INTRODUCTION

Technological change takes place in various spheres as a part of the 'modernisation' process. Like any other change, it is twin edged. While cost consideration is the prime movers of such a change, the workers who depended on an earlier technology is likely to fall victims to the change. A technology may be defined in the social sciences as a particular combination of labour and capital to produce a specified good. Labour includes the manual labour, management and supervisor services. Capital includes materials, capital equipment and the land or spatial requirements for the production process. A change in technique is thus a change in the combination of labour and capital inputs, which might take a variety of forms, ranging from minor adjustments in the use of labour to major changes in the type of capital equipment employed.

Technological change is not a homogeneous process, but one which involves the application of widely varying types of scientific and technical knowledge to production problems. It is only to be expected, then, that the effects of changing technology on employment will be equally diverse, with some kinds of change producing little or no consequences for labour. It follows that we cannot proceed from an observation that technological change is taking place at a relatively high rate to the conclusion that proportionately large changes will be occurring in the employment sector. Secondly, the emergence and adoption of a new production technique, which in its application may have substantial labour force effects, need not be associated with widespread displacement of
labour. Thirdly changes in technology produce a bargaining situation in which wages, conditions of employment, structure of the labour etc. come up for consideration.

Attempt in this thesis is to look into the actual process of mechanisation in an agro-based industry and maps out its consequences in its multiple dimensions. The case in point is the coir industry of Kerala State in India. Coir extraction and processing continues to be one of the important agro based industries of Kerala. It employed several lakh workers. The coir extraction activity substantially depended on a natural process. Technology in other spheres was relatively simple with a huge human component.

A shift from an existing technology to a higher technological frontier is a complicated move because the level of technology in use is shaped by a host of factors other than economic factor. A higher technology may be ideal from the point of view of productivity but may not be advisable to the social economy where they are applied.¹

Currently, the modernisation of the coir industry is taking place in the state with suitable modifications so as to save it from its peril as well as in such a way that the negative impact on the working class is relatively soft. Attempt in this thesis would be to capture these changes in detail.

The coconut tree is the most precious gift bestowed to mankind by the providence with love. Its root, stem and leaves, its fruits, fibre and dust are all used by mankind. "Cocos Nucifera", the husk of the coconut which surrounds the bare shell protecting the kernel provides the raw material for the coir industry. Coir or ‘Cocos’ is the natural fibre

protecting the coconut fruit. The fibre extracted from the coconut husk is known as coir. It is natural, biodegradable and environment friendly. It is tough and durable, versatile and resilient, resistant to flame and fungi, provides insulation and helps sound modulation.\(^2\)

Coir has indeed come a long way from its origins. Today coir products have gained popular acceptance not only because they suit the purse of the common man, but also because they are durable, functional and carry very low maintenance charges. They are also said to be dust-proof, mothproof, soundproof, and fungus-proof.

Coir occupies a unique place among the several natural industrial 'hard fibres', which are traded in the international market today. Coir fibre is a versatile hard fibre used commercially for the manufacture of wide range of coir yarn and products like mat, matting, geo-textiles, etc. It is put to multifarious uses in this modern world. It is used for industrial, engineering and agricultural purposes. In the USA, coir yarn is mainly used for hop cultivation.\(^3\) It also acts as a substitute for certain cordage for which it is claimed to be superior to hemp and sisal.

Coir Industry is one of the traditional cottage industries concentrated in the coconut producing states of India. India exports coir yarn and attractive floor coverings such as mats, matting, rugs and carpets. Geo-textiles made to prevent soil erosion find ever-increasing applications. 'Coir-pith', hitherto a waste is now a marketable product and is used for manufacturing organic manure. ‘Polycoir’ a blend of coir fibre and resin is an effective substitute for wood. Rubberised Coir Mattresses are sought after for their

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2 Technological Research on Coir, COIR quarterly journal of the Coir Board, August 1956, p.17
3 Sabarinath and Murugesan, Facts for You, Jan 1991, p.42
comfort, luxury and health aspect. Murals, Coir Tiles, PVC-tufted mats and a host of other new products are coming out to market today.

Statement of the Problem

The technological advancement that took place after the Second World War in different parts of the world has been absorbed by many industries. The traditional and agro-based industries in India such as cotton textile, jute, coffee, tea etc. have also responded to the technological change. However, coir industry in India remained insulated. Fearing displacement, the labour unions have stalled the modernisation of coir industry for long in Kerala. The impact of such resistance to modernisation had been severe. Coir products turned to be relatively inferior and costly in the world market. The country's share in the international market dwindled from seventy five percent in the fifties, to less than twenty percent by the end of eighties.

Modernisation thought in Kerala

The imported fibre from Pollachi, a major coir-producing centre in Tamil Nadu at one point of time helped to supplement the shortage of husks in Kerala and retain employment in the spinning segment. Pollachi started emerging slowly, as a centre of yarn production as well. Further the threat from the other neighbouring states have also forced the employees and Trade Unions in Kerala to realise the importance of urgent modernisation of the coir industry. Given this new scenario, where the conditions for modernisation were conducive, the Government of Kerala constituted a special Task Force consisting of economists, industrialists, trade union leaders and officials in April 1990. The dawn of 1990s presented a changed scenario favourable for technological reorganisation. The lack of steady employment in the industry, the higher level of
education attained by young women, the changed attitude to work, and the possibility of alternate employment, in the construction and service sectors have all contributed to a reduced preference for work in the coir industry. As a result enough labour was not forthcoming in particular to the defibring process.

The Task Force constituted by the government submitted the report in June 1990. The report emphasised on the importance of modernisation of this industry. On the basis of the recommendations of the special task force, the National Co-operative Development Corporation (NCDC), Central Government and State Government, initiated a Joint Coir Developmental Plan.

The Development plan aimed at increasing productivity, wages and value-addition, assuring steady employment, and reducing backwater pollution due to retting. It envisaged technological reorganisation of retting and defibring, the two important stages in the coir yarn production.

Instead of backwater retting of husk, mechanical extraction of fibre from green husk and treatment with bio-inoculants for improving the quality of fibre was proposed. This process was expected to significantly reduce retting time. At the same time it was also expected that the process would avoid pollution of backwaters. The introduction of mechanised defibring mills would help to a large extent eliminate the hard labour done in the manual defibring process.

Mechanised defibring mills are expected to eliminate manual defibring in a phased manner. The defibring mill is driven by electricity. Mechanisation of this process was
expected to increase productivity. The Task Force also recommended motorised ratts in the place of traditional spinning process by hand or hand-driven ratts.

All these would increase productivity and turn out more value-added products. The yarn produced with the motorised ratts is of finer variety that could be used for weaving. Though the demand for yarn as an end product has been largely stagnant, the derived demand for yarn as an intermediate product for mats and matting has increased. This implies that the ongoing modernisation would enable the industry to cater to the needs of mats and mattings production. Modernisation scheme also envisaged the conversion of defibring waste namely pith, into a commercial product.

The ongoing technological modernisation plan when fully unfolded would change the technical organisation of the production process of defibring and spinning, and add a new process to produce pith plus using pith. Under the modernisation plan, 100 fibre extracting mills that can produce quality fibre from the green husk with the help of combining machines, 25,000 motorised spinning ratts and 3,000 fibre cleaning machines are being installed. An amount of Rs. 50 crores was invested by the Government of Kerala in the early 1990s for modernisation. Importantly this investment by the Government is more than its total investment on this account during the previous 45 years.

The Integrated Coir Development Project (ICDP) is jointly organised by National Co-operative Development Corporation, Union Government, and State Government, by contributing 50, 20, and 25 per cent of the outlay. The balance 5 per cent of the outlay is met by the co-operatives. Besides this, government of Kerala has also introduced two other schemes. The first offers financial assistance to the spinning co-operatives for
creating the infrastructure like purchase of land, construction of storage tanks etc. to undertake rapid retting and conversion of pith plus. The second scheme on the anvil, aims to provide assistance to the co-operatives for the purchase of diesel-fuelled electric power generators to operate the machines during power shortage.

Till 1999, assistance has been offered to set up 125 mechanised spinning units and 58 defibring mills in the State. Of these, production has commenced in 63 spinning units and 12 defibring mills.4

Scope and need for this study

Modernisation of the coir industry in Kerala was pending for a long time. The Trade Unions in Kerala prevented modernisation, involving mechanisation in the industry, fearing the displacement of labour, prior to 1990. In the changed industrial scenario as stated earlier, responding to the need of the time, a change in the outlook towards modernisation of the industry emerged ultimately among the Trade Unions in Kerala. Consequently, the modernisation process in the coir industry in Kerala commenced all on a sudden in the year 1990-91 with the wholehearted support of the government and the Trade Unions. In 1992, Government of Kerala launched an Integrated Coir Development Project for modernisation and mechanisation of the industry.

The on going technological change in the industry is likely to have its impact on the socio-economic scenario of the state. Further the success or failure of technological changes in this industry has considerable significance from a growth perspective of the industry and the economy. The fact that technological change in progress today came after
a gape of nearly a century and half holds a mirror to the issues of long run technologies in the Kerala industry. The findings of this study may offer lessons to the planners while introducing modernisation in similar industries.

The research work done so far in the field of coir industry is very limited. There are only few publications and doctoral studies relating to coir industry. The following are the important studies available relating to the industry.

Prof. Baskaran Unnithan conducted the first study on the problems of marketing and foreign trade of Kerala in 1968. He concluded that the future of the coir industry in India hinges on the constructive measures to increase productivity, improve quality, and reduce cost and above all to improve the marketing mechanism.

Dr. M. V. Pylee*, conducted a study on 'the problems and prospects of the Coir Industry in Kerala'. In this study he examined the basic facts relevant to the study such as the production of coconut, process of fibre extraction, production of coir, internal consumption of coir, and the world trade in coir. He suggested modernisation of the production process in the industry in Kerala. He also suggested more value addition in the country by importing technology from the European Countries.

The special task force consisting of economists, industrialists, trade union leaders and officials with Dr. Thomas Issac as the chairman, examined the question of

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modernisation and submitted its report in June 1990. The report emphasised the importance of modernisation of this industry.⁸

Dr. Thomas Isaac, *et al* observed that modernisation of traditional industries like coir is very important to accelerate the economic growth in Kerala. They felt that technological change is necessary to sustain and develop this industry. They found it obvious that some form of technological improvement in the Indian coir industry cannot be avoided if India wants to maintain its position in the world market for coir products. Only increased labour productivity and innovative marketing, including the development of new products might reverse the stagnation in India's coir export markets. They also suggested technological alternatives for modernisation of the industry.

All the available studies on coir industry in India ends at this stage. Modernisation of the industrial process in coir industry is a recent happening. Therefore no study has so far been made on the impact of modernisation of coir industry in Kerala. The on going technological change in the industry has implications for vast sections of the disempowered people engaged in the industry, in the state.

The present study focuses on the context, nature and scale of the on going technological modernisation. It will also examine the comparative cost advantage of modern technology. The likely social implications, in terms of employment and the socio-economic standing of gender group will also be examined. It will also examine the impact of such modernisation in the domestic and international coir trade.

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⁷ Dr. M. V. Pylee, 'A Study of Coir Industry in India Problems and Prospects', 1975.
⁸ Dr. Thomas Issac, Chairman, Special Task Force, Government of Kerala, 1990
Objectives of the study

Keeping in view of the possible multidimensional impact of modernisation of coir industry, involving mechanisation, the following specific objectives have been framed.

a) To examine the effect of modernisation on the cost of production.

b) To identify the impact of modernisation on the employment of coir workers.

c) To examine the gender selectivity in employment during modernisation.

d) To examine the impact of modernisation on the volume of both domestic and export trade.

Hypotheses

In view of the objectives stated, the following hypotheses are formulated.

1) Technology up-gradation results in cost reduction.

2) Modernisation of production results in displacement of workers.

3) Modernisation involving mechanisation of production will result in male domination in employment.

4) Modernisation of production results in avenues for employment to more educated workers.

5) Modernisation of an industry will give a competitive edge to its products in the international market.
Modernisation of an industry resulting in increase in the product range will lead to the expansion of the domestic market.

Methodology

The present study is based on the primary and secondary data in order to understand the multidimensional impact of modernisation of coir industry. Both primary and secondary data pertaining to pre mechanisation and post mechanisation phases were collected during the filed work.

The modernisation process commenced in 1990-91. The latest available authentic data regarding the pre modernisation status in Kerala is available in the Report on Coir Workers Census in Kerala 1988, compiled by the Department of Economics and Statistics, Government of Kerala, and the records of the Coir Board. Hence the secondary data obtained from those sources pertaining to 1987-88 were used to assess the pre modernisation status.

To understand the ongoing modernisation status both primary and secondary data pertaining to 1997-98 was collected/compiled. Information regarding various activities of the coir industry was elicited from those who were directly or indirectly involved. To be more specific, information was collected from the workers, employees, traders, and officials using interview schedules/questionnaires. Observation method was also adopted.

The major sources of secondary data were the following. The Coir Board, Coir Development Directorate, Department of Economics and Statistics, Kerala State Coir Corporation, Coir FED, Central Statistical Wing of the Department of Statistics, Ministry of planing Government of Kerala, Books and Journals, Newspapers and Magazines,
Seminar Papers and the Annual Reports of the Coir Board. Information on movement of husk, fibre, coir and coir products into and from Kerala State through road is taken from the reports of the Coir Board.

Considering the number of workers involved, the activities taken for the study are retting, defibring, spinning, manufacturing of coir products, domestic trade and foreign trade. In all the selected activities, impact of modernisation on cost of production; volume of employment; nature of employment in terms of gender; educational status of the employed; and changes in the volume of export trade of the industry are examined.

Selection of Coir Producing Districts

In all the districts in Kerala some form of coir production activity can be traced. However, around 98 percent of the coir producing activities in the state are confined to the ten districts identified by the Coir Board as coir producing districts viz. Trivandrum, Quilon, Alleppey, Kottayam, Ernakulam, Trichur, Malappuram, Kozhikode, Cannanore and Kasaragode.

The composition of the activities in the coir producing districts varies from district to district. Certain activities are confined only to certain districts. For example coir weaving and manufacturing activities are confined to certain Southern districts in Kerala where as the Northern districts concentrate only on defibring. Similarly the different varieties of coir yarn come from different districts in Kerala. These varieties are determined by the staple length of the fibre produced in different districts and its colour varies depending on the retting yards and rivers in those places. All these factors...
necessitated taking all the ten districts for the study. Hence all the ten said coir-producing
districts are taken for the study.

Selection of Wards

The coir workers census reports have identified 480 coir worker wards confining
to the ten coir producing districts in Kerala. It was decided to have a sample of 48 wards,
which constitute ten percent of the total population.

The 48 wards represent all the ten coir producing districts. Number of wards to be
selected from each district varied depending on the concentration of the coir workers
households available in the districts as per the census reports. A detailed sampling
procedure is given in the Appendix I. Wards were selected using simple random sampling
technique.

Selection of Households

List of households for the sample wards was obtained from the census reports. It
was decided to have 10 households from each selected ward using simple random
sampling technique. As there is no significant variation in the economic status of the coir
workers, stratified proportionate random sampling was not adopted. In general a
multistage sampling technique has been adopted for selecting districts, wards and
households.

Household Survey

A coir household for the purpose of the study is any household where at least one
person is engaged in any activity related to production of coir or coir products. Selected
house holds were interviewed with detailed interview schedules eliciting information
regarding the number of employees in each household, their age, sex, educational level, occupation, employer, membership in co-operative society, type of activity they do, average hours of work per day, average productivity per day, bonus received during the year, details regarding self employment, coir production equipment owned by the household, coir production equipment leased by the household, and their working condition. Suggestions were also obtained from the households.

Establishment Survey

Data regarding the coir establishments is taken from the Establishment Survey Reports of the Kerala Statistical Institute. Coir establishment includes Co-operatives, coir establishments registered under the Factories Act, 1948, coir establishments registered with the Coir Board and the private producers. Information regarding the establishments such as type, year of starting, capital employed, source of finance, type of activity, equipment used, details regarding raw-materials consumed, production and sale during the year and the workforce employed during the year were collected.

Statistical Tools

Unit costing technique was adopted for the cost comparison. Impact of modernisation involving mechanisation was assessed by comparing the data relating to the post modernisation and the current status. As simple statistical tools like percentages and averages could bring out the results clearly, use of any sophisticated statistical tools was not necessitated. Pie-diagrams and line-charts are used for exhibiting the results.
Conceptual Problems

The following are the conceptual problems, which were confronted by the researcher in the course of the study:

The different classes of entrepreneurs and employees in the industry overlap i.e., some small retters may be manufacturers and traders of coir and coir products. Similarly, there are many self-employed people doing work at various stages of production. A survey of the Department of Economics and Statistics of Government of Kerala in 1981 revealed that nearly 40 of the coir units worked for less than 6 months in the previous year. There is no significant change in the state of affairs even today. Seasonal employment and other sources of employment also posed problems to identify the households depending on this industry.

Operational Definition

1. Wards

A Ward is a cluster of villages grouped into a segment by the revenue authorities for the convenience of administration.

2. Household

A group of persons normally living together and taking food from a common kitchen constitutes a household.

3. Coir worker

A person engaged in any type of activity related to coir industry for wages or otherwise as self-employed, regularly or seasonally, for his/her livelihood, including those
who were traditionally employed in the industry and now unemployed due to lack of work are considered as a coir worker.

4. Main worker

One who earns his or her income mainly through employment in the coir industry.

5. Subsidiary worker

A worker whose employment in the coir industry is only a secondary source of income is a subsidiary worker.

6. Self employed

A person who is employed himself or herself in his or her own-house with or without the help of the household members is called a self-employed.

7. Employee

An employee is one who is engaged in coir industry for wages or salary in cash.

Limitations of the study

The following are the important limitations of the study. The data collected through personal canvassing of questionnaires is subject to the error of response to some extent. Such errors of response are largely due to the indifference and lack of memory of the respondents.

The data on the cost of production and wages excepting those from the co-operative societies for the past may not be precise. This is because of the fact that very few workers maintain accounts. It is for this reason that details of costs have been
collected item wise so that it would be easier for the respondents to furnish the same. There is still the possibility of the data being not very precise. However, the margin of error is not likely to be so large as to vitiate the findings.

**Chapterisation**

The study is divided into six chapters including summary findings and suggestions. The first chapter provides the statement of the problem, objectives, hypotheses, scope, methodology and limitations of the study.

The second chapter deals with the history of coir industry in Kerala. It also gives the reasons for the prominence of the coir industry in Kerala. It explains the various processes involved in the industry. It provides all the background materials to place the subsequent findings and arguments in their perspective.

In the third chapter, impact of technological change on cost of production is dealt with, to understand, the comparative cost advantages of modernisation at various stages of production, such as retting, defibring, spinning, and weaving. Cost of production of traditional and modern technology is compared to assess the impact of modernisation on cost of production.

The fourth chapter deals with the impact of modernisation on employment. The impact of technological changes on the employment at different stages of production is examined. Occupational structure of employees involving the gender ratio and educational status of the employees are also examined in this chapter. Changes in the working conditions as a result of modernisation and its impact on environment are also examined.
Chapter five deals with the impact on the volume of domestic and export market. Modernisation was expected to improve the quality of the product along with reduction in the cost of production. New products were also expected. It was hoped that these changes would lead to increase in the volume of trade both in the domestic and export markets. In this chapter, the researcher analyses the changes in the volume of domestic and foreign trade. New products, which have come in to the domestic and foreign market after the commencement of modernisation are observed to assess the diversification as an impact of modernisation of the industry. The impact of modernisation on the volume of export by region and by item is also attempted in this chapter.

The sixth chapter summarises the findings and suggestions. The important conclusions that emerge from the study are listed. Suggestions are discussed in this chapter. Policy suggestions that emanate from the findings of the study are given in this chapter.

The findings may prove the fears expressed by the trade unions as ill founded or well founded. The results of this study may offer lessons to the planners regarding technological change in similar low productive industries like handloom weaving and cashew nut processing that operate in a similar social environment. Further as this study is conducted when the modernisation is in progress, the findings of this study may help the government to take preventive steps to avert the ill effects if any, during the next phase of the modernisation program. It is in this context that the present study is considered relevant.