

**Technology for Rural Development**

**- Some Issues**

**Prepared for UNESCO**

**by**

**Institute of Social Studies  
M-1, Kanchanjunga, 18, Barakhamba Road  
New Delhi**

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#### Bibliography

## A word about the Institute of Social Studies

The Institute of Social Studies (ISS) is a voluntary non-profit research organisation, founded in 1964.

In its first phase, 1966-74, ISS conducted surveys ranging from aspects of development of Indian handicrafts, problems of urbanisation, to an evaluation of a rural man-power project and a report on co-operative agro-based industries and so on.

In its second phase, commencing in 1975, ISS has been concentrating on studies on different aspects of women's employment and their integration in development. These include studies of viable projects employing rural women, impact of an employment guarantee scheme on poor rural women, workings of an agricultural landless workers union, impact of a modernisation plan on rural women's employment.

More recently, ISS has completed an analysis of five selected projects and endeavours of women to understand levers of power. These case studies have been published as a book titled "Women's Quest for Power".

The studies on stream at ISS at present include Female labour/supply behaviour based on a study of time disposition of selected rural households and a directory of voluntary organisations working with and for women from poverty groups.

Though ISS has not been involved in development of appropriate technology, it has acquired some insights into this problem during the course of its studies. It undertook the preparation of this paper on technology, on behalf of UNESCO, in the belief that some of its observations may be of help to the specialists engaged in the development of technology appropriate for rural development.

1 Importance of Rural Development and Its Goals

Population and poverty are on the increase in the region. Industrialisation and modernisation attempted in the past three decades have failed to solve the problems of unemployment and destitution. All eyes are now turned on rural development to absorb idle labour and to provide minimum subsistence in the shortest possible time.

India exemplifies these problems and pursuits common to the region, in good measure. Mounting unemployment and poverty which engulf over half of India's vast population of 640 million - a majority of whom live in villages - explain India's emphasis on rural development. The goal is to generate full employment opportunities in the rural areas by systematic use of local resources in each of the 5,000 development blocks comprising the country.

The removal of poverty implies raising the consumption levels of the population in terms of food, clothing, shelter, drinking water, literacy, education and health care. The vast increase in production of goods and services required to raise the consumption level of the poor also provide considerable opportunity for reducing under-employment and unemployment.

The strategy adopted to attack the problems of unemployment and poverty is:

- a increase agricultural productivity
- b protect (existing) and promote non-farm employment opportunities in decentralised industries.
- c raise consumption levels of the poor

## 2 The Role and Relevance of Technology

Technology is critical to the attainment of the aforesaid goals and strategy of rural development. A common feature of the region is abundant labour and scarce capital. On the contrary, import of technology on which the region has hitherto relied, has maximised capital and minimised labour. Indeed in many cases it even destroyed traditional employment avenues or uprooted workers from their homes and bundled them in slums - heaping misery upon the poorest of the poor.

Fortunately, there is growing awareness in the region of the crucial role and relevance of technology choices which are appropriate to the aims and endowment factors of these societies. At the philosophical level appropriate technology is seen as having the potential to usher "decentralisation of power and wealth" fundamental for an equilibrium and democratic society:



On the one hand it (appropriate technology) simplifies the technology and makes it possible to be taken to every home and on the other hand it minimises the drudgery and monotony of the workers. This term has a wider application and should transcend the narrow limits of hardwares and technical equipment and become the philosophy of life for a simple living, for a better management of economic and social affairs and distribution of wealth and power to the people<sup>1</sup>.

At the practical level search is on for those techniques of production which while delivering the requisite quantity and quality of goods and services planned, maximise labour absorption and minimise the use of capital which is scarce.

The criteria for choice of appropriate technology according to India's Sixth Plan is to prefer that technology - out of options available - which would maximise employment per unit of capital and output, and minimise capital per unit of output and labour without too much

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1 Jayaprakash Narayan in a foreword to 'Appropriate Technology - Directory of Machines, Tools, Plants, Equipment, Processes and Industries', Appropriate Technology Development Association, Lucknow (India), March, 1977.

sacrifice in terms of cost and quality. Further, technology adopted must maximise the use of local resources, minimise damage to environment, reduce (if not eliminate) drudgery and promote spatial dispersal and de-centralisation to ensure widest possible diffusion of economic power and benefits. The Plan identifies some consumer goods industries<sup>2</sup> as the most eligible for optimising employment.

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2 Textiles, Sugar, Wood and Leather Products, Metal Fabrication, Edible Oil, Soap and Matches.

### 3 Status of Appropriate Technology

From the view-point of rural development, the areas where technology changes are relevant may be broadly classified as under:

- 1 agriculture and allied activities;
- 2 industry; and
- 3 services.

There are four stages in appropriate technology development and its application -

- a identification of areas where technology changes are relevant;
- b generation of appropriate technology;
- c its appraisal; and
- d application.

We may briefly look at the technology development/application arrangements in these three sectors and the sub-sectors in them.

### 3.1 Agriculture and Allied Activities

#### 3.1.1 Agriculture

Land being a scarce resource, the primary objective of policy is to increase productivity per unit of land in a manner which increases labour absorption.

In agriculture considerable advance has been made in crop technology specially the development of improved seeds, fertilisers, pesticides and related cultural practices. The application of improved technologies specially in the matter of two major crops - wheat and rice - has attained remarkable success both in terms of wide coverage and farmers' acceptance. These have been sustained by large increases in productivity and consequent rewards.

The crucial factor responsible for successful agricultural productivity increases in India is the large net-work of Agricultural Universities and Research Laboratories which combine research with training and extension and are well endowed with multidisciplinary

groups of scientists and technologists. Appendix I lists the Indian Agricultural Research Institutes.

Besides there is a country-wide extension organisation which is able to transmit the knowledge in the field and assist the farmers in adoption of the recommended techniques and inputs. The extension efforts are backed by suitable policy and fiscal support including subsidies to the farmers for shifting away from traditional to the new practices.

However, in respect of other crops such as cotton, oil seeds and pulses little progress has been made so far in the development of appropriate seeds and technology or their extension in the field.

### 3.1.2 Animal Husbandry

Next important area where notable success has been attained is animal-husbandry. On a wide-scale the poorer breed of cows have been improved through artificial insemination and supporting veterinary services. The results have been more satisfactory in areas where supply

of appropriate cattle feed has been ensured and organised marketing support readily available for milk and milk products.

However, there is comparative neglect of development of similar technology and its application in respect of smaller animals such as goats, sheep and pigs which are of vital importance to the poor.

### 3.1.3 Agricultural and Animal Wastes

Conversion of agricultural and animal wastes into wealth for the rural communities is <sup>the</sup> neglected sector right from identification of wastes, their potential uses, technology and equipment.

### 3.1.4 Farm Tools and Equipment

Pre and post harvest tools and equipment have a lot of bearing on productivity, employment and elimination of drudgery as also on the extent of women's employment. Considerable development work has been done by a net work of specialised technical research

institutions in this field. The tools developed include Levellers, Furrowers, Furrow Opener, Spades, Weeding Hoes, Dusters, Hollow Earth Auger, Seed & Fertiliser Drill, Hand Seed Drill, Plant Putter, Potato Digger, Fruit Picker, Seed Dresser, Paddy Transplanter, Groundnut Harvester, etc.

However, there is no systematic and rigorous appraisal of the tools developed in terms of the criteria for choice of technology. There is also no serious effort at their large scale application.

Indeed, the modern industry and imports are pumping in tractors and other farm machinery which defeat the basic employment objective. It is an area of unresolved conflict because of strong and resourceful lobbies of large farmers who prefer labour-displacing equipment, and large firms which have taken to manufacture farm tools displacing traditional village blacksmiths.

### 3.2 Industry

In the field of industry, it is necessary to have some sub-classifications from the view point of their relevance to rural development -

- a traditional artisans and village industries;
- b modern agro-processing industries; and
- c consumer goods industries.

### 3.2.1 Traditional Artisans and Village Industries

There is a wide range of vocations pursued by traditional village artisans. The foremost among the village artisans numbering over 10 million are the village blacksmiths, carpenters, potters and leather workers. In terms of development of appropriate tools for the village carpenters, blacksmiths and potters some progress has been made by several institutions, notably the Khadi and Village Industries Commission (KVIC).

The appraisal and extension of the tools and technologies in this field is also inadequate although the potential beneficiaries - the traditional artisans of whom women are a significant proportion - are some of the poorest and are the worst victims of unequal competition from organised large and indeed modern small scale industry.

According to KVIC which is the principal national



agency for the development of this sector, the coverage of artisans so far is less than 10 per cent. One of the major reasons for poor progress of application of developed technologies in this field is the absence of an adequate extension organisation comparable to the agricultural extension organisation.

### 3.2.2 Agro-processing Industries

An area of vital importance to the rural population is the progressive installation of processing facilities located within their reach, as far as possible, to ensure better returns to the primary producers and employment especially to women. Considerable development work has been done on equipment for threshing of paddy, parboiling of paddy and processing. Appropriate technologies have also been developed for extraction of edible and non-edible oils, manufacture of sugar and ginning of cotton. Similarly considerable progress has also been made in the development of agro-tools and implements, including pre and post harvest operations. A chain of modern cooperatively owned agro-processing industries has been established. The major agro-based industries are sugar, dairying, cotton ginning,

pressing and spinning, oil seeds processing, food grains processing , fruit and vegetable processing, cold storage and rice mills.

But the choice of technology (process equipment and scale of production) of these officially sponsored and financed cooperative agro-processing units is not linked with the technology development institutions in this field; and the sector development agencies operate independently often destroying existing avenues of employment and women are the worst sufferers.

### 3.2.3 Consumer Goods Industries in Rural Areas

There is a wide variety of industries - mainly traditional, in rural areas producing consumer goods such as cloth, shoes, household utensils, furniture etc. There is also a large network of Scientific Industrial Research Institutions (Appendix II) of which only a few concern themselves with problems of rural industries.

#### 3.2.3.1 Textiles

Handloom weaving for production of textiles required mainly for consumption by the rural population

is the largest single consumer goods industry in the rural areas. It offers large employment. Considerable research has been done in improving spinning as well as weaving techniques to enhance the survival prospects of this industry against stiff competition from textile mills. Technology research in spinning aims to decentralise yarn production to ensure its easy availability to the handloom weavers who are heavily dependent upon the big textile mills for their raw material. Research has attempted to produce a 6-spindle spinning wheel, a 12-spindle spinning wheel (KVIC) as well as a mini-spinning plant (Appropriate Technology Development Association, ATDA, Lucknow). While the 6-spindle and 12-spindle spinning wheels have been extended in the field to some extent, the research on the mini spinning plant is still inconclusive. The problems of cost and quality of yarn with regard to all these have yet to be resolved.

Work is also in progress to develop an appropriate spinning contrivance for the woollen sector by ATDA in collaboration with Intermediate Technology Development Group (ITDG). Both the cotton and the woollen spinning sectors are of vital importance for the employment of women.

Weaving technology research is being carried out by a network of Institutes of Handloom Technology and Weavers Service Centres. These Institutes are an integral part of the sector development organisation (All India Handloom Board) and as a result some progress has been made in replacing old traditional weaving and pre-loom equipment with higher productivity looms and pre-loom processing equipment.

What is lacking is rigorous appraisal of the new equipment prior to its application in the field. Consequently, as one of the case studies attached to this report shows women's employment has been affected by 'modernisation'. The eminently sensible criteria for choice of technology evolved by the national Planning Commission (referred to earlier) is not being strictly enforced.

### 3.2.3.2 Foot-wear

The rural foot-wear industry (which employs about 1.5 million poorest of the poor households who are not only economically but also socially the most suppressed

group) is grossly neglected in development of appropriate technology, tools and equipment for flaying, tanning and products making, and in extension of the results of research.

There is undoubtedly a prestigious National Leather Research Institute with commendable achievements but the fruits of its research have benefitted mainly the large firms engaged in tanning and manufacture of high quality leather and leather products.

The products the poor need such as ordinary footwear are in neglect which is punishing both the poor producers and consumers of leather goods. In fact technology support to this sector deserves higher priority because it faces bitter competition from plastics and other synthetics.

### 3.2.3.3. Other Industries

Other consumer industries where appropriate technology is being developed and applied albeit in a limited way are manufacture of matches, soaps, candles, preservation of foods, vegetable dyes, preservation of articles made of bamboo, cane and fibres, handmade paper and bee-keeping.

Tools for craftsmen engaged in a wide variety of handicrafts are also being developed by the Central Handicrafts Development Centre, Bangalore (All India Handicrafts Board) including pottery, ceramics, bronze casting, bamboo, mat weaving, in-lay, wood carving, lacquer work.

### 3.3 Services

The services sector includes among others housing, sanitation, drinking water supply, rural transport, rural roads, energy, literacy and education, health services etc. This sector, vital to women, is by far the most deficient in technology research and social awareness let alone application.

#### 3.3.1 Housing

Given the massive need for housing of the roofless millions and limited resources, there is general awareness of the need for low-cost housing appropriate to different areas of the country based on local materials, climate and life-styles. Some research and pioneering projects have also been developed. The New Delhi based UN (ESCAP) Centre for Housing (National Building Organisation, NBO) has also contributed to development of low-cost housing solutions and

training of housing administrators. The Central Building Research Institute at Roorkee has also developed processes for water-proofing of mud-walls and fungi-proofing, pest-proofing and fire-proofing of thatched roofs of rural houses. It has also researched into suitable building materials including the method for making soil-cement.

But application in the field is disappointing for several reasons including low priority for the housing of the poor, conventional approach of public housing agencies and their rigid standards and procedures with in-built preference for high-cost and modern building materials. Worse still there is total lack of participatory development of housing plans. A few non-official efforts combining participatory development with low-cost building techniques have recently emerged on a tiny scale.

### 3.2.2 Sanitation

Technology appropriate for sanitary rural latrines with arrangements for hygienic and easy disposal of night-soil and its conversion into useful manure, has been developed by several institutions<sup>3</sup>. Its extension is now picking up

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<sup>3</sup> National Environmental Engineering Research Institute, Nagpur; Planning Research & Action Institute (PRAI) Lucknow; Safai Vidyalaya, Ahmedabad.

but is still a long way to go. Lack of toilet facilities in rural areas particularly affects women especially from poor landless households.

### 3.3.3 Energy

Technology has developed for the use of bio-gas for meeting the fuel and lighting needs of the vast rural population in China and India<sup>4</sup>. In China there is widespread proliferation of the technology, in India there is a national policy to support the installation of bio-gas units for preserving forests and economising on oil yet extension is slow. Pakistan, Malaysia and Bangladesh have taken halting steps in modifying/Chinese/Indian designs or their extension.

### 3.3.4 Drinking Water

There is high priority accorded to provision of potable water in rural areas. Considerable progress has been made in recent years in installing drinking water facilities. But as a study of the Karnataka Council of Science and Technology shows little thought has been given to identifying appropriate equipment which can

<sup>4</sup> China: Azolla Propagation and Small Scale Bio-gas Technology, FAO, Soils Bulletin 41, 1978; Indian Institute of Sciences (ASTRA) Bangalore, KVIC and PRAI, Lucknow.



withstand local handling. The study found that over 10,000 water pumping sets needed repair or replacement in less than a year of installation. There is a Central Institute for Public Health Engineering Research for technical research in this field but its impact is limited. UNICEF has documented rural water supply systems in developing countries.

### 3.3.5 Irrigation

Considerable work has been done to devise and extend minor irrigation systems and equipment and methods of construction including hand pumps, forms for casting well rings, well lining rings, ring well installation etc. Experiments in wind mills being made with Dutch help in Uttar Pradesh (India) are as yet inconclusive. Minor irrigation is a large investment area but thoroughly inadequate attention is being given to its technology needs..

### 3.3.6 Nutrition

Commendable research has been done by the National

Institute of Nutrition<sup>5</sup>. It has a large training programme. But in the absence of an extension machinery, the application of results in the field is poor and the Institute exists in near isolation with the community. NIN is not fully associated even with officially sponsored programmes of rural nutrition or functional literacy.

### 3.3.7 Cooking

Traditional equipment for cooking, given traditional fuels is injurious to women's health especially eyes. Improved chullas (ovens) for cooking have been designed and tested (PRAI, Lucknow) but their application in the field is painfully slow. Thus women's eyes and health especially in rural areas continue to suffer badly.

### 3.3.8 Transport

Improvements in traditional bullock-carts, cycle rickshaws and wheel barrows have been made by several research institutes and the demonstration effect is visible.

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5 Especially on Blindness in Children - What to Feed Infants, How to Prepare Low-cost Nutritious Feed Supplements.

Bank credit is playing a noteworthy role in extension of these improved contrivances in the field. But both technology development and extension need greater input and effort.

### 3.3.9 Education and Training

Educational aids developed include low cost microscopes, solar still, soil testing kits, puppet making. Extension is limited by meagre school budgets. Instructional technology as a whole including functional literacy need much more doing.

#### 4 Some Issues

The foregoing review of the progress and problems of development and application of technology appropriate to the aims and endowment factors (mainly of India) throws up several issues.

##### 4.1 Administration of Technology Policy

While it is necessary to have an overall policy framework and criteria for the choice of technology, it is not a sufficient condition. Many research institutions and sector development agencies appear to promote technologies which run counter to the national policy and criteria. Little thought is being given to the tie up between policy and its administration leading to gross distortions of policy. This lacuna has to be set right.

##### 4.2 Widening Technological Options

Even where some technological options are available, these have not necessarily been developed to suit the given

set of conditions. To call them 'options' is a misnomer. The most one can do is to choose the least bad of the available options. Therefore, it is necessary that in selected sectors options are widened by conscious technology development in answer to a given set of conditions. If the search fails, that is another matter, but the range of options must be deliberately widened.

#### 4.3 Lags

Even where the right kind of technological solutions are available, there are no corresponding arrangements for appraisal of technology and/or its extension. Costly research sitting on the shelves is of little value to the poor. The organisational gap between development of technology and its extension must be bridged. There is as much need to innovate organisation as technology itself.

#### 4.4 Social Awareness

There is appalling absence of social awareness in technology research, policy and programmes. In particular there is little awareness of the needs and problems

of women. This has led to development and/or application of inappropriate technologies from the point of view of the rural poor and women.

It is possible to identify the serious, mostly negative effects of this neglect in every sector mentioned above. The social as well as economic havoc this causes - often an increase in disparity between the sexes, even amongst children - has also to be the concern of the personnel engaged in technology and rural development. Technology research and extension institutions should include social scientists and women at all levels - identification of areas needing technology innovation, technology development, appraisal and extension.

## 5 Leads for UNESCO

The foregoing review shows that in almost all areas - be it agriculture, industry or services, the needs and problems of women are the most neglected. There is no awareness of the special problems of women. As a consequence in policy, plans, programmes or projects decisions and directions are often being taken which deprive women of even such links with income and facilities to which they have had access in the past.

One of the most vital areas, therefore, for UNESCO's contribution would be to bring about a focus on women in policies, plans and programmes in the countries of the region just as UNICEF has been able to do so for the children. In this, priority may be given to women's employment and income.

Traditional occupations providing full time or part time employment to large numbers of women may be identified, their structure studied including their technology,

tools and techniques, the nature of threats arising to women's employment from modernisation in order that concrete policy, plan, programme and technological answers can be advanced from the women's point of view.

Next area of importance to women is housing, sanitation including safe drinking water and domestic fuel. Here again UNESCO can play an important role particularly in housing. More than the development of appropriate technology what is required in the case of housing is to innovate housing organisation, standards and procedures without which appropriate technology cannot be introduced.



Appendix II.

Industrial/Scientific Laboratories/Institutes/  
Research Associations

1. Ahmedabad Textile Industry's Research Association,  
(A. T. I. R. A.)  
Polytechnic P.O.,  
Ahmedabad-15.
2. Birla Industrial and Technological Museum, (B. I. T. M.)  
19-A Gurusaday Road,  
Calcutta-19.
3. Cement Research Institute, (C. R. I.)  
M-10 South Extension II,  
Ring Road,  
New Delhi.
4. Central Building Research Institute, (C. B. R. I.)  
Roorkee (U. P.)
5. Central Drug Research Institute, (C. D. R. I.)  
Chatter Manzil Palace,  
Lucknow.
6. Central Electronics Engineering Research Institute, (C. E. E. R. I.)  
Pilani. (Rajasthan)
7. Central Electro-Chemical Research Institute, (C. E. C. R. I.)  
Karaikudi-3.
8. Central Food Technological Research Institute, (C. F. T. R. I.)  
Cheluvamba Mansion,  
Mysore-2.
9. Central Fuel Research Institute, (C. F. R. I.)  
Jealgora,  
Distt. Dhanbad.
10. Central Glass and Ceramic Research Institute, (C. G. C. R. I.)  
P.O. Jadavpur University,  
Calcutta-32.

11. Central Indian Medicinal Plants Organisation, (C.I.M.P.O.)  
NBC Campus,  
Lucknow. (Regional Centre:National Aeronautical  
Laboratory Campus, Bangalore).
12. Central Leather Research Institute, (C.L.R.I.)  
Adyar,  
Madras-20.
13. Central Mechanical Engineering Research Institute, (C.M.E.R.I.)  
Mahatma Gandhi Avenue,  
Durgapur-9.
14. Central Mining Research Station, (C.M.R.S.)  
Dhanbad (Bihar)
15. Central Public Health Engineering Research Institute,  
(C.P.H.E.R.I.)  
Nagpur.
16. Central Road Research Institute, (C.R.R.I.)  
P.O. CRRI,  
New Delhi-20.
17. Central Salt and Marine Chemical Research Institute,  
(C.S.M.C.R.I.)  
Bhavnagar-2.
18. Central Scientific Instruments Organisation, (C.S.I.O.)  
Sector-30,  
Chandigarh-20.
19. Indian Institute of Experimental Medicine, (I.I.E.M.)  
4, Raja Subodh Chandra Mullick Road,  
Calcutta-32.
20. Indian Institute of Petroleum, (I.I.P.)  
P.O. IIP, Mokhampur, Dehradun.
21. Indian Jute Industries Research Association, (I.J.I.R.A.)  
17, Taratola Road,  
Calcutta-53.
22. Indian National Scientific Documentation Centre, (I.N.S.D.C.)  
Hillside Road,  
New Delhi12.

23. ~~India~~ ~~Calcutta-7.~~
24. Indian Plywood Industries Research Institute, (I.P.I.R.I.)  
P.B. 2273,  
Tumkur Road,  
Bangalore-22.
25. Industrial Toxicology Research Centre, (I.T.R.C.)  
CDRI Campus,  
Lucknow.
26. Indian Rubber Manufacturers' Research Association, (I.R.M.R.A.)  
Plot No. B-68, Road No. 24,  
Wagla Industrial Estate,  
Thana.
27. International Crops Research Institute for Semi-arid Tropics,  
(I.C.R.I.S.A.T.)  
Begumpet,  
Hyderabad.
28. National Aeronautical Laboratory, (N.A.L.)  
P.B. No. 4,  
Bangalore-17.
29. National Buildings Organisation, (N.B.O.)  
Nirman Bhawan,  
New Delhi.
30. National Botanical Gardens, (N.B.G.)  
Lucknow.
31. National Chemical Laboratory, (N.C.L.)  
Poona-8.
32. National Environmental Engg. Research Institute, (N.E.E.R.I.)  
Nehru Marg,  
Nagpur.

33. National Geophysical Research Institute, (N.G.R.I.)  
Hyderabad-7.
34. National Institute of Oceanography, (N.I.O.)  
Miramar, Lalit Niwas,  
Panaji (Goa).
35. National Metallurgical Laboratory, (N.M.L.)  
Jamshedpur-7.
36. National Physical Laboratory, (N.P.L.)  
Hillside Road,  
New Delhi-12.
37. Regional Research Laboratory, (R.R.L.)  
Sachivalya Marg,  
Bhubaneswar-1.
38. Regional Research Laboratory, (R.R.L.)  
Hyderabad-9.
39. Regional Research Laboratory, (R.R.L.)  
Canal Road,  
Jammu-Tawi.
40. Regional Research Laboratory, (R.R.L.)  
Jorhat.
41. South India Textile Research Centre, (S.I.T.R.C.)  
Coimbatore-14, Aerodrome P.O.,  
Coimbatore-14.
42. Structural Engineering Research Centre, (S.E.R.C.)  
Roorkee.
43. Tea Research Association, (T.R.A.)  
Royal Exchange,  
6, Netaji Subhas Road,  
Calcutta-1.

Appendix I

AGRICULTURAL RESEARCH INSTITUTES

1. Indian Agricultural Research Institute, New Delhi 110012.
2. Central Rice Research Institute, Cuttack 753 006.
3. Central Potato Research Institute, Simla 171 001.
4. Central Tuber Crops Research Institute, Sreekariyam, Trivandrum 695 017.
5. Sugarcane Breeding Institute, Lawley Road, Coimbatore 641 007.
6. Indian Institute of Sugarcane Research, P.O. Dilkusha, Lucknow 226 002.
7. Central Plantation Crops Research Institute, Post Kudlu, Kasaragod 670 124.
8. Indian Institute of Horticultural Research, 255 Upper Palace Orchards, Bangalore 560 006.
9. Central Institute for Cotton Research, 151/A Ravi Shankar Shukla Marg, Civil Lines, Nagpur 440 001.
10. Cotton Technological Research Laboratory, Adenwala Road, Matunga, Bombay 400 019.
11. Jute Agricultural Research Institute, 24-Farganas, P.O. Barrackpore 743 101.
12. Jute Technological Research Laboratories, 12 Regent Park, Calcutta 700 040.

13. Central Tobacco Research Institute, Rajahmundry 533 101.
14. Indian Lac Research Institute, P.O. Namkum, Ranchi 834 010.
15. Central Soil and Water Conservation Research and Training Institute, 218 Kaulagarh Road, Dehra Dun 248 195.
16. Central Soil Salinity Research Institute, Karnal 132 001.
17. National Bureau of Soil Survey and Land Use Planning, Nagpur 440 006.
18. Indian Grassland and Fodder Research Institute, Gwalior-Jhansi Road, Jhansi 284 001.
19. National Bureau of Plant Genetic Resources, IARI Campus, New Delhi 110012.
20. Central Institute of Agricultural Engineering, Additional A-Block, II Floor, Guru Tegh Bahadur Complex, T.T. Nagpur, Bhopal 462 003.
21. Indian Veterinary Research Institute, Izatnagar 243 122.
22. Vivekananda Parvatiya Krishi Amusandhan Shala, Almora 263 601.
23. National Dairy Research Institute, Karnal 132 001.
24. Central Sheep and Wool Research Institute, F.O. Avikanagar 304 501.
25. Central Marine Fisheries Research Institute, P.B. No. 1912, Vincent Road, Cochin 682 018.

26. Central Inland Fisheries Research Institute, Barrackpore 743 101.
27. Central Institute of Fisheries Technology, P.O. Matsyapuri, Cochin 682 029.
28. Indian Agricultural Statistics Research Institute, Library Avenue, New Delhi 110012.
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## AGRICULTURAL UNIVERSITIES

### Andhra Pradesh

- 1 Andhra Pradesh Agricultural University,  
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### Assam

- 2 Assam Agricultural University, Jorhar 785 013

### Bihar

- 3 Rajendra Agricultural University, Veterinary  
College Campus, Patna - 800 014

### Gujarat

- 4 Gujarat Agricultural University, Sardar  
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### Haryana

- 5 Haryana Agricultural University, Hissar 125 004

### Himachal Pradesh

- 6 Himachal Pradesh Agricultural University,  
Palampur - 176 061

### Karnataka

- 7 University of Agricultural Sciences, Hebbal,  
Bangalore-560 024

### Kerala

- 8 Kerala Agricultural University, Mannuthy 680 651

### Madhya Pradesh

- 9 Jawaharlal Nehru Krishi Vishwa Vidyalaya,  
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### Maharashtra

- 10 Konkan Krishi Vidyapeeth, Dapoli 415 712,  
District Ratnagiri



- 11 Mahatma Phule Krishi Vidyaapeeth, Rahuri  
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Orissa

- 14 Orissa University of Agriculture and  
Technology, Bhubaneshwar 751 003

Punjab

- 15 Punjab Agricultural University, Ludhiana  
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Rajasthan

- 16 University of Udaipur, Udaipur 313 001

Tamil Nadu

- 17 Tamil Nadu Agricultural University,  
Coimbatore 641003

Uttar Pradesh

- 18 Chandra Shekhar Azad University of Agriculture  
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Agriculture and Technology, Pant Nagar  
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West Bengal

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Haringhatta, P.O. Mohanpur, Nadia 741 240

A Case Study - Modernisation of Handloom Weaving Industry in Kashmir

The Purpose of the Study

The purpose of this study was to ascertain whether and to what extent the integrated project for the modernisation of the traditional woollen handloom weaving industry in the Kashmir Valley is adversely affecting the employment and income of the traditional artisans, especially women.

The project is sponsored by the Government of India in the States of Jammu & Kashmir, with assistance from the United Nations Development Programme (UNDP).

The study has been carried out by the Institute of Social Studies, New Delhi and was initiated by the Asian and Pacific Centre for Women and Development, in August 1977.

The Traditional Industry

The woollen handloom industry in the Kashmir Valley is an ancient craft. The skill in weaving is handed down from one generation to the next. The looms and equipment used are simple and are made locally. The raw wool is also produced in the valley.

The handwoven woollen fabrics have a local market because of the severe winter.

Also because of the climatic conditions, only one crop can be grown annually, in the warm season. Thus for the winter period many rural households would be without employment were it not for the weaving industry. The industry becomes their most important supplementary source of income.

In short, the industry uses local materials, satisfies local demand and provides essential work for rural household labour during the off-season.

The main constituents of the industry are the hand spinning of the woollen yarn, the hand preparation of warp and weft and the hand weaving of fabrics.

Yarn making is the first step in the process of woollen fabric production. In the Kashmir Valley an estimated 16,000 rural women are engaged as hand-spinners. They earn an average of Re. 1 a day for about four to five months a year. They work about four to five hours a day. Ordinary wooden spinning wheels are used and spinning wages account for 15 to 17 per cent of the value of the spun yarn.

It is estimated that a further 10,955 persons are engaged in the pre-weaving and weaving operations. Of these, one quarter are weavers and three quarters are allied workers who carry out pre-weaving operations, such as preparation of the warp and weft. Allied workers are generally members of the weavers household and are most often women. The weaving work is contracted by the weavers on a piece-rate basis, which invariably includes charges for pre-weaving operations. It has been estimated that allied workers contribute about 15 per cent of the weavers earnings. The weavers wages ranges from Rs. 6 to Rs. 10.40 per day, depending on the quality and quantity of work available to them. They work for the little over seven hours a day for about five to six months of the year.

### The Marketing and Servicing Structures

There are three independent public-spirited marketing organisations serving the industry in the State, namely, the Khadi and Village Industries Commission, Gandhi Ashram and Kashmir Distakar Anjuman. They have a large field organisation reaching out to the villages which distributes the raw wool to the spinners to whom they pay wages. They collect the spun yarn, have it dyed, distribute the dyed yarn to the weavers, specify the products and designs to be woven, fix weaving charges, collect the woven fabrics and arrange for their final finishing at their respective centralised post-loom processing facilities. They have a marketing net-work for retail and wholesale disposal of the finished products in different parts of India. There are also private trading firms marketing these products. Annual estimated sales in 1975-76 were over Rs. 30,000,000 or approximately US \$ 3.75 m.

### The Introduction of Intermediate Technology

Domestic demand for traditional products of the industry has been growing and in recent years supply has been short of demand. Consequently, the Khadi & Village Industries Commission (KVIC) started to introduce intermediate technology, replacing the traditional throw shuttle loom with a fly shuttle loom. KVIC also provided training to weavers who opted for this change.

By December 1977, nearly half of the total number of looms had been converted to fly shuttle looms. These looms can produce nearly twice the yardage of the throw shuttle loom. Eight hours of weaving a fly shuttle loom can produce seven to eight metres as compared with the three to four metres produced by the more traditional loom.

It is important to note that the fly shuttle loom raises productivity and income per weaver without affecting the pattern of employment in the rest of the industry. The work of the spinners and allied workers is correspondingly increased with the increased productivity of the weavers.

### The Integrated Development Project for Woollen Handloom Weaving Industry

#### Background

In 1975 the Government decided to modernise the Kashmir woollen handloom industry. One of the important objectives of this modernisation was to equip the industry to produce hand woven woollen fabrics for the export market. It was believed that the present products were not suitable for export and that the industry was not adequately equipped to produce exportable quality and width of fabrics.

#### Detailed Description of the Modernisation Project

The development of the handloom industry is the responsibility of the Directorate of Industries. In previous plans, a few schemes for providing training to weavers and some facilities such as improved equipment had been implemented but due to the constraint of resources, as well as the absence of an integrated programme, the efforts were deemed to be marginal and inadequate. As a result, weavers continued to remain in depressed conditions, with low earnings, etc.

In the absence of any large and medium industry in the State, the handloom industry was one of the important planks in the overall strategy for industrial development of the region. It has immense potentiality for development and growth since the state is a large wool producer and the availability of this raw material is increasing rapidly.

Apart from meeting the basic need of the local population, woollen products can meet external demands including foreign markets which remain untapped. To satisfy these demands, what is needed is to increase productivity maximise added value, enlarge production capacity and improve marketability.

Keeping the above factors in view, the Government launched a two pronged programme. One constituent is the Wool Utilisation and Development Project, partly funded by the UNDP and the other known as the Intensive Development Programme which is to be financed entirely by the Government. The two components are integrated and complementary.

#### A. Wool Utilisation and Development Project

##### Objectives: Long Range

The long range objective of this project is to assist the Government in its efforts to raise the incomes of the weaving community. It is expected that the wool producers will benefit economically from improved utilisation and marketing and that the foreign exchange earnings of the country will benefit from the increased sale abroad of improved woollen products.

##### Immediate Objectives

The immediate objectives of the project are:

1. To advise the Government on the construction of a development and training centre and particularly on the layout of the equipment.
2. To assist the Government in establishing and running a centre which has the following functions:
  - (i) Developing appropriate intermediate techniques for the handloom cottage industry with respect to the processing of raw wool, designing weaving, knitting and finishing.
  - (ii) Training 20 master-craftsmen a year and 10 extension officers and implementing an extension programme in the State.
  - (iii) Providing guidance to producers on the marketing of wool and wool products.

##### Financial Outlay

The Project will be financed both UNDP and Government. The UNDP contribution will be US \$ 807,450 and that of the Government Rs. 3,890,600. Finance is to be provided under Sector-35-Industry; Sub-Sector: 3523- Handicrafts and Small Scale Industries.

## Installed Capacity

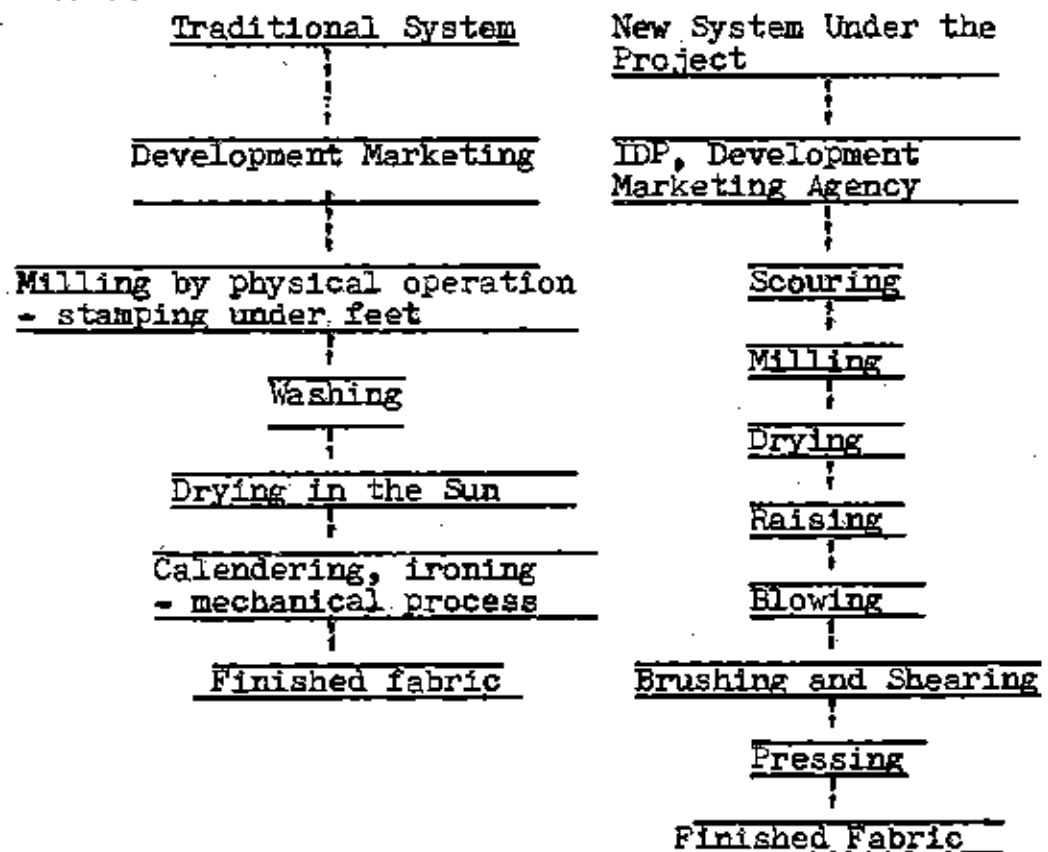
Installed Capacity of the Project when completed will be as under:

Scouring	-	120,000 kgs. annual
Dyeing	-	100,000 kgs. annual
Finishing	-	200,000 kgs. annual

## Process Facilities To be Provided

The Project primarily seeks to diffuse improved technology by providing capacity for pre-loom and post-loom processing. It will create a mechanical capacity for scouring, dyeing, finishing, calendering, etc. to improve the standard and market price of the end products. The changes/improvement it will bring out in processing sector over the current system are illustrated in the following flow charts (Table 1):

Table 1: Processes Flow Chart For Woven Fabric



The process of scouring will be both for raw wool and woven fabrics. Similarly, dyeing will be both for woollen yarn and woven fabrics.

Rates for various processes will be evolved in consultation with Intensive Development Project and the three marketing agencies after the trial run of the Project which is to be carried out in the early part of 1978.

## B. Intensive Development Project

### Objective

The Project will provide a total package of inputs including raw material, finance, improved equipment, pre-weaving and post-weaving processing facilities, design assistance, training and marketing for a given number of looms.

### Financial Outlay

The Project envisages an outlay of Rs. 31,988,000 for 5 years.

For the year 1977-78, against the estimated requirement of Rs. 3,836,000 a sum of Rs. 2,522,000 was allocated. In the Revised Estimates, a provision of Rs. 5,080,000 has been requested to meet the Project requirement. For the year 1978-79, the budget estimate is Rs. 6,700,000.

### Productivity of Loom

The new loom is said to have advantage over the traditional fly shuttle in terms of volume of production, productivity and finish. It can undertake weaving of fabrics of any length upto 100 metres. The productivity of the weaver averages 10 metres per day of various widths. This compares with 7 to 8 metres on traditional fly shuttle turning out fabric of a fixed width with a maximum length of 15 metres.

A further advantage is that the weaving process can continue uninterrupted since the woven portion is automatically wound on, whereas, on the traditional loom the weaving process has to be suspended after every six inch weave for winding.

### Supply of Prepared Warp and Weft

The Project has taken upon itself the supply of prepared warp and weft to its weavers. Currently only prepared warp is supplied and yarn is issued for weft. Winding of weft bobbins is attended to by the family members of the weaver and this process calls for less hands as well as a shorter span of engagement. The Project is installing machinery for preparing weft. When this is completed, the weaver will receive the prepared weft also. In this case no pre-weaving activities will be carried out at the weaver's household and thereby all allied workers will become redundant.

### Inputs To Be Provided

#### Supply of Looms

The project envisages the supply of 1,000 new looms with take up and let off motions in a phased manner to the weavers, on subsidised rates; of the total cost of Rs. 1600 each, 75% will be borne by the Government and 25% by the weavers. Installation of the looms at the Weaving Centres was started towards the end of June 1977 and the number of looms installed and commissioned so far is as follows:

Name of Centre	No. of Looms installed	No. of Looms commissioned	Percentage of Looms to the total looms installed
1. Inder/Gadoora	224	125	55.8
2. Chadura	18	13	72.0
3. Pampore	<u>2</u>	<u>2</u>	<u>100.0</u>
	<u>244</u>	<u>140</u>	<u>57.4</u>

#### Size of Loom

The new loom is very solid and its standard size-6' (length) x 8' (width) x 6½' (height), whereas the size of traditional loom varied: 8' x 6' x 6' and 4½' x 4½'.



### The Main Features

The modernisation project can be broadly divided into three components:

- (1) the replacement of hand spun yarn with mill made yarn; replacement of existing looms including fly shuttle looms with more modern looms fitted with 'take up and let off' motion; and, the replacement of the manual preparation of warp and weft by a central mechanised unit to prepare and supply ready-made warps and wefts.
- (2) Installation of modern plant and equipment for all pre-loom and post-loom processing, including scouring, dyeing and finishing.
- (3) Training and marketing support.

Out of a target of 1,000 looms, the Project has so far installed 244, and of these only 140 have as yet been commissioned to produce. These looms with their 'take up and let off motion' can produce upto double the width of existing looms. Their output is 10 metres per 8 hours compared to the 7 or 8 metres of the fly shuttle loom. The cost of each loom installed by the project is Rs. 1,600, that is more than three times the cost of the intermediate fly shuttle loom, and more than six times the traditional throw shuttle loom.

The project has also established central mechanised facilities for the preparation of warps and equipment for mechanical preparation of weft is being installed. However, the warp making capacity established so far is not adequate to supply ready made warps to the 140 looms so far commissioned. As a result these looms are working below capacity.

The weaving wages presently being offered by the Project for work on the new looms is Rs. 1.75 per metre. But this is expected to be reduced to Rs. 1.50 per metre when the Project begins to supply ready-made weft. This wage rate is for double the width fabric. For single width fabric produced on the traditional looms the marketing agencies pay Re. 1 to Rs. 1.50 per metre.

The Project is using only mill-made yarn brought in from Amritsar in the neighbouring state of Punjab. All the project looms have discontinued the use of handspun yarn made locally.

The initial project design was to advise the weavers on the market possibilities and was itself to market 50 per cent of the total production. The remaining 50 per cent was to be left for the traditional marketing outlets, and also to allow the weavers to produce according to their own judgement. In actual practice, the Project has bound every weaver to whom it has provided new looms to work exclusively for the project. It has taken the total quantity of fabrics produced so far. Furthermore, the Project has not allowed these weavers to work for any other traditional marketing channels even though the Project itself has not been able to provide them with an adequate quantity of warps.

The project has not set up any marketing organisation of its own. The finished products that it has acquired are accumulating in its warehouse.

#### Some Negative Consequences

The project so far has made only partial progress in installing all the facilities that were intended. However, even at this stage it is possible to feel as well as foresee some of the unfortunate consequences that are arising from it. The effect on rural women's traditional employment is of particular concern.

As part of this study, case studies of six weaving households were carried out. These studies show that in all cases there has been a sharp reduction - ranging from 40 to 80 per cent - in the employment of allied workers, mainly women belonging to the weaver households, and that all the weavers have suffered a fall in their monthly income since they joined the Project. In three cases, the decline in income ranged from 60 to 80 per cent.

The following conclusions can be drawn from these studies:

1. As only mill-made yarn is to be used, the expansion of the Project will make the 16,000 women handspinnners its first victims. They are bound to lose their traditional occupation and income. How many of these women will in fact be displaced will depend upon the extent to which the Project pursues its present policy of using only mill-spun yarn replacing existing looms which use handspun yarn and insisting that Project looms work exclusively for the project. If the project installs all the 1000 looms as presently planned an overwhelming majority of the women handspinnners will have their employment taken from them.

2. Another large group of women workers, estimated between 2000 and 3000 whose employment is sure to be destroyed are those who prepare the warp and the weft. Together with these men who undertake this part of the process, the women will be fully unemployed as soon as the Project has completed the installation of its mechanised equipment for the preparation of the warp and the weft.
3. The Project's ability to increase the financial gain of the weavers is itself in doubt. As the case studies have shown, the weavers are receiving a lower cash income than they did before they joined the Project. This is despite the fact that they now have high productivity modern looms that have been installed at substantial capital cost and public subsidy.

The weavers who have given up their traditional looms are filled with great anxiety about their futures. Some of them even expressed a desire to revert to the old system but are not sure how they can get out of their contractual agreement with the Project.

4. The traditional marketing channels also face disruption at the hands of the Project. The exclusivity arrangement which prevents a weaver from producing for anyone else, has deprived these channels of any supplies from the Project looms. This is in spite of the fact that the looms and the weavers are not being fully utilised, and that the clause itself is contrary to the policy outlined in the project proposal at the time of its approval.
5. This reduction in supply to the traditional marketing channels will adversely affect local consumption patterns, especially considering that supplies are already short of demand.
6. Thus the basic character of the traditional weaving industry in the Kashmir Valley will suffer. From an industry based on local raw materials, satisfying local demand and providing essential employment to thousands of rural households, and women in particular, it will become an industry based on imported materials, producing goods for an export market, utilising only a percentage of the previously active labour force.

## Guidelines for the Future

The foregoing review of the modernisation project, provides us some valuable lessons for future planning. The foremost is that good intentions, which explain the substantial financial support given, are no substitute for the careful and painstaking investigations which must precede such funding particularly by agencies which are committed to the lessening of unemployment and raising the status of women.

From the available Project records it is clear that no preliminary investigation was carried out to ascertain the nature of the existing patterns of employment, both direct and indirect. Nor was any analysis of the likely economic and social consequences of the Project attempted. Had such an exercise been carried out, the potential destruction of the employment opportunities of the 16,000 women engaged in hand spinning would have become obvious to the project planners. Similarly, they could have clearly foreseen the further displacement of women workers by the mechanisation of the warp and weft preparation process.

In fact an extensive preproject study would have made it obvious that there was no necessity to disrupt the traditional sector at all in order to start export production. The modern looms for producing export goods could have been introduced independently of and alongside the existing industry. This would have created new employment possibilities without displacing existing ones.

Another important lesson is that adequate feedback to the funding agencies during implementation is essential. Had machinery for this purpose been established, some of the unfortunate consequences of the Project may have been discovered and remedial action taken.

Lastly, this review shows that the project appraisal criteria, personnel and procedures of U.N. agencies are not as yet sufficient to implement the resolutions relating to the need for a new economic order nor those relating to the need to integrate women into the processes of development.

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