and to frustrate the expectations of the powerless".⁵

Beginning from Marx to the present sociologists, many have discerned five types of of alienation of man entailed in present technology. These are : the powerlessness of individual when he feels himself controlled by other people, or by an impersonal system (technology), the meaninglessness that he associates with his work a feeling increased by division and fragmentation of production task, the selfestrangement of the worker who often experiences a form of depersonalised detachment from his work and a general normlessness and isolation that can lead to social alienation or the general break-up of integrated communities (Emile Durkheim's concept of anomie). Robert Blaumer in a wide-ranging study of factory worker in America observed "inherent in the techniques of modern manufacturing and the principles of bureaucratic industrial organisation are general alienating tendencies".⁶ Marcuse in "One Dimensional Man" writes "the liberating force of technology the instrumentalisation of things turns into a fetter of liberations the instrumentalisation of man" while Roszak states that "in the case of technology, totalitarianism is perfected because its techniques become progressively more subliminal".⁷

The Salvage In Alternative Technology :

The criticism against modern technology has led to the search for an alternative mode of technological development. The alternative technology starts from the premise that the roots of the problems created by modern technology are to be found as much in the design of the technology as in the uses to which it is put. Robin Clarke pointed out "a real way out will involve a science and technology even if those activities in the future bear little qualitative or quantitative resemblance to science and technology today".⁸ This technology has been variously termed as soft technology low impact technology, intermediate technology, peoples technology and laboratory technology. They include, minimum use of non-renewal resources, minimum environmental interference, regional or sub-regional, self sufficiency and the elimination of alienation and exploitation of individuals. The alternative technology might coincide with Aldous Huxley's suggestion that we need a "differently oriented technological progress, (resulting in), a progressive decentralisation of population, of accessibility of ownership, of means of production, of political and economic power"⁹ and ties in with Gandhi's recommendation that "every machine that helps every individuals has a place, but there should be no place for machines that concentrate

power in a few hands and turn the masses into mere machine-minders, if indeed they do not make them unemployed".¹⁰ In short, the alternative technology seeks to provide a basis for "a life style that is personally fulfilling, socially just and economically and ecologically viable".¹¹

New Technology And The Developing Economies :

E. F. Schumacher was unsparing in his effort to popularise the idea of Intermediate technology. In Britain in 40 Universities about 200 projects of Intermediate technology have been taken up to solve the problems of the developing economies containing vast rural areas. The 64th Session of the Indian Science Congress stressed that Indian Technology should spring from Indian needs and priorities.

Blind adoption of Western technology injures the interest of the society. ILO study shows that use of a highly costly moulding machine for leather goods, though made the shoes cheaper, resulted in loss of earning for 5000 artisans of a country. Dr. Y. Nayudamma, Director General of C. S. I. R. recently observed that we shall have to go back to the concept of Mahatma Gandhi to give a boost to the programme of economic development on desirable lines. We have to work at the links of technology with raw materials, social needs and people's skill. A few factories with sophisticated technology cannot bring in general economic development.

While using economic resources, the complex inter-relationships between technological and economic progress, between the new productive forces and the production relations, between the social structure and system of ownership have to be considered. The royal route of technological transformation, no doubt, lies in the diffusion of highly efficient and most productive technology throughout the economy. But it is impossible to switch the entire economy from the traditional to modern footing as if by a miracle. This is a slow, gradual and multi-stage process. To raise the technology therefore some thought has to be given to machinery of "first generation," simple, cheap and accessible to small producers. A structural change in the developing economies and a complete renewal of the technological methods of production require a wide range of new technologies. Thus technology suited to the conditions of developing economies has to be developed.¹² This has to be a mix of technologies appropriate to various productions,

Rural Industrialisation And New Technology :

Serious efforts at evolving appropriate technology in India with a view to modernising small and rural industries, began with appointment of

Prof. E. F. Schumacher as a consultant to the Indian Planning Commission in 1962. In June, 1966, the Ministry of Commerce constituted a Committee on Khadi and Village Industries under the Chairmanship of Asoka Mehta to make recommendation for strengthening the programme. To provide a nucleus of activities relating to identification, innovation, adaptation and extension of appropriate technology, the Ministry of Industrial Development constituted in 1971 an appropriate technology cell. The 1973 Industrial Policy decision conformed to the growth profile of economies of scale, appropriate technology etc. The Draft Five Year Plan 1978-83 stressed that industrial research and technological development capability would be "specifically oriented to establishing links between the industry and laboratory and implementing programmes of regional interests including those specific to the needs of the village and small industries".¹⁸ Large number of special organisations have been built up to develop and popularise small industries with new technology.

Thus, the Government has been trying since 60s to evolve suitable technology, efficient but less capital using to promote small industries, more particularly in rural areas. Technology has to facilitate rural industrialisation, that is, to have large number of rural industries. Rural industries have been defined by C. S. Hard of F. A. O. as "an activity in which the predominant man-power resides in the farm and where modern technique and technology is applied to fabricate process or otherwise transform products into a more finished State".

N. C. Chakrabati of I. S. I. defines rural industry as "an enterprise carried out in rural environs mainly with the help of rural workers (1) for the processing, fabrication and transformation of products (not merely for household consumption) into a more finished states (2) for the preservation and storage of products and (3) for repair and other servicing of articles".¹⁴ Rural industries, therefore, include (a) cottage and household industry (b) crafts and handicrafts (c) processing of farm products (d) other rural industries of non-household type carried out by more than one person in partnership or group of rural people on collective or cooperative basis and (d) small industries.

Rural industrialisation implies having wide dispersal of such industries that would create an industrial bias among rural people and industrial and developmental tempo in the country-side.

Notwithstanding such pious intentions, certain faulty policy and other constraints have impeded the application of appropriate technology on an appreciable scale.

The raising of ceiling on investment in small units to qualify for Government assistance from time to time and waving out the employment criterion have discouraged introduction of appropriate technology.

Any scientific definition of small units which could be helpful in present context should have been in terms of product type, system of work organisation, number of workers, capital investment in relation to energy input, physical measure of output and value of production. The existing approach has enabled many metallurgical, electrical and chemical units to incorporate higher levels of technology. Those items which have standardised production operations and which could be carried out according to specification, blue prints and designs supplied by large units have been successfully undertaken in many efficient small-scale units. But such a growth pattern has led to a kind of cartelisation among the small and large scale establishments. This approach to small units has certainly led to a widespread dispersal of entrepreneurship but has failed to encourage substantially introduction of labour intensive technology. Skill formation under master craftsman has not been achieved.¹⁶

Three special factors impinge on technological status of small scale industries, such as (a) distinct pattern of small and production organisation (b) imitative rather than innovative technology extensively prevalent among small artisans and entrepreneurs and (c) poor availability of managerial techniques.

The Indian Standard Institute has, no doubt, standardised more than 6000 items, a large proportion of which covers small scale industries. But the lack of specifications regarding the tools, equipment and production process which could be adopted retarded the evolution of appropriate technology. The manufacturing operations have not been organically related to the culture and environment of the rural communities.

Choice of Technique :

Choice of technology is not merely a question of mechanical skill or engineering knowledge. It has to consider the political system and social

goals of the country. The question assumes significance as it influences income generation, saving potential and income distribution.

Appropriateness of any technology is considered in relation to the need it has to fulfil. The following needs appear significant :

(I) Production of a required article :

Technology has to result in commercial fabrication of newly innovated articles to meet the consumption need of people.

(II) Improvement in quality of the product.

(III) Achieving economies of scale : Technology intends to raise productivity and reduce cost of production of a commodity.

(IV) Efficient utilisation of natural resources.

Technology to effect efficient utilisation of resources has to depend on market size, quality and size of resources available, gestation period involved and managerial expertise required.

(V) Move to full employment—

Suitable technology to use more labour with efficiency is also desired

(VI) Fabricating goods for international markets.

This requires adaptation of high level technology.

(VII) Survival of different scales of operation.

Dualism is a feature of all economies. Existing industries with various scales need continuation for various reasons. Technology has to reckon with this need.

(VIII) Technological support to non-economic goals like supporting village weavers etc.

The main consideration in adopting a technology has to be reduction of disparity between two sectors of the economy, modern and traditional. This may be achieved either by expending modern sector or by raising the productivity of the traditional sector or by lowering the productivity of the modern sector in correspondence with the rise of productivity in traditional sector. The exact step to be taken will very much depend upon socio-political forces prevailing in the period.

Disheartening Picture of Orissa :

With about 90 percent of total population living in rural area, Orissa provides ample scope for rural industrialisation.

In the organised and factory sector, small scale industries constitute 91 percent of total manufacturing units accounting for 3 percent of total productive capital. The corresponding shares of combined medium and large units are 9 percent and 97 percent. With 78.8 percent of units belonging to the private sector, the capital investment of the sector is only 13.2 percent.

Thus, in Orissa in the total productive capital, the shares of medium and large industries and of the public sector are much higher than those of small units and private sector. When small industries are so insignificant, rural small industries will be still more insignificant.

Large and medium industries account for 91 percent of total output while small units account for only 9 percent. 85 percent of total employees are in large and medium industries. The share of small units in total units and total capital has come down between 1970-71 to 1975-76. All this shows a relative slower growth of small units compared with that of large and medium industries.

The story of efficiency however runs in favour of small units. Output per unit of fixed capital is 0.44 in large, 2.10 in medium and 3.47 in small industries. Value added per unit of productive capital is 0.11 in large, 0.33 in medium and 0.35 in small units. Fixed capital per employee in small units is only Rs. 4000 while in medium and large units it is Rs. 49,000.

Another feature of industrial landscape of Orissa is disconcerting. Cuttack, Puri, Koraput, Sambalpur and Sundergarh account for 96.45% of total capital and 92 % of total value added. The shares of these districts are on the increase.

Number of employees per factory in large and medium industries declined from 1366 in 1971 to 1036 in 1976 while that in small industries increased from 27 to 37. The number of working factories which rose from 649 in 1965-66 to 938 in 1970-71 fell to 819 in 1975-76.¹⁶

These facts suggest that large and medium industries have become more capitalusing and less labourusing.

Income from manufacturing (un-registered) accounted for 3.50% of state income in 1970-71 and 3.85% in 1978-79. Preponderance of large and medium units, of State sector and of 5 districts suggests discouraging trend of rural industries in the State.

Conclusions :

Technological changes are bound to be slow and time-taking. It took 9 years for Russia to mechanise 75% of coal mines. Technological change has to be directed towards (a) evolving new design and (b) new equipment for production. Any change in the direction has to take into account its ramified impact on productivity employment, production relation and politico social matrix.

So far as rural development through appropriate technology is concerned the following objectives should be kept in view.

(i) Evolution of technology should induce industrial establishment in rural region to meet the acutely felt need of the region.

(ii) Technologies should be integrated with rural social fabric, local living habit, occupational pattern and even educational level and family system.

(iii) New innovation should be introduced cautiously. Improvement in technology should be gradual. Resistance to steel storage bins, new pots and pans for the kitchen is a pointer.

(iv) Technological thrust in rural region must recognise the rhythm of agricultural operation.

(v) Technological programme must begin on a selective basis, varying in nature with the nature of people in an area. The nimble fingered Kerala girls suited for electronic assembly work are different from the poetic Bengalee women.

Rural industry is a transmission belt of knowledge. Technical know-how has to be built into the rural organisation slowly but steadily. Industries utilising animal wastes, agricultural products and forest products, biogas plant and mini-cement plants can be developed through less capital intensive modern techniques.

Success of new technology in the programme for rural industrialisation depends on the solution of various problems which haunt small entrepreneurs in new areas, such as, lack of adequate infrastructure, inadequate local demand due to low purchasing power, absence of skilled labour and managerial personnel and apathy of the Government officials.

A massive obstacle on the path of proper innovation is that unlike in the west in India "only the off-spring of the middle and upper classes are ui effect allowed into the technological jobs. These Indian classes have

traditionally no interest in and some-times downright contempt for manual dexterity and manual skill and for experimentation in which true mechanics delight. There is corresponding subjective lack of interest in the engineers and technicians assigned to technologically innovative work.¹⁷

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RURAL INDUSTRIALISATION :

A Plea For Intermediate Technology

B. P. Dash

Technology is inextricably linked with the process of economic development and capital accumulation. Technological development is the product of invention, research and development. It contributes to an increase in productive capacity of an economy by raising the productivity of factors of production. Thus, technological change brings in its trail a shift in the production frontier. An improved technology has three distinct effect on production : (i) quantity augmenting (ii) quality improving and (iii) cost reducing. As a result of these effects, hosts of benefits from technological changes accrue to different classes in the society— producers, consumers, traders and investors. Thus technology helps maximization of economic welfare.

Classification :

Technology can be broadly classified into three categories¹ : (a) consumption technology, (b) production technology, and (c) organisation technology. Consumption technology is associated with choice of products or the product-mix. "It defines the mix of goods that production technology has to deliver". Production technology is very familiar in the usual parlance of the term. It is connected with the techniques of production : Labour-intensive and capital intensive. By and large, production technology is determined by the consumption technology. Organisation technology includes in its ambit organisation of production, distribution, and consumption. "It provides the faramework under which the production technology is selected and applied and its fruits distributed socially. It both affects and is affected by other aspects of technology. Its principal determinant is the nature of power relations in the society".² It may be noted that these types of technology are not exclusive of each other rather they are closely interlinked.

Appropriate Technology :

Appropriate technology is a dynamic concept. It aims at the attainment of the optimum combination of resources : physical, capital and human resources. The best combination is determined according to the prevailing

circumstances. "It is the circumstances that decide what is best and it is the principal task of every developing country to apply a technology that is really appropriate to its circumstances".³

Technology that is considered to be appropriate for an economy may be unsuitable to another. Hence appropriate technology would vary from one country to another, from one set of circumstances to another. Primarily, technology is determined by the resource endowments of the economy and the relative prices. *Ceteris paribus*, it is the objective set which would largely influence the technology of the country. The objective set is governed by the prevalent socio-economic conditions of the country.

"Technological development is demand rather than supply-induced at least in its initial stages. The over-all growth and development strategy which is to be adopted must be such as to expand the range of technologies that it is economically feasible to adopt and create a material basis for the generation and adoption of technologies that are more appropriate to fundamental socio-economic objectives".⁴

The current economic situation of the country reveals a gloomy picture. There is abject poverty, large scale unemployment, wide disparity in the distribution of income and wealth. The pressure of population on agriculture continues to be very high. Further, poverty and unemployment are mostly concentrated in the rural areas. Adoption of an appropriate technology in the context of rural industrialisation may go a long way in salvaging the grim situation that surrounds the rural landscape. Here arises the classic case of technological choice; the choice between the two maxima : output maximization and employment maximization.

The Controversy

The controversy emerges with regard to choice of production technology : capital-intensive or labour-intensive. A. K. Sen⁵ and others argue that with the adoption of capital-intensive technology more investible surplus will accrue to the economy; and with the reinvestment of such surplus output and employment in the later period can be maximized. In the short run, employment to a certain extent has to be sacrificed with the hope of large employment and output in the long run. Such situation will be conducive to economic growth, as economic growth aims at output maximization. Application of labour intensive techniques may maximise the employment immediately but it may affect adversely the growth output. Under conditions of unemployment, the opportunity cost of labour is zero, therefore if the objective is immediate maximization of output, we can think

of labour intensive technology..... Immediate output maximization is not, however, a universally accepted policy objective, for it might be achieved, beyond a point, at the cost of economic growth"⁶ But the argument that labour intensive technology will not generate substantial reinvestible surplus is not accepted by many writers. These writers hold that the rate of profit in the small industries, adopting labour intensive technology is not much lower than in other competitive industries. Dr. T. Y. Wu is of the view that "in countries with large unemployment and underemployment, capital-light production by providing more employment and larger output and by reducing the needs of supporting the unemployed, may increase saving through external economy."⁷ This argument can be substantiated by a comparative study of some sugar plants with an initial investment of Rs. 2.8 crores.

TABLE-I

	Small Scale	Large Scale
No. of plants	47	1
Production	30,280 tons	12,150 tons
Employment	9,937 persons	900 persons
Cost of production	Rs. 223 to Rs. 236 per 100kg.	Rs. 235 per 100kg.

Source : Economic Times June 29, 1980, P. 4,

Table-I shows that employment potential of the small scale industries (with labour intensive techniques) is large, output produced is greater and cost of production is also lower than in the large scale industries with capital intensive industries.

This argument can be further substantiated if we study the employment and output potential of the industries in Table-II.

Table-II reveals that chemical and chemical products claim 17 times more fixed capital per employee in comparison to beverages, tobacco and tobacco products, but value added per employee in the former industries is only 3 times more than the latter; on the other hand, employment potential of beverages, tobacco and tobacco products is significantly greater than many of the more capital intensive industries. On the basis of Table-II it can be safely concluded that with lower capital labour ratio, output, employment and also investible surplus can be maximised.

TABLE-II

Industry	Fixed capital per employee (Rs.)	No. of persons employ- ed per Rs. 1 lakh invested in fixed capital	Value added per emply- ee (Rs.)	Emolu- ments per emply- ee (Rs.)	Rank in term of employ- ment potential
1. Food Products	6101	16	4498	2211	3
2. Beverages, Tobacco & Tobacco products	3994	25	6611	2347	1
3. Cotton Textiles	5680	18	6389	5369	2
4. Wool, Silk and synthetic	11,268	9	11,471	5318	7
5. Jute, Hump & Mesta Textiles	7241	14	6183	4990	5
6. Paper, paper products, printing, publishing & allied industries	15,977	6	12066	5748	11
7. Leather, Leather products,	6238	16	7857	4139	4
8. Chemical & Chemical products	52,766	2	22,464	8312	16
9. Non-metallic mineral products	12,273	8	7476	4020	9
10. Rubber, Plastic & Petroleum	30,861	3	20510	7511	13
11. Basic metals & alloys & Iron & Steel	36,916	3	9692	5632	14
12. Metal products, parts except machineries & transport equip.	8220	12	9852	5205	6
13. Machineries Tools & parts except electric machineries.	14,968	7	13728	6806	10
14. Electric machine	15,807	6	17401	8281	12
15. Transport Equip.	11,521	9	11279	7621	8
16. Water works & supply	33,662	3	7350	3822	15

Source : Economic Times, July 21, 1980.

The case for Intermediate Technology

In India the pressure of population on agriculture is very high. In spite of various plans for agricultural development, about 72% of the total population continue to depend on agriculture. Further, in the rural sector unemployment, underemployment and disguised unemployment are of menacing magnitude. In the face of such hazards, a policy of rural industrialization with the adoption of intermediate technology becomes an imperative need. Intermediate technology is not the same as traditional technology, but it is a technology which facilitates the use of local resources, labour and skill. Such technology does not require much savings, large imports and sophisticated skill. It is based on simple methods of production, requiring nominal skill. Since capital is deficient, and heavy investment of capital is a prerogative of the few, adoption of moderate cost technology would be relatively easier. The argument does not rule out the adoption of sophisticated modern technology but such technology may be pursued only in the urban sector or in the heavy industries. Schumacher calls it the "technology with a human face", a 'self-help technology'. With the application of such technology process of production is carried on by the masses. The system of production by the masses mobilises the priceless resources which are possessed by all human beings".⁸ Where poverty is looming large and unemployment is acute, intermediate technology serves the best. "Economic development in the poverty-stricken areas can be fruitful only on the basis of intermediate technology."

Conclusion :

Technology depends on the objectives. Objectives are determined by the prevailing socio-economic conditions. In India, the technology, will be considered appropriate "which helps solve the problem of poverty and malnutrition and which can banish hunger and unemployment."⁹

But adoption of intermediate technology to absorb the unemployed labour force in the rural areas may not succeed unless the demand for the products produced in the small scale sector is somehow raised. This calls for co-ordinated planning and management.

At this stage it becomes imperative to implement the policies of land reforms so as to redistribute land amongst the tillers of the soil and raise the agricultural wage rate. As a consequence, the income and hence the demand for the products produced under the aegis of intermediate technology will increase. The biggest obstacle for the expansion of small scale sector with labour intensive technology is the limited market. Adam Smiths

maxim that "division of labour is limited by the extent of the market" is well applicable to this small scale sector with intermediate technology. If demand or an enlarged market is assured to this sector, this sector, with intermediate technology, would go a long way in accelerating the process of rural industrialisation.

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NEED FOR RURAL INDUSTRIALISATION IN ORISSA AND CHOICE OF TECHNIQUE

Dr. M. R. Das

Need for Rural Industrialisation :

Agriculture occupies a predominant place in the economy of Orissa. For over many years agriculture and allied activities have contributed between sixty to seventy percent to state income.¹ Cultivators and agricultural labourers combinedly constitute about seventy seven percent of the working population.² This clearly indicates that there is relatively a greater degree of dependence on agriculture as the means of livelihood and employment. It may be pointed out here that excessive dependence on agriculture leads to a lower standard of living. With the economic progress of every country, there must be shift of population from the agricultural sector to the manufacturing and tertiary sectors but this has not happened in case of Orissa. Colin Clark writes that a higher average level of real income per head is always associated with a high proportion of the working population engaged in manufacturing and tertiary industries and a low real income per head is associated with a high percentage in primary production.³ The observation of Colin Clark that over dependence on agriculture leads to a lower per capita income enjoyed by the subject of a state is seen in case of Orissa. The per-Capita income indicates the standard of living of the people. On the basis of per-capita income, we find that Orissa is one of the poorest states of the country.⁴ It has also been pointed out that while in case of underdeveloped economies seventy percent or more of population is dependent on agriculture, the developed economies can feed themselves twice as well with only twelve to fifteen percent of their population in agriculture.⁵ It is because the yield rate is higher in the developed countries. It may be pointed out here that rice is the dominant crop in Orissa which covers more than seventy percent of the total cropped area but the yield rate is very low as compared to many other states and to the Indian average.⁶ Improvement in agricultural productivity in early phases of economic development is of paramount importance as this provides the base for future industrial expansion.⁷ If productivity in agriculture increases more resources can be mobilised from this dominant sector for financing the

industrial sector as was done in the earlier stages of growth in Japan and Russia⁸ besides the provision of raw materials to those industries which consume agricultural raw materials.

However, the task of diverting the excess man-power in the agricultural sector to the non-agricultural sector and also increasing the agricultural productivity from the traditional agriculture over a short period is not easy. It may be pointed out that even Japan, with large capital contribution for agriculture and unusually rapid growth of industries, took more than half a century to reach a point where the unfarm jobs could more than absorb all increments of total population and allow an absolute decline in farm labour force.⁹

The above study reveals that there is excessive dependence on agriculture in Orissa. The productivity of the dominant crops is very low. These have resulted in a low percapita income enjoyed by the people. Hence to raise the standard of living of the majority people, suitable steps have to be taken first to raise the agricultural productivity and secondly to direct the excess man-power from the agricultural sector by opening new employment opportunities in the industrial sector. Regarding the latter, rural industrialisation seems to be the solution.

Choice of Technique :

Keeping the nature of the economy of Orissa in view, one can suggest the following techniques for use (a) those which can be easily learnt in short-time (b) those requiring small initial investment (c) those which reduce the gestation period of investment (d) those requiring less investment in specialised and skilled labour (e) those saving scarce resources rather than labour; and (f) those which raise the level of production.¹⁰ Labour intensive methods have been suggested by economists like Ragnar Nurkse for countries where capital is scarce and labour abundant. Orissa falls in this category. Nurkse mentions that the densely populated countries, in process of development do not need tools and machines of the same degree of capital intensity as those used in advanced economies where labour is relatively scarce.¹¹ W. Arthur Lewis also prescribes labour intensive techniques. He says, "capital is very scarce in underdeveloped countries, and so those which have abundant resources of labour relatively to land and other resources, are wise to develop methods of production which use labour rather than capital". Further he points out, "Factory production also calls for a great deal of supervisory skill, in shape of foreman, engineers, accountants and the like, and such skill is also in short supply."¹²

The prospect of small scale and cottage industry depends upon improvements of its techniques. Often, the tools in use have not changed for centuries, and it is possible to improve them very substantially in the light of modern experience without altering the basic skills required by the craftsmen. In Orissa, we have many skilled craftsmen who have ability in producing artistic goods in horn, brass metal, betel nut, lacs and textiles etc. Their working ability can be improved with provision of simple but effective machineries. The growth of Japanese cottage industry can be studied. Japan has excelled in organising new trades on a cottage industry basis, without indeed the government having much to do with the matter. In that country the "putting out" system seems to have taken firm root, private merchants supplying materials to craftsmen to be worked up in their homes, or in small workshop. The system is specially famous for its extension into trades where a commodity has to be made in several parts, the parts are put out to individual craftsmen or to small workshops, working to detailed specifications, whereafter the assembly is done in central factories. Thus, many commodities are being made by Japanese craftsmen to day which were totally unknown to their forefathers. The survival of small scale production depends upon continuous enterprise of this sort bringing new commodities within the range of the system.¹³ Such efforts can be made in Orissa.

Keeping in view the situation prevailing in Orissa and the suggestions made regarding the appropriate technology for industrialisation, policies may be framed to have rural industrialisation with the objective of reducing the pressure of excess man-power on agriculture.

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RURAL INDUSTRIALIZATION : A key to Orissa's Development

R. K. Mishra

The pace of economic development of a country depends on how quickly and efficiently it utilizes and transforms its natural resources in the process of production. The proverbial poverty amidst plenty of natural resources, which still persists in Orissa clearly points out that its natural resources have not been profitably exploited during the full past years to the expectation of the planners. Commenting on the low per capita income of the State estimated at Rs. 190/- in 1956-57 as against Rs. 294/- for all India. Dr. P. S. Lokanathan, in the preface of the "Techno-Economic Survey of Orissa" compiled by NCAER, sounded his optimistic note that "the per capita income will almost double and catch up with the all India level of 1971." This he expected with the belief that "the share of agriculture in the State income will fall from 50% to 30% and that of factory industry would go up from six to twenty percent." He also anticipated a 250 percent increase in the overall productivity per worker in the factory sector and 50 percent in other sectors by implementation of his programme, as a result of which the state would be transformed from a backward agrarian economy to a progressive industrial state.¹ But his expectations only remained as a dream. This is evident from the fact that the per capita income of the State in 1978-79 is calculated to be Rs. 500/- compared to the national average of Rs. 712/- and 85 percent of its people are below poverty line.² The number of workers engaged in the industry constitute only 5.9 percent of the total workers of the state whereas the manufacturing sector in all India level employs 9.5 percent of the economically active population.³ As per the 1971 census 60 percent of the state income comes from the agriculture and allied activities and only 15 percent from mining, manufacturing and small enterprises. Its economy still remains predominantly rural as 91.6 percent of its population are living in villages and 80 percent of its total working force are engaged in agriculture and allied activities. The industrial sector in the state is thus relatively small and dominated by the unorganised cottage type of industries. The Techno-Economic Survey of Orissa points out that "in 1956-57 for every factory worker there were fourteen workers in these industries. In all India the ratio was 1:3.8. This is a significant index of industrial back-

wardness because the predominance of the cottage sector implies poor technological development and low labour productivity in the industry. The situation in Orissa is made worse by the fact that labour productivity in both the non-factory sector and factory sector is nearly 30 percent lower (Rs. 494/- and Rs. 1500/- respectively) than the average for the country as a whole (Rs. 790 and Rs. 2100/-).⁴ As a result of low productivity the contribution of Orissa to the total industrial production in India was about 25 percent in case of the Maharashtra—the most advanced industrial state in the country. The industrial scene of the state thus presents a disheartening picture. Going deep into the causes of backwardness and poverty one agrees with the observation of Dr. K. M. Pattnaik that “the only element of consolation in the dismal picture of the industrial development of our state is that no heroic effort has been made in previous five year plans for a breakthrough in the situation”.⁵ This view is reinforced by the fact that the total plan investments made over the last 25 years industrial development have hardly exceeded Rs. 80 crores. A low percentage of the total investment was marked for the industry and mining during the previous plans. Plan-wise figures are indicated below.⁶

First Plan	— 5.9%
Second Plan	— 4.5%
Third Plan	— 3.5%
Fourth Plan	— 8.1%
Fifth Plan	— 4.0%

Thus there has been an agreement on the fact that our poverty, backwardness are the result of the inadequate attention paid so far for the development of industrial sector. This past experience has incited our Chief Minister for making an official statement announcing a massive programme of industrialization in the ensuing Sixth Plan period. This official statement sincerely recognises that the planned development efforts of our state for the upliftment of its people from the morass of poverty, backwardness and consequential social evils, should embark on a vigorous and comprehensive programme of industrialization. The success of such a broad based programme depends of course on its nature and the sincerity of the administrative and planning machinery involved in implementing it.

Coming to the nature it is suggested that such a programme for rapid growth of industries in the state in conformity with the new industrial policy of the country should have a rural orientation.

The new industrial policy of the Government accords top priority to generation of new employment opportunities in rural areas by encouraging

schemes of self employment in the nature of small industries, cottage industries both need based and resource-based having high employment potentialities. The Development of resource-based industries with its initial impetus on employment generation, in subsequent stages is expected to lead to the encouragement and establishment of a net work of demand-based industries resulting thereby in an over all development of the economy.

Since the non-factory sector plays a significant role as regards to its employment potentialities alongwith the encouragement and establishment of the new units, due care must be taken to reorganise and modernize the existing non-factory sector which as per the survey conducted in 1965 by the Bureau of Statistics consists of about 3,72,000 units employing about 7,00,000 persons in village and small industries.⁷

Another line of approach would be to undertake a programme which would result in more profitable utilization of land, cattle and other resources in the rural areas. This should cover schemes for cattle development, dairy development, fruit processing and the like in which small farmers, landless labourers and others are invited to participate.⁸ The programme should incorporate, besides other facilities like the provision of finance, easy supply of raw-material, infrastructural facilities, sufficient incentives for motivating the people in devising and adopting new improved technologies for industrial ventures.

In this connection it is worthwhile to mention that the choice of technology is of immense significance in the programme. However, there is a lot of controversy regarding its nature and application and therefore calls for continuous research and innovation. A. K. Dasgupta, in this context, maintains that

- (a) "Economic growth is achieved by sustained improvement in labour productivity;
- (b) The growth in Labour Productivity is dependent on the rate of diffusion, of technological improvement and its diffusion in different industries."⁹

Thus he advocates, the choice of optimal technology will be adoption of a technology designed for raising the productivity of the labour in the industry. But at the same time as Eckaus emphasizes "it is after all productivity of the entire labour force and the out-put of the entire economy which is important for development." Further he points out that "the

criterion for optimal choice does not involve maximising either the productivity of the employed labour force, the equipment used or of any other particular resource input. Its objective is to maximise the total output that can be obtained from all the resources available to the country".¹⁰

The choice of technology in the context of rural industrialization should also consider the existence of surplus labour force and local talent. In Schumacher's opinion much of the miseries of the rural areas is because of the destructive tendencies of modern industries in metropolitan cities, killing of "Competing types of traditional production through the countryside, thus causing widespread unemployment or underemployment,¹¹ and migration of labour force to the metropolitan areas. He suggests adoption of an intermediate technology and the establishment of industries in the village areas to ease out such evils. His suggestions can be accepted as a valuable guidance in shaping the strategy of our industrialization programme. In the words of Schumacher "it would seem that the primary task of the developing countries— and also of the givers of the foreign aid is to go straight into battle with the twin evils of mass unemployment and mass migration into cities.¹² This means that work must be created where people live and that the method should be simple and dependent on local resources.

This will be realised —

- (a) if there is a regional approach to development and
- (b) if there is a conscious effort to develop what might be called an "intermediate technology".¹³

Elaborating on this Arbind Mafatlal, a leading industrialist of the country is of the opinion that the technological models have to be labour-intensive and productive and should be such as to take the families out of poverty in a period of three to five years. Highlighting few related industries he says, "the cow meaning the cross breed cow is the focus of the new technology" relevant to the removal of poverty among the rural poor. Milk can be treated as food as well as raw materials for the development of dairy industry. Bottling of methane gas and manufacturing of dry ice from carbon dioxide can open a new chapter in village industries and provide employment to many more.

The small and marginal farmers can be motivated and assisted to produce fodder and food crops simultaneously with production of vegetables thereby increasing their income four to five fold.¹³

Thus right from the businessman, planners, to the leading economists like Bhoothlingam, the Director General-NCAER¹⁴ all agree that additional employment can be secured best by a "happy combination of more labour intensive cottage and rural industries sector with the modern factory sector".¹⁵ It is well known that the encouragement of the handloom and powerloom units in the textile industry is an example of this sort of combination. This strategy besides leading to the overall development of rural masses will ensure economic justice in the society.

Thus the development of the masses, is possible through the sincere implementation of a comprehensive rural industrialization programme with the emphasis on the adoption of intermediate technology. But the success of such a programme depends on the active co-operation and involvement of the administrators and the people in general. As Lewis remarks - "The fundamental task of development planning is to release the energies of the people so that they may do what needs doing to raise the rate of economic growth. The things to be done are productive decisions to be made by a very large proportion of the country's inhabitants; industrialists are to build factories, farmers are to adopt new technologies. Labour is to move to new jobs, research workers are to find new solutions".

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INDUSTRIALISATION OF RURAL ORISSA

An Analysis of the Technological Structure

Benudhar Mishra

The Interdependence

It is now accepted in all quarters that rapid industrialisation of the economy is essential for creating the foundations and maintaining the tempo of overall economic development of the country. It is simultaneously pointed out that the programme for industrialisation should not be of the traditional variety where, during the earlier days of development planning, deliberate and rapid industrialisation programmes were always initiated through the public sector. The limitations of this approach have now been clearly perceived on empirical tests and "the earlier confrontation of industrial development versus agriculture has been shown to be a false issue and the concern now is rather with the interrelationships between industry and agriculture and the contribution that each can make to the other".¹ It is no longer industry versus agriculture, but industry along with agriculture that has been the watchword of economic development. In the language of Rosenstein - Rodan to rouse an underdeveloped economy from the deep slumber of underdevelopment so as to start the process of growth and to maintain it at a sufficiently high level, it is necessary to provide a 'big push' through a process of rapid industrialisation based on the gains that have already accrued through innovative practices adopted in the agricultural sector. Thus in modern times whenever the attempt is being made to outline a strategy for industrial development, the close interdependence between agriculture and industry - both small and large scale has to be constantly kept in mind and used as a lever for efficient implementation of the programme for economic development.

Rapid industrialisation starts a new lease of life for the traditional society. It is a completely new civilisation that we have to live through. "An institutional frame work different from the present one is clearly necessary for the successful carrying out of industrialisation in international depressed areas".² Experiences in industrially advanced countries of the west pointedly show that people in those countries got adopted to the industrial mode of life and the industrial way of thinking in short to the

industrial civilisation and this has brought about a complete transformation of the society in the direction of economic development. Therefore the existing institutions in the underdeveloped areas are to be modified and the most resistant ones are to be done away with so that the process of industrialisation does not encounter unnecessary and avoidable hurdles.

The Issue In Perspective

Against this background, when we look at Orissa, a typically underdeveloped region in comparison to most other states in India, we find a dismal picture so far as industrialisation is concerned. "The state abounds in vast mineral, forest and other natural resources. But non-utilisation of the resource potential and lack of planned and systematic efforts towards exploitation of the available natural resources, which should form the strategy for industrial development, has made Orissa industrially backward".³ This becomes clear from a close look at the pattern of allocation of investment funds among different sectors through the different plans in Orissa. The allocation to industry and mining has ranged between 3.5 percent and 8 percent of the total investment where as that for agriculture has ranged between 9.2 percent and 28 percent and for irrigation and power between 26.1 percent and 46.9 percent. This takes into account the period upto the end of the Five Year Plan.⁴ This lack of concern for industrial development has allowed the economy to languish in the industrial front.

Agriculture continues to be the dominant sector in the economy of Orissa. It contributes approximately 65 percent to the total state income where as the manufacturing sector contributes around 15 percent. Eighty eight per cent of the people live in rural areas leaving a meagre 12 percent who live in urban areas. 80 percent of the total working force is engaged in agriculture and allied activities. Of this vast rural population the tribal population comes to nearly 22 percent. Thus from the point of view of distribution of population we find a minority urban population which is exposed to the industrial civilisation in cities like Rourkela, Sunabeda and such other industrial urban areas where as the vast rural masses remain far away from the fold of industrialisation. To add to the problem, the tribal population lives in prehistoric conditions of life and stands as a stumbling block on the path of modernisation and industrialisation of the economy of the state. Agriculture — the dominant sector — also does not provide for any type of diversification because of its peculiar character. "The over whelming predominance of paddy cultivation in the state leaves little scope for diversification of production pattern on the basis of which establishment of agro-based industries in the state could be considered".⁵

Thus when one looks at industrialisation of Orissa the task appears to be stupendous. Rousing the slumber-bound economy and its people and exposing them to the new values of an industrial civilisation is definitely an uphill task, once we think in terms of overall economic development of the state. Any such attempt foils down, in the ultimate analysis, to making attempts for industrialising the rural sector. The industries are to percolate into the rural areas and bring the rural mass into the fold of the beneficial effects of industrialisation without which maintenance of the tempo of economic development will be very difficult. This primary change in the strategy is very much basic to any exercise on economic development in terms of sophisticated techniques and computerised devices. As Myrdal points out "a simple model of circular causation with cumulative effects released by a primary change may be more typical of actual social processes than the intersection of demand and supply curves at an equilibrium price which has become symbolic of much of our reasoning in economic theory."⁶

The Appropriate Technology

But the basic issue involved here is the appropriate technology to be adopted for realisation of the objective of rural industrialisation. Technology in this context has two aspects : one, the purely mechanical aspect concerning factor proportions and the second the institutional aspect concerning the setup, the environment in which it is to be applied. We consider each separately.

From the purely mechanical point of view the controversy between labour intensive and capital intensive techniques particularly in the context of rural industrialisation is quite old. But we have to take note of the following factors before we jump to any conclusion regarding the above controversy.

The Bureau of Statistics and Economics Orissa has published an "Annual Survey of Industries in Orissa 1965-69." The data presented there are in some cases revealing. We consider some of them for our purpose here.

First, we look to the facts relating to the capital output ratios by industries, 1969.⁷ We find the picture as follows.

TABLE-I

Industries—	Value added per unit of productive capital invested.	Remarks
1. Iron and Steel	0.08	} Large scale Capital intensive sector
2. Industrial Chemical	0.09	
3. Paper and paper products	0.34	
4. Sugar	0.15	
5. Metal products	0.14	} Medium and small scale sector
6. Cotton textiles	0.34	
7. Misc chemical products	0.42	
8. Grain Mill	9.28	} Tiny sector.
9. Furniture and fixture	0.22	
10. Saw mill	0.40	
11. Repair of motor vehicles	0.47	
12. Tobacco	0.53	

These figures lead us to the obvious conclusion that the tiny sector shows a relatively higher productivity in comparison to the heavy and medium sector. Productivity is inversely related to the size of capital investment in the firm.

Second, we consider the facts regarding labour productivity, 1969 in different industries.^a we get the following picture.

TABLE-II

Industries—	Value added per unit of emolument paid	Remarks
1. Iron and Steel	1.33	} Large scale Capital intensive sector
2. Industrial Chemical	1.77	
3. Paper and paper products	2.19	
4. Sugar	3.55	
5. Metal products	1.53	} Medium and small scale sector.
6. Cotton textile	1.17	
7. Misc. chemical products	2.59	
8. Grain mill	2.36	} Tiny sector
9. Furniture and fixture	0.91	
10. Saw mill	1.83	
11. Repair of motor vehicles	1.09	
12. Tobacco	1.93	

Labour productivity in the tiny sector and medium and small scale sector does compare favourably well with the capital intensive large scale sector.

Third, we take into account the rate of profits. Here also one is led to the conclusion that small industries and the tiny sector are not adversely placed in comparison to the large scale and capital heavy sector. It will be clear from the following table.⁹

TABLE - III

Industries—	Cost as % of value of gross output.	Remarks
1. Iron and Steel	94.71	Large scale capital intensive sector.
2. Industrial chemical	93.05	
3. Paper and paper products	82.92	
4. Sugar	88.81	
5. Metal products	87.46	Medium and small scale sector.
6. Cotton textile	96.75	
7. Misc. Chemical products	83.98	
8. Grain mill	74.17	
9. Furniture and fixture	10.33	Tiny Sector
10. Saw Mill	74.84	
11. Repair of motor vehicles	71.79	
12. Tobacco	96.18	

Fourth, the trend regarding profit rate also points out that the small scale and tiny sector generates adequate savings for further investment, a fact which is so often refuted by those who are the advocates of the cause of the capital intensive sector. Thus on the basis of the above considerations one is led to the obvious conclusion "that small scale industries are decidedly superior from the point of view of employment generation and faster rate of growth of output. Empirical evidence also shows that these units are not inferior to large-scale units from the point of view of rates of profits obtained and generation of surplus for reinvestment."¹⁰ These are the objectives which are to be realised in the process of planning for economic development and small industries are best suited for the purpose. These industries also help in easing the social tension that arises due to unemployment and under-employment by reducing the needs of supporting the unemployed or as Schumacher calls it "the process of mutual poisoning between the urban and rural areas."

Schumacher goes further to add that "the primary task of the developing countries and also of the givers of foreign aid is to go straight into battle with the twin evils of mass unemployment and mass migration into cities." His programme includes :

"(a) that work places have to be created in the areas where the people are living now and not primarily in metropolitan areas into which they tend to migrate.

(b) these work places must be, on average, cheap enough so that they can be created in large numbers without this calling for an unattainable level of savings and imports.

(c) that the production methods employed must be relatively simple so that the demands for high skills are minimised not only in the production process itself but also in matters of organisation, raw material supply, financing, marketing and so forth.

(d) that production should be largely from local materials for local use.

These four requirements can be met only (a) if there is a regional approach to development and (b) if there is a conscious effort to develop what might be called an intermediate technology."¹¹

It is therefore obvious that so far as the mechanical aspect is concerned the intermediate, capital light technology is best suited for small industrialisation in Orissa.

We now come to the second aspect of technology, i. e., the institutional aspect. Here we have to adopt the regional approach and consider a cluster of villages as the unit to be served by an industrial centre. These industrial centres in popular parlance are termed as industrial estates.

The concept of industrial estate is a later addition to the list of institutional techniques that have been applied more or less successfully to the basic task of initiating and sustaining development of small and medium scale industry and creating new industrial centres or fostering development of regions which would lag behind if left to themselves. It belongs properly to a new branch of technology — "the social technology of development."¹² An industrial estate is seen as "a tract of land which is subdivided and developed according to a comprehensive plan for the use of a community of industrial entrepreneurs."¹³ In American usage it is sometimes referred to as an industrial park which has "the characteristics of openness (or low density occupancy) plus a parklike character, with protective restrictions

that are written into deeds or lease. It ensures compatibility between the industrial operations therein and the existing activities and character of the community in which the park is located."¹⁴

The working of the industrial estates in most of the countries has been encouragingly significant. The achievement of this technique has been magnificent even in industrially advanced countries like USA and Great Britain.¹⁵

These industrial estates are associated with significant effects so far as development of particularly the rural sector is concerned. They work as growth centres and assist in dispersal of industries. They inject an element of new life in form of industrialisation in the slumberbound rural landscape. Secondly they will have the effect of filling in the gap in facilities and there by provide ample employment opportunities in ancillary trades and occupations. A study conducted in Great Britain comes to the finding that three people are employed in the provision of services of different kinds for every two persons employed in manufacturing industry. Similar studies in the US also come to the same type of conclusions. Thirdly as the Planning Commission rightly observes, "The problem before underdeveloped countries embarking upon development at this late stage is so to plan the alignment of productive resources and of class relationships as to combine development with reduction in economic and social inequality, the process and pattern of development has, in essence, to be socialised."

Fourthly, the industrial estates, in the process of socialisation, will serve as seed bed of local entrepreneurial development and pooling together and promotion of the latent talent for organisation and management. Good management is even more important for the development of small industry than are efficient and sophisticated techniques of production. It is felt that no amount of capital equipment, no number of enthusiastic government planners and no teams of foreign consultants can compensate for a lack of individuals eager and able to seize opportunity to develop. Thus the small industries with intermediate technology organised into industrial estates will be in a position to change the rural landscape by spreading the industrial civilisation and thereby contributing to the overall economic development of the state.

The Summing-up

Thus the emerging industrial picture of the state will have a small core sector consisting of heavy industries like the Rourkela Steel or Sunabeda

MIG or the Therubali industrial complex. Super imposed on the core sector will be a large net work of rural and semiurban industrial estates working like catalysts in the otherwise still and dormant atmosphere so as to bring about an industrial explosion and to cast off the proverbially dampening nature of the economy of the state. Would it usher in the industrial and economic millennium for us !!!

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APPROPRIATE TECHNOLOGY FOR OIL INDUSTRY IN ORISSA

Smt. Bedabati Mohanty

The success of rural industrialization depends on adaptation of a suitable technology. An attempt is made in this paper to find out appropriate technology for oil industry in the State. Orissa is an important producer of oil seeds such as groundnut, sesamum, rape seed and mustard and castor seeds. The prospects of development of oil seeds in the State are also brighter as compared to India as a whole. While recently there has been large scale decline in area under oil seeds in India, the area under oil seed cultivation in Orissa has been steadily increasing. The oil seed production in the state has increased from 1.7 lakh tons in 1968-69 to 4.269 lakh tons by 78-79.

In Orissa there are generally four methods of oil extraction in use, viz, (1) Traditional bullock driven oil ghani, (2) Bullock driven improved Wardha type ghani, (3) Power driven ghani and, (4) Oil expeller.

Traditional Oil ghanis are found in villages situated mostly in houses of oil man. No separate shed is provided for them and these ghanies are operated by two bullocks. According to Annual Progress Report of village oil industry for the year 1979-80 there were 2713 traditional oil ghanies of which only 421 were working. Thus nearly 85 percent of the ghanies have been closed down owing to introduction of other improved types of ghanies.

The improved Wardhatype ghani is simply a modified version of traditional ghani. The designs of the paste and mortar of the old ghani have been changed under the new system and here only one bullock is necessary to operate the ghani. There has however been great resistance to the introduction of this improved ghani in villages by traditional oilmen and they prefer to carry on with two bullocks only. The Annual Progress Report of '79'-80 shows, that out of 214 such units only 16 are working which works out at less than 8 percent.

Power driven ghani are no different from Wardha type ghani except for the fact that the former is operated by electricity where as the latter is run by bullock. The annual report of '79-'80 reveals that there are 113 power ghanies in the State of which 29 are working.

These oil ghanies are run by cooperative societies. The total number of co-operatives in Orissa assisted by Khadi Commission upto 1979-80 has been 302 including 5 registered institutions and one departmental oil unit. The Annual Progress report of 79-80 gives a very dismal picture of village oil industry. Out of 466 working ghanies information could be obtained only from 261 ghanies covered by 34 co-operative societies. In districts like Kalahandi and Phulbani, which produce a large quantity of oil seeds, all the units have become defunct. The total oil produced by these ghanies during 79-80 is 1152.56 quintals, which comes to 4.41 quintals on an average per ghani. This shows the existence of huge excess capacity in this sector. The employment created in this sector is reported to be 105 full time jobs, 244 part time jobs and 81 casual jobs.

There are 312 registered oil mills in Orissa, the greatest number being found in Sambalpur district. Out of these 184 units exclusively deal with edible oil, 8 units manufacture both edible and non-edible oil and 120 are multipurpose units processing wheat, oil seeds and even in some cases rice.

So far no systematic study has been conducted in this sector of small scale and village industries on the basis of which a comparison can be made on the efficiency of oil extration under different technology so as to find out their appropriateness in rural Orissa. The annual survey of industries conducted from time to time which covers only the factory sector provides us with scanty information. Since no information about capital investment in village oil industries is available a comparison between oil ghanies and oil expellers is not possible. There is thus necessity for conducting some study which will help us to find out the technology most appropriate for oil industry in our economy.

The objectives of this study are,

- (1) to find out the cost structure of oil industries under different technology and make a comparison among them to find out which is most economical,
- (2) to find out the employment generated in oil industries under different technologies and compare their investment employment ratios.

(3) to find out the viable technology for oil industry under the economic conditions prevailing in rural Orissa on the basis of cost structure and employment.

Methodology :— The study covers oil ghanies and expellers processing only edible oil. A survey of some units in each sector is conducted to make a comparative analysis. Information have been collected in a prepared questionnaire from Wardha type ghani at Bolagada in Khurda sub.division, power driven ghani at Udyogpuri near Bhubaneswar, and oil expeller at Cuttack town, through personal contact. The traditional oil ghanies however have not been covered by the survey as they are in remote villages and could not be personally contacted. The inclusion of traditional ghanies however is not likely to affect our conclusion as almost all of them are reported to be sick.

II

Cost Structure

Data collected on the cost structure of oil industries under different technology are presented in Table-I.

TABLE-I
Cost Structure of Oil industry under Different Technology
(per Quintal 1979 80)

Sl. No.	Name of the Unit.	Fixed cost in Rs.	Variable cost in Rs.	Total cost in Rs.	Total Yield in Quintals	Cost for Quintal of oil in Rs.
1.	Chandi Oil Mill Nuabazar, Cuttack	6600	3,53,520	3 60,120	198	1818.7
2.	Power Driven Ghani Udyogpuri, BBSR (4 Ghanies)	7400	3,51,120	3,58,520	171	2096.6
3.	Improved Wardha Type Ghani, Bolagada (4 Ghanies)	19,896	2,68,800	2,88,696	117	2467.4

Table-I shows that total investment as well as the return is the highest in oil expeller and lowest in Wardha type ghani. The cost per quintal of oil comes to Rs. 1819 in oil expeller, Rs. 2097 in power driven ghani and Rs. 2467 in Wardha type ghani. On the basis of cost structure one may be tempted to argue that it is the oil expeller which is the most suitable for the

economy. However under the prevailing condition the appropriate technology cannot be selected only on the basis of minimisation of cost per unit. Employment generated under different technology has to be analysed before a conclusion can be reached on the viability of the technology.

EMPLOYMENT :

Data collected on employment generated in oil industry under different technology are represented in Table-II.

TABLE-II

Investment Employment Ratio Under Different Technology

Sl. No.	Name of the Industry	Total Investment in Rs.	Units of labour employed.	Investment per man-day of Employment.
1.	Chandi Oil Mill	3,60,120	900	400
2.	Power driven Ghani	3,58,520	1500	239
3.	Wardha type Ghani	2,88,696	1200	240

Table-II shows in oil expeller with Rs. 3 60,120/- 900 man days, in power driven ghani with an investment of Rs. 3,58,520/- 1500 man days and in wardha type ghani with an investment of Rs. 2,88,696/- 1200 man days of employment are generated. The investment per manday of employment is found to be the lowest in case of power driven ghani and highest in case of oil expeller.

Thus on cost basis the oil mill appears to be the most suitable where as on employment basis the power driven ghani appears to be the most appropriate. In no case wardha type ghanies are to be recommended. In the conditions prevailing in the State where huge unemployment exists, the employment consideration naturally occupies more importance. As E. F. Schumacher once said it is important that "everybody should produce something than that a few people should each produce a great deal and this remain true even if in some exceptional cases the total output under the former arrangement should be smaller than it would be under latter arrangement." Between the oil expeller and power driven ghani even though production is greater and cost per quintal of oil is comparatively lower in case of oil expeller, in view of employment generating capacity it is the power driven ghani which seems to be the most appropriate in our economic condition. Moreover the quality of oil is superior in case of power driven ghani as unlike the oil produced by expeller this oil has no iron

content. The power driven ghanies in the State at present are not operating very efficiently from management point of view. For repairing they depend on technicians provided by the Khadi Board who often do not reach them in time and consequently the machineries remain idle. It is therefore suggested that more people should be given technical training in the field and posted in rural areas so that power ghanies can be provided with prompt and ready technical facilities. This will also not require huge investment as these machinery are comparatively simple and their repairing does not require long and costly training. From marketing stand point also power ghanies are found to be in a better position. The oil produced by the ghanies is sold in the local area itself and the demand is found to be wide. On the other hand oil expellers are faced with uncertainty in market condition and sometimes there is piledup stock with them, due to inflow of oil from outside.

The only limitation of the power ghanies is that the oil extraction is hardly 28 to 30 percent, whereas in expeller it can be 33 percent at the minimum, and thus much oil is wasted under the power ghani. This is however not a serious objection against the technique because the oil cake from the power driven ghani acts as a better fertiliser and cattle feed compared to that from an expeller. Whatever wastage is there also can be eliminated by coming into contract with large oil mills for utilising the oil cakes for further extraction.

The total oil seeds produced in the State is 4,26,950 tons. Power driven ghanies (4 ghanies in one unit) crush 600 quintals of oil seeds in a year working for one shift. If the entire oil seeds of the State are crushed through this method it will require 71,158 such units and can provide employment to approximately 3,55,790 persons. On the other hand through alternate technology of oil expeller it will create employment approximately for 2,13,524 persons. It is important therefore that more of power ghanies should be installed in rural areas along with provision for technical facilities so that besides generating more employment in rural areas they provide the mass with better quality of oil at reasonable price.

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TECHNO-ECONOMIC FEASIBILITIES FOR ESTABLISHING RICE BRAN OIL EXTRACTION PLANTS IN ORISSA.

Satyabadi Misra

Rice, the major food grain, forms the staple food for nearly half of the world's population. India is the largest rice growing country in the world. Rice is extensively cultivated in Orissa.

As most of the agricultural commodities undergo some kind of processing operations before they are consumed, similarly paddy is to be dehusked or pounded to yield rice to be used for food. Utilising the technological knowhow the byproducts can be used profitably.

Rice milling industry produces two main by-products, namely, husk and bran.

Husk is available in abundant quantity and has 20% weight of paddy. It has a very low nutritive value. Though husk is used as fuel, yet, it can be effectively utilised (a) as a raw material for Furfural (b) for making light weight concrete and c) for making particle board. Furfural is widely used in plastic, synthetic rubber and oil refining. Furfural production from paddy husk is capital intensive but, light weight concrete and hard board have been very successfully produced from husk. This can be very successfully used as insulating and packaging material, production of glass, and fire bricks. For this production, success have been limited to laboratories and commercial production is yet to start.

'Paddy' refers to grain enclosed by husks on glumes. Rice is the grain devoid of husk. Paddy has the following composition under milling (in percentage).¹

Clean Rice	—	46
Broken rice and points	—	16
Meal	—	3
Bran	—	13
Husk	—	20

During milling of paddy the protenous aleurone layer and outer layer of endosperm with carbohydrate form a powdery mass, the bran, which comprises (in percentage).²

Carbohydrate	—	40-50
Soft oil	—	15-20
Crude oil	—	0.4-1.0
Protein	—	5.10
Fibre	—	5.15
Free fatty acid	—	3 in fresh bran and increase with storage and humidity.

Rice bran is a valuable by-product where as husk has become the liability for the producer. Rice bran contains oil which can be used as edible oil and for soaps and detergents when the former specifically is in a short supply. In India availability of brain is to the tune of 2 million tones with production ability of oil worth Rs. 1200 million. Oil content of bran is 15-20% for raw rice and 20-30% for par boiled rice. Shelled bran is pure where as hulled bran contains pulverised husk and yields very less oil, only to the extent of 6-8%. Presently, in our country only 2,00,000 tons of brain is crushed to yield 3,000 tons of bran oil. Bran oil containing less than 10% of fatty acid are utilised for edible purpose for preparation of Dalda where as, that containing more than 10% is used for soaps and detergents.

Crude bran oil can have several important uses such as :

- Manufacturing of fatty acids.
- Protective Coatings.
- Detergents and Emulsifiers.
- Synthetic fibres.
- Medicines such as Oryzonal, Squalene, Tecoferol.
- Edible use for saled oil, cooking oil.

De-oiled bran contains lot of vitamins and minerals and can be used as cattle feed and manures.

SCOPE FOR ESTABLISHING BRAN OIL EXTRACTION UNITS IN RURAL ORISSA :

1. Yield Potential :

Rice is the staple food of the people of Orissa. Target production for the sixth five year plan (1983-84) depicts the highly optimistic target of more than doubling the production. At the rate of 13% of the paddy grain,

total bran availability by 1984 shall be to the tune of 530.56 thousand metric tonnes. Oil yield potential out of the available bran @ 18% is calculated a 95.40 thousand metric tonnes. This yield potential shall justify establishing a number of oil extraction units.

2. Cost Factor :³

Setting up of a four tonne capacity rice mill with par boiling will require an investment of 15 lakhs of rupees. A 30 tonne capacity bran oil extraction with require Rs. 26-27 lakhs. To make the supply of bran is kept for more than 48 hours a stabilising unit for Rs. 1.75 lakhs per unit shall be added.

A rice-mill of 4 tonne capacity shall yield $4 \times 0.13 \times 0.18 = 0.54$ tonnes of bran oil and for an oil mill of 30 tonne capacity it is required that the raw material should be supplied by not less than $30/0.54 = 55$ such rice milling units to keep the oil mill running. The capital required for 55 such units shall be around $15 \times 55 = 825$ lakhs or 8.25 crores if other small units shall not be required to yield bran.

3. The Problem :

With the target of increased rice yield from 4 million tonnes at present to 6.5 million tonnes at 1983-84 the setting up of rice-bran oil extraction units in Orissa in Sixth Five Year Plan is quite feasible. We may start with a 30 tonne plant in the extensively rice growing districts like Cuttack and Sambalpur. A waste product utilisation scheme of this type has a lasting economic benefit of creating new local industry and employment possibilities, of course, depending on the people's attitude of participation and accepting the product which can provide useful assistance for boosting the rural economy.

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APPROPRIATE TECHNOLOGY FOR RURAL INDUSTRIALISATION OF ORISSA.

R. C. Ray

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Rural Industrialisation is a complex problem. In the matter of Industries, the rural economy in India is trapped between the old and new orders. All possible effort are made to find a way out of it. Choice of appropriate technology to industrialise the rural economy is a controversial issue which is being debated since some time to evolve a scientific solution. This paper purports to offer an approach to the problem of choice of appropriate technology for rural industrialisation of Orissa.

THE PROBLEM :

Industries which flourished in the rural areas of India much before the birth of modern industrialisation in Western Europe¹ are, in some form or other, still with us today. The high artistic skills of the craftsmen in these cottage and household industries remains an integrated part of the rural culture in India. For several reasons, this traditional industrial sector no more flourishes to fetch social prosperity. Rural industrialisation tries to modernise or revitalise this sector. But this is only a small part of rural industrialisation. It has to introduce new technology for a fundamental socio-economic transformation of the rural areas. It, therefore, emphasises the need for change in the old order and "seeks to transfuse modern industry into the life of the people of a particular locality by emphasizing area development and maximising local skills and resources"². What then is this modern industry and new technology ? Is it appropriate to our rural economy ?

CHARACTERISTICS OF RURAL ECONOMY OF ORISSA

The rural economy of Orissa has certain characteristics features which have to be carefully considered for selecting an appropriate technology.

Orissa is predominantly an agricultural State. The share of agriculture in the state income was about 62 percent in 1973-74.³

Paddy is the main crop in the State which occupies 4,734 thousand hectares of land. This constitutes 30.46 percent of total geographical area and 69.62 percent of the area under cultivation.⁴ However there has been no significant improvement in levels of agricultural out-put during the last two decades. Pattern of agriculture remains traditional and unscientific. Not much diversification has taken place.

Another feature of State's rural economy relates to abundant availability of labour. No reliable data are available so far on the unemployment problem in this State. The per capita monthly consumption expenditure of rural workers was as low as Rs. 39.19 in 1973-74.⁵ Bulk of the labour force is unskilled and consequently efficiency is low.

A large part of the industrial population of Orissa is formed of artisans, who are adept in traditional skills. In total, there are about 35,000 artisans families engaged in manufacturing about 50 varieties of handicrafts. Of them, 15,000 families are engaged in manufacturing brass and bell metal articles. There are around 2,98,430 handloom weavers and 26,750 Tasar rearers in Orissa.⁶ There are different types of rural artisans in the State. The class of artisans engaged in manufacturing fancy goods are independent. The artisans are not specialised and the division of labour is extremely limited.⁷ They are also not aware of improved techniques of production. Therefore any suggestion for an appropriate technology for rural industrialisation in Orissa has to take account of (a) existence of the large number artisans who are to be economically stabilised and (b) creation of employment opportunities for the unemployed and labour force of the state.

INTERDEPENDENCE AND CHOICE OF TECHNOLOGY :

It is now agreed by all that "an industrial country is one with a highly developed agriculture."⁸ Technological choices for agricultural development would certainly influence the base for industrialisation.

In the given set up of factor endowment with plenty of labour and low land per capita in Orissa, appropriate technology in agriculture must emphasise investment in such capital goods which are substitutes of land. These are irrigation, improved seeds and fertilizer. Investment in these is equivalent to an increase in supply of land.⁹ But there are capital goods like tractors, tools and equipments, investment in which will lead to mechanised farming and will create new opportunities for labour power.¹⁰ Further investment on land can raise farm productivity and will help to build up an agricultural surplus. This food surplus can either be invested in

agriculture or devoted for consumption. In both the cases the industrial sector will get a stimulus. The marketable surplus can also be used for creation of social and economic overheads. Further, transformation in agriculture from subsistence farming to diversification and mixed farming can take place. The scope for agro-based industries which is limited now on account of predominance of paddy cultivation and absence of diversification in agriculture in Orissa¹¹ will expand.

Rural industries have linkages not with the agricultural sector alone. They have effective forward and backward linkages with other sectors as well. But their primary function in rural areas is to absorb the surplus labour force from agriculture. The range of items they produce covers products of a number of primary and secondary processing industries. Technology would vary for the various items produced under different scales of production. Nevertheless, the appropriate technology should have a distinct bias in favour of labour-intensive and low-cost technology, as labour is abundant and capital is scarce. Three broad categories of industries can be suggested to form a core of the different levels of technology appropriate for the rural areas of Orissa. They are—

- (1) Household Industries
- (2) Simple processing industries
- (3) Other small industries.

1. Household industries :

These include carpentry, blacksmithy, village potteries, handicrafts, coir, handloom, bamboo and cane work, snuff making, bee keeping, sericulture etc. Some of these come within the purview of the Khadi and Village Industries Commission. These village industries process the locally available resources with simple and inexpensive tools. Khadi and Village Industries Commission (KVIC) has, in some cases, tried to improve the simple technology applied here. It has devised a new type of potter's wheel for the pottery units. In another case the KVIC has devised a new method to make a blending of polyester and khadi which doubles the strength of the cloth and increases the earning of the artisans by 50 percent.¹² Primitive technology used in these household industries lead to wastage of resources. Efforts have to be made through constant research and development to find out better low cost, labour intensive and more efficient techniques like the ones cited above. The artisans should be induced to accept the modern devices.

2. Simple Processing Industries :

These are also small village industries processing local resources with the help of simple machines and have large employment potential. All the units which come under the purview of KVIC, other than the units mentioned in the previous section, are included here. Such industries cover processing of cereals and pulses, ghani oil, manufacture of khandasari and canegur, palm-gur making and other palm products, cottage match, cottage soap, manufacture of shellac, manufacture of gums and resins, manufacture of katha, handmade paper, tanning of hides and skins, cottage leather industry, lime manufacturing, fruit processing and preservation, manufacture of household utensils of aluminium, brass and bell metals.¹³ Such industries are appropriate to rural economy of Orissa as they involve not-so-rigorous technical process. They also have tremendous potentiality to absorb labour and introduce diversification. The manufacturing process here can be improved. The scope of KVIC can be widened to include some more village industries like bidimaking, beverages, tobacco and tobacco products, brick making, etc.

3. Other Small Industries :

These industries include the large number of industries of the small scale sector. All such industries do not depend upon local resources. Demand-based industries and ancillaries to medium and large scale industries come under this category. They import resources, and at times skilled labour, from other places. Capital content in such units are comparatively high. About 834 items reserved for exclusive production in small scale sector belong to this group. The techno-economic feasibility of such industries has to be carefully studied before they are set up at a particular place. In this regard, the SISI, Cuttack has assisted 35 industrial units of Orissa in choosing the best technology appropriate to them.

The above classification is only a matter of convenience, but not without reason. They have been done so as they are appropriate in three different spheres of operation in the rural areas which is unfolded in the following section.

REGIONAL APPROACH :

Rural industrialisation implies dispersal of industries. But industries that are promoted now are confined mainly to the leading trade centres of Orissa. In fact, all industries cannot be taken to the village level. The currently emphasized, "Integrated rural and area development" is possible in

our State if the "growth foci" approach advocated by the experts of regional planning is adopted. It is held that Khadi & Village Industries will act as "Lower level growth foci" and form linkages in the integration process.¹⁴ A three-tier approach has been advocated in which the rural artisans will operate at village level, simple processing industries will remain at block level and other small industries will remain at the district level.¹⁵ The focal points over space at the block and district level have to be identified so that the industries of different scales can be set up at appropriate places. These three categories of industries, noted earlier, can be made to fit the hierarchical order of the rural settlement. In such an approach the appropriate technology scale will match the rural economy of Orissa.

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Use of Appropriate Technology for Rural Industrialisation in Orissa - a case study of KUDUMULGUMMA Block in Koraput District.

P. K. Mohapatra

'Appropriate Technology' connotes a particular point of view of technology in the context of economic development. It suggests that technology is neither neutral nor does it evolve a single path. It recognizes that different cultural and geographical groups will have different technologies that are appropriate to their circumstances; that technological self determination is essential to cultural identity. It may otherwise be called, "environmentally appropriate technology." It assumes that the purpose of economically productive activity is to produce what is determined by need, in an enjoyable, creative process, and not what is determined by endless greed, in an alienating repetitive production process.

It stresses that every society has a technological tradition and that new technologies must improve upon and grow out of this tradition. As suggested above, appropriate technology is not a new concept advocated by the people of rich countries who are working for a human scale technology to fit into their own conditions but the very origin of the movement come from Gandhian tradition of local production for local needs.

To sum up the concept of appropriate technology permits—

- (1) That local people are to be involved in identifying and working to address their needs.
- (2) It means the development of tools that extend human labour and skills and makes it both more productive and more creative.
- (3) It represents a comprehensible and controllable scale of activities and organization.
- (4) It allows a more economical operation and greater interaction of local industry.

(5) It provides a region with a cushion against the effects of outside economic changes (e. g. the collapse of the world sugar market or the sudden unavailability of fertilizer).

(6) It helps to reduce economic, social and political dependence, between regions and between nations.

(7) It is in harmony with the cultural traditions of the area. This does not mean that it is stagnant ; but that it evolves along with the culture and does not contradict the system of the people concerned. Thus technology values is adapted to fit into the culture rather than the culture being forced to adopted to fit into the 'technology'. An attempt is made in this paper to present a case study conducted in Kudumulgumma Block of Koraput District which shows the extent to which we have a communication barrier and in what direction our extension services need improvement so as to make the new technology reach the intended beneficiaries.

Kudumulgumma block consists of five Gram Panchayats with 161 villages. Total household as per 1971 census comes to 7050 with a population of 32,550, of which 67% (22,250) belong to Scheduled Tribe ; 7% (2,065) belong to Scheduled Caste and balance 26% (8,215) belong to other classes. Parajas constitute 50% of the S. T. population and Kandha, Dudei and Bhuyans together forms the rest 50%. All most all the people are land less labourers. They are exposed to continuous exploitation by the middlemen because of their illiteracy and ignorance. They are used to utilise the forest resources in the most primitive and traditional method. If the lot of the tribals is to be improved it is required to spread the participatory Technology development process and a horizontal communication net work. To certain extent the K. & V I. Commission has been trying to have a break through in the system. But such activities need further acceleration particularly in the tribal belts.

Technical Feasibility of RURAL INDUSTRIALIZATION IN ORISSA

R. K. Choudhury

Rural Industrialisation implies industrialisation of the country as widely dispersed, on as small a scale, with as high an employment potential as is compatible with an efficient technique and the requirement of the process of development. Since the beginning of the Indian history cottage and handicraft industries have constituted the central force in the culture and organic unity of the people. In the numerous and far-flung villages of the State, the colourful tradition and culture were woven into these unique objects making each of them individualistic, beautiful and sensitive. The pains-taking labour of the cottage products and their unique producers found their fullest application and thrived through the ages. The golden historic past of Orissa reveals the artistic products being sold in large volumes in distant markets till the arrival of British which destroyed the cottage industries and converted the self contained rural scene to its peril.

The rapid and steady rise of population has led to a situation in which there are too many hands to be engaged in agriculture, too many mouths to be fed, and too many to be settled. The situation is further aggravated by an antiquated land tenure system, by poor standards of health and nutrition, by the continuance of primitive and inefficient technique of agriculture on small uneconomic holdings. An unexhilarating climate, combined with a traditionally fatalistic outlook on life tends to undermine efforts for economic development. Orissa is an outstanding example of a state which despite rich endowment of natural resources has remained extremely backward. Its per capita income estimated at current price is Rs 825 in 1978-79 which is much below the all India average of Rs. 1163 in 1977-78. Out of the total population of the State as estimated at mid 1976 of 2.44 crores nearly 80 percent live in rural areas and more than 77 percent of the total population depend upon agriculture. A microscopic observation at particular village in Orissa will reveal admiration at the achievement of planning, while disclosing the concealed failure to boost up agricultural efficiency.

Though the social change has been induced, economic change however, has been small.

The rural areas can be identified with the chronic unemployment and poverty has been the order of the day. The vicious circle of poverty which encircles the underdeveloped areas, particularly the rural belt permits saving and investments to be inadequate. A provision of employment opportunities for the millions in the rural areas would be the only possible answer to the problem of poverty. Here in Orissa the nature of the problem is not that a large number of the people remain constantly unemployed, rather most of them find some work for some weeks or months and are forced into idleness during the rest of the year. Lack of employment opportunities in rural areas not only reduce their efficiency but push people out of hearth and home, to the places where employment opportunities are available, particularly in urban areas. The continuing unwarranted growth of the unemployed and the underemployed in the rural areas and consequent push and pull of migration result in the glut in the rural and urban labour market.

Under these circumstances, the problem of unemployment and underemployment can be tackled by the expansion and modernisation of agriculture, by increasing the area and pattern of cropping, and the small scale and cottage industries dispersing into the rural areas. As large scale industries cannot move to rural areas for obvious reasons our anxiety naturally is to raise the productivity of the rural population in the rural setting. Any plan which seeks to eradicate or reduce unemployment should primarily direct its efforts towards absorbing as much of the unutilised labour as possible in production. With a view to providing employment to the unemployed and subsidiary employment to the underemployed, small and cottage industries should be diffused in the rural areas.

During the years of planned development whatever industrialisation took place it was confined to the urban areas as a result of which, non-agricultural activities and employment also concentrated in the urban areas. Much was talked about integrated rural development, rural industrialisation, village and cottage industries, but little was attempted and practically nothing was realised. There is a great hiatus between the policy framed and the practical implementation. The problem of unemployment and rural upliftment can be tackled if there is determined political will.

Rural industrialisation, prior to the Third Plan, was expressed more or less in terms of village, and small scale industries. In Orissa rural industria-

lisation was initiated only in 1961-62 when it was decided to make massive expansion of small and cottage industries in the rural areas under the panchayat samities and gram panchayats. The panchayat industries programme actually started during the year 1962-63. By 1965-66, 150 industrial units went to production but only 75 units were running in the state. During these years small units have been stabilised but the mortality rate has contributed for the decline of the total number of units.

The most striking cause of slow growth and high mortality of rural industries is the inadequacy of capital, both fixed as well as working, dearth of entrepreneurs and absence of infrastructural support. Rural industrialization does not take place in a vacuum. Choice of industries is one thing, but choice of technology to be employed in the rural setting under the circumstances is quite another. The importance of small units cannot be overemphasized. The "small is beautiful." The small traditional household operations no matter how numerous, are likely to be less suitable to the natural environment than large scale one, simply because their individual force is small in relation to the recuperative force of nature. Moreover, the methods and equipment used also leave ample scope for human creativity.

The underdeveloped economies are characterised by two related but conflicting problems of shortage of capital and high unemployment. Hence it can be safely argued that the low capital intensive techniques utilised in the small industrial units will serve two useful functions of increased output with a given amount of capital and increased employment within a given amount of investment. The assumption of low capital consumption of the scale and handicrafts industries is necessary in the rural settings of an underdeveloped state like Orissa. The capital intensity may imply either intensity of capital per worker—the capital labour ratio, or intensity of capital per unit of output—the capital output ratio. The industrial units in rural areas can thrive if the techniques are less capital intensive both in terms of labour and output. If the technique employed is only less capital intensive in terms of capital—labour ratio, but more intensive in terms of capital out-put ratio, employment of such technique might create more employment with a given amount of investment but would obviously result in less out-put. On the other hand, techniques with higher capital—labour ratio but a lower capital output ratio would tend to achieve increased output as well as increased employment. In such cases total wage bill would be less, as a result of high capital—labour ratio, and the surplus available for further capital formation or for employment would increase.

Hence the more labour intensive technique, simultaneously reducing capital requirement, would succeed in creating more employment and out put, under the condition of scarcity of capital and abundance of labour.

Moreover, there is a correlation between the number of persons engaged in an establishment and the composition of its capital. The proportion of working capital to total capital would be low or the proportion of fixed capital to the total capital would be high if the size of the unit will be extremely small. But the size of the unit should not be too small which may reduce the marginal productivity of capital. In the condition of acute capital deficiency, it may not be proper to use capital with low marginal productivity. In view of the enormous odds that seem stacked against the possibility of rural industrialisation in creating employment, a major alternative suggested is the increased investment in agriculture and public works programme. On the basis of the pilot project, the Dantwala Committee recommended rapid extension of the provision for irrigation for double cropping and supplementary work such as milk production, poultry keeping and piggery. The suggestions, however optimistic might be, cannot be accepted and cannot solve the problem of unemployment and poverty. In a country where nearly half of the population is still below the poverty line, the food for works programme not only can miserably fail but can humiliate and further dwindle the conditions of the underfed and undernourished.

It cannot be exaggerated that Japan's phenomenal progress of the rural economy could be made possible by removing unemployment and shifting the rural population, through rapid establishment of small industries in the rural areas. The District Industries Centre and the cooperatives have the significant role to play in this direction. However, the progress of both is not encouraging. This is not due to the institutional setting but to the organisational defects. Required enthusiasm to alleviate the condition is neither coming from the rural people nor from the institutions. Whatever programmes are undertaken for the rural areas are either not reaching the vulnerable section of the population or are benefiting the rich, middle and dominating sections of the rural population. The strict observance of the purpose of rural industrialisation rather than the theoretical principle is important. The purpose of rural industrialisation is not to establish industries in the rural areas for its own sake but to relieve the underfed and undernourished, to relieve the pressure of population on agriculture, to increase the efficiency of the rural population. This requires the establishment of tiny industries of a labour-intensive character without ignoring the efficiency of

capital and labour and output augmentation. We have to think in terms of persons rather than in terms of output.

The nature of the problem is varied. The choice is not in between small scale or large scale, labour intensive or capital intensive to suit a particular economy. The choice is to select a particular technique suitable for a particular unit of production in a specific area. The solution should be local and individual rather than provincial or national. This requires wide research keeping in view the broad objectives. No plan of rural industrialisation will succeed if the plans are framed capitals. Plans should be framed with austerity at the spot to save democracy and planning from going down the gutters.

RURAL INDUSTRIALIZATION AND APPROPRIATE TECHNOLOGY THE CASE FOR SMALL-SCALE INDUSTRIES IN ORISSA.

R. P. Choudhury

SUMMARY

The rural unemployment and poverty in Orissa assume serious magnitude and large scale industries alone may not solve this problem. In such context the emphasis on small scale industries seems to be relevant.

The contribution of village and small industries to the Indian economy is significant in terms of employment, export and value of production.

The concept of rural industrialization as an integrated process of rural development was introduced in the form of Rural Pilot Project under Second Plan on the advice of the Karve Committee. Small scale industries form the kingpin of rural industrialization in Fifth Five Year Plan.

The motive behind the Sixth Plan strategy is to give due weightage to modernisation and technological development in the small scale sector in order to reduce rural poverty and unemployment. The main objective of the Plan is to encourage export oriented village and small industries.

The 'Appropriate Technology' for rural industrialisation is neither too much capital-intensive, nor it is pure labour-intensive, but is supposed to be most economic, and efficient technology satisfying the basic objectives of the National Plan.

Problems of Small Industries in Orissa :

Small industries particularly at the village level are bound to face difficulties in competing with large established firms. Small industries in Orissa are developing sickness due to lack of infrastructural facilities in rural areas.

Conclusions :

In order to reduce the appalling poverty and unemployment in the State the policy of establishing nucleus industrial complex with capital intensive advanced technology, in the backward regions should be encouraged.

This will help the small and tiny industries to grow in rural areas. State patronage and adequate financial assistance will no doubt accelerate the growth of village and small scale industries in rural Orissa.

A CRITERION FOR CHOOSING AN INTERMEDIATE TECHNOLOGY FOR RURAL INDUSTRIALISATION

Kumar B. Das

SUMMARY

The rural poverty accentuates due to the inability of rural agricultural population to stop or decrease 'reproduction' and to enhance total "production". Therefore then RAS has a limited significance in finding a solution for the rural sufferings. Then IRD assumes that RIS can play a very relevant and complimentary role considering the socio-economic ends of Rural economy. And among other things, RID functionally (positively) related to technological adoption. So the appropriateness of it will ensure to minimise the gap between potential labour force and actual employment available.