COMMON FUND FOR COMMODITIES

Technical Paper No. 44

A ROAD MAP FOR JUTE

INTERNATIONAL JUTE STUDY GROUP
IJSG

CFC
COMMON FUND FOR COMMODITIES

International Trade Centre
UNCTAD/WTO

A Road Map for Jute

In association with

International Jute Study Group (IJSG)
Dhaka, Bangladesh

and

International Trade Centre UNCTAD/WTO (ITC)
Geneva, Switzerland

Funded by

Common Fund for Commodities (CFC)
Amsterdam, The Netherlands

A Road Map for Jute

(Organizational Partners)

The International Commodity Body

International Jute Study Group (IJSG)

The International Jute Study Group is an intergovernmental body whose members are Bangladesh, India, Switzerland and the European community representing over 60% of the world trade in jute. Its main objective is to provide an effective framework for international cooperation among members and to facilitate the improvement of structural conditions in the jute sector and to promote the expansion of international trade in jute and jute products. IJSG was set up in 2002 as a successor of the International Jute Organisation (IJO).

International Jute Study Group (IJSG)
145 Monipuripara, Near Farmgate Tejgaon
Dhaka – 1215, Bangladesh
Phone (880 2) 9124884
Fax (880 2) 9125248
Email secy.gen@jute.org
Web www.jute.org

The Project Executing Agency

International Trade Centre UNCTAD/WTO (ITC)

The International Trade Centre UNCTAD/WTO is the technical cooperation agency of the World Trade Centre (WTO) and the United Nations Conference on Trade and Development (UNCTAD) for operational and enterprise-oriented aspects of international trade development.
ITC was set up in 1964.

International Trade Centre UNCTAD/WTO
Palais des Nations
CH-1211 Geneva
Switzerland
Phone 41 22 730 0111
Fax 41 22 730 4439
Email itcreg@intracen.org
Web www.intracen.org

The Financing Agency

Common Fund for Commodities (CFC)

The Common Fund for Commodities is an intergovernmental financial institution. Its objective is to improve the opportunities and prospects of commodity producers by financing commodity development projects and to act as a catalyst in mobilizing trade and investment resources into the commodity sector. CFC was set up in 1989.

Common Fund for Commodities
P.O.Box 74656
NL-1070BR Amsterdam
The Netherlands
Phone 31 20 575 4949
Fax 31 20 676 0231
Email Managing.Director@common-fund.org
Web www.common-fund.org

FOREWORD

Jute continues to be an internationally traded major commodity originating primarily in two developing countries – Bangladesh and India, where jute occupies a unique position in the national economies in terms of its contributions to employment in industry and agriculture, as also in foreign exchange earnings. Bangladesh, India, China, Nepal, Myanmar and Thailand are the major producers accounting for over 95 percent of the total world production of jute, kenaf and allied fibres. Bangladesh is the leading exporter of raw jute and jute goods to many countries of the world, while India is the largest producer of jute fibre and also exports jute goods to a number of countries.

Since the early 70s, the economic importance of jute in international trade has been on the wane for various reasons – national and international. The decline of jute consumption as well as export trade has had a significantly adverse impact not only on the export earnings and balance of payments of these countries, but also on the socio-economic conditions of a large number of populations, especially in the rural areas.

Jute is a versatile fibre with multifarious end-uses. However, the recent technological developments, especially in the petro-chemical industries, led to the progressive replacement of natural raw materials like jute, by synthetic substitutes. The trade mechanism and trade practices in vogue in the marketing of jute goods for both home consumption and exports of the major jute growing countries have historically grown in the context of trading conditions in the jute industry, but these countries kept themselves away from modern innovations and developments. Therefore, lack of significant efforts for product developments or diversification in keeping with the modern technology or following modern marketing procedures and international trade practices, were apparently responsible for the decline in the home consumption and export trade. The governments and trade bodies in the jute growing countries are now making concerted efforts to arrest the situation and to promote the comparative advantages of jute, kenaf and allied fibres, especially the environment friendly attributes in enhancing the diversified uses of these fibres. The International Jute Study Group (IJSG) is making strong efforts in undertaking necessary activities and implementing various projects for developing required technologies and quality of products for the overall growth of jute sector. The Common Fund for Commodities (CFC) has been a major funding agency of IJSG Projects and Programmes implemented for the global development of the jute sector.

Consequent to various efforts, considerable progress has been made in recent years in developing diversified jute products for various end-uses like jute geotextiles, composites, technical textiles, home textiles, nursery pots, pulp and paper, etc. IJSG is taking up more projects to develop products with promising market prospects and consumer needs.

In the backdrop of rising global awareness to use more natural fibre products to keep the environment safe and free from pollution, the International Jute Study Group undertook the project "Seminar/Workshop for Formulating A Road Map for the Jute Industry with Focus on Diversified Products (CFC/IJSG/20FT)" for the development of a Road Map for the Jute Sector funded by the Common Fund for Commodities (CFC).

The International Trade Centre UNCTAD/WTO (ITC) has implemented the project as the Project Executing Agency (PEA). Under the project, seminar/workshops were held in Geneva (Switzerland), Kolkata (India) and Dhaka (Bangladesh), in which leading exporters/importers/experts/scientists and representatives of jute-related associations from European countries, Bangladesh, India and some other countries participated. In the seminar/ workshops, there emerged, *inter alia,* an in-depth assessment of market prospects and requirements for development of jute-based products, capabilities of producing countries in respect of product diversification, product development and constraints in the supply chain on the basis of which the Road Map for the Jute Sector has been finalized. The Road Map provides an "Action Plan" and recommends a number of programmes required for the comprehensive and sustainable development and promotion of the jute sector with a total estimated cost of 17.31 million US dollars.

The Road Map for the Jute Sector has focused on the prospects and future activities of the jute sector. It is intended to impart the findings and recommendations of the Road Map to all concerned so that appropriate steps can be taken for the development of the jute sector, as a whole.

Research and development institutions, policy makers, industrial enterprises and international donors and funding agencies are urged to come forward in materializing the recommendations of the Road Map for the Jute Sector in order to avert further decline in the use of jute products and thus help sustainable development of natural fibres, protect the environment and bring about a tangible change towards ameliorating the economic conditions generally of the millions of jute and kenaf cultivators and industrial workers.

Amb. Ali M. Mchumo
Managing Director
Common Fund for Commodities

A.F.M. Sarwar Kamal
Secretary General
International Jute Study Group

Acknowledgements

The International Jute Study Group, the International Trade Centre UNCTAD/WTO and the Common Fund for Commodities are very grateful for the co-operation of the authorities, organisations, professional associations and the private sector in the countries involved and for the inputs received from many experts and individuals who actively participated in the technical workshops organised in Bangladesh, India and Europe. Special thanks to the valuable contribution received from the Bangladesh Jute Mills Corporation (BJMC) and the Jute Manufacturers' Development Council of India (JMDC) in preparing this report.

The Road Map was prepared by Gordon Mackie, principal technical consultant on jute under the guidance of Vinay Chand, international consultant on marketing of jute and allied fibres.

Antony Sandana, Senior Commodity officer of ITC, co-ordinated and supervised all the work related to the preparation of this Road Map.

Cover photo: courtesy IJSG

TABLE OF CONTENTS

LIST OF ACRONYMS AND ABBREVIATIONS

BJC	Bangladesh Jute Corporation
BJMA	Bangladesh Jute Mills Association
BJMC	Bangladesh Jute Mills Corporation
BJSA	Bangladesh Jute Spinners Association
BTB	Bangladesh
CAGR	Cumulative Annual Growth Rate
CBC	Carpet Backing Cloth
CFC	Common Fund for Commodities
CRIJAF	Central Research Institute for Jute & Allied fibres in India
EC	European Commission
EDF	European Development Fund
Est	Estimated
FAO	Food and Agricultural Organisation of the United Nations
GOB	Government of Bangladesh
GOI	Government of India
HA	Hectares
IFC	The International Finance Corporation (World Bank)
IJSG	International Jute Study Group
ITC	International Trade Centre UNCTAD/WTO
JCI	Jute Corporation of India Ltd.
JMDC	Jute Manufacturers' Development Council
JSAC	Jute Sector Action Plan
JUMS	Jute Manufacturing Survey
KEBICO	Central Sales Committee
MAU	Market Analysis Unit
MDT	Man Days Ton
MIS	Management Information system
MLS	Multiple Listing Service
MSP	Minimum Support Price
Mt	Metric tons
NCB	Nationalised Commercial Banks
NIRJAFT	National Institute of Research on Jute & Allied Fibre Technology
NORAD	Norwegian Government Aid Agency
r.p.m	Revolutions per minute
Rs.	Rupees
PP	Polypropylene
R & D	Research and Development
SEDP	Socio Economic Development Plan
SME	Small and Medium Enterprises
Tk	Taka
UK	United Kingdom
UNCTAD	United Nations Conference on Trade and Development
UNDP	United Nations Development Programme
USA	United States of America
USD	United States Dollars
WTO	World Trade Organization

A ROAD MAP FOR JUTE

EXECUTIVE SUMMARY

'A Road Map for Jute' has been commissioned by the International Trade Centre, ITC (WTO/UNCTAD) on behalf of the International Jute Study Group (IJSG) with funding from the Common Fund for Commodities (CFC).

Jute is a valued natural fibre with unique characteristics and long standing end-use applications. It played an even stronger role in the post second world war recovery and growth with traditional end-uses such as sacking, hessian and carpet backing requiring larger volumes. Increasing production was, in fact, unable to meet the needs of rapidly expanding demand, resulting shortages in and for which manufacturers of synthetic substitutes were able to compete with a far larger potential capacity, budgets for promotion and lower prices.

The demand for jute in export markets for the traditional products declined in the face of this competition with carpet backing the first to suffer in the United States, followed by sacking, loss of markets due to the collapse of the former USSR and most recently a sharp decline in Europe.

There have been positive developments in the form of a growing market for yarn used in woven carpets and end-user preference for food grade sacks for carrying some commodities. Use of mineral oil is incompatible with the eco-friendly characteristics of jute and needs to be phased out as far as possible.

The decline in world markets and falling real values led to a substantial reduction in production in China and Thailand and a gradual reduction in hectarages and volumes in Bangladesh. These factors were, however, more than compensated by the increase in consumption of jute sacking in India, where it enjoys a measure of regulatory support and in production due mainly to higher yield rates, but not in hectarages devoted to jute. Indian production of jute has not kept pace with increasing demand and India is now a major fibre importer from Bangladesh.

Global production and consumption of jute has therefore become and is increasingly concentrated in India. This is not considered as being healthy by the industry or the Government and both would like to see an export led pro-poor vertical diversification. Diversified or non-traditional jute products production has been growing in India in addition to that of yarn. The same trend can now be noted in Bangladesh.

A general consensus was expressed at the workshops that jute could once again compete for export markets provided that action were taken to increase productivity of higher quality fibre together with a decrease in costs of conversion. This was based on the facts that: synthetic substitute prices were rising due to higher oil costs and were likely to continue to do so; that technology allowed production today of higher quality yarn and fabrics; and that the scope for increased competitiveness was substantial.

The key to hopes and strategy is markets. The strategy has to be market driven. Without market development and promotion, there was and is not enough incentive in undertaking investments. The market developments required are major. It will not be enough to develop niche markets. If there is to be a shift from Indian consumption of sacking to alternatives, it will involve developing markets for hundreds of thousands of tons.

The first battle has to be to retain existing markets for jute goods and to defend them by using whatever marketing resources, which, can be, brought to bear. In parallel with this defensive strategy there must be a concerted effort to improve fibre quality, to retain the farmer's interest in growing the crop and to reduce agricultural costs in ways that benefit the farmer. Secondly jute mill productivity can, and has to be improved and processing costs reduced. To do this, investment in machinery design and development is clearly needed. To establish the need for funding for these industrial and agricultural objectives is an essential part of the road map's purpose and has helped shaped its basic assumptions.

There was unanimous consensus among participants at the workshops that it was essential for the Indian market for jute sacking to be defended while exports were being developed. In Bangladesh, although the internal market for jute goods is much less prominent than in India, there is a good case to be made for the introduction of packaging regulations to encourage the use of jute sacks as has existed for many years in India.

The most immediate export development would take the form of reducing the decline in markets for jute sacks, a process that will inevitably be assisted by a perceived narrowing of the gap between jute and synthetic costs of production. Increased use of bulk handling makes this task more difficult but there is sufficient scope for defensive and active measures. There is also scope for looking at possible action to defend use as secondary carpet backing and for hessian.

In the longer term there are known potential markets for substantial quantities of jute in plastic composites, of higher value fabrics in apparel and household furnishings, in niche market applications and others that are yet to be developed.

Jute has to be more competitive to enable this development and that requires a thorough understanding of the commodity chain and action at every stage to result in a leaner and stronger competitive posture.

The Consultants have tried to summarise findings regarding industry needs and have proposed an investment of additional funds amounting to US$ 18 million in order to mobilise private sector resources to help transform the sector into one targeted at sustainable and growing markets.

1 INTRODUCTION

'A Road Map for Jute' has been commissioned by the International Trade Centre, ITC (WTO/UNCTAD) on behalf of the International Jute Study Group (IJSG) with help from the Common Fund for Commodities (CFC).

The Road Map for Jute is based in part on three major Consultancy papers commissioned for presentation at the three workshops held in ITC, Geneva on June 9th, in Kolkata on 4th July, and in Dhaka on 6th July 2005. It also includes a background strategy paper prepared by the International Jute study Group (IJSG), entitled 'A Strategy for the Jute sector' adopted without dissent by the IJSG members on 31st August 2004. Additional contributions were made during the three workshops, and the road map includes knowledge gleaned from those involved in working in the sector and or from other studies. Statistical data from the FAO Rome is quoted extensively to support the history of past events

The proceedings of these three workshops and the main papers presented during them form part of the annexes to the Road map. Representatives of all segments of the Jute industry were present at the three workshops. The list of institutions and companies represented also forms part of the annex.

2 THE JUTE SECTOR

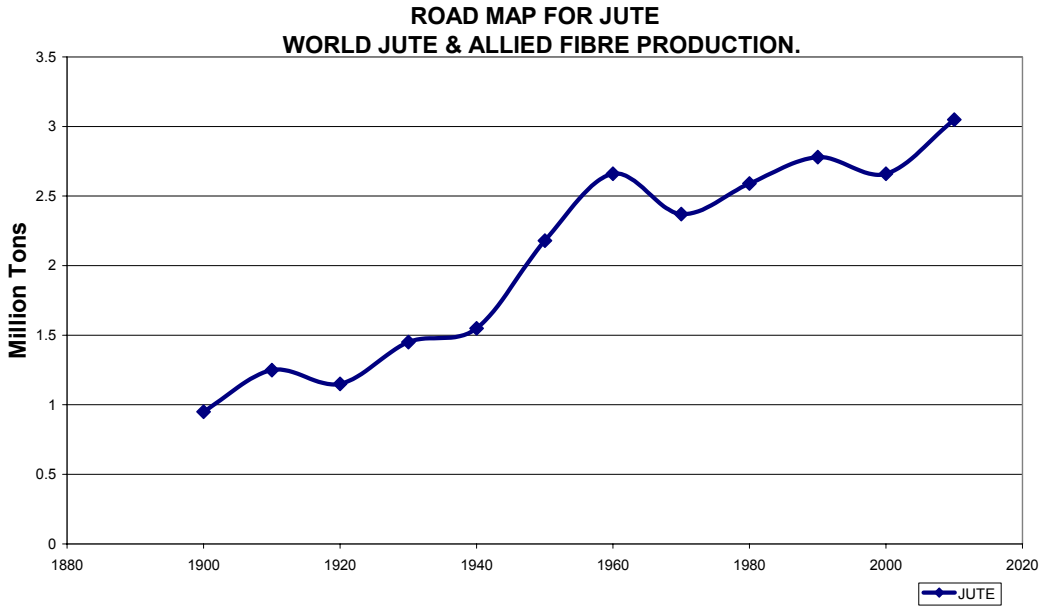
2.1 Overview

2.1.1 Production

The people of India traditionally used jute to make rope, sacks, paper, and coarse hand woven fabrics for matting and bedding. English traders saw the potential of jute as a substitute for hemp and flax as early as 1793, and eventually a consignment found its way to Dundee in Scotland. The flax spinners there learned how to spin jute yarn by batching fibres with whale oil and water and modifying power-driven flax machinery. Before long they were producing jute goods in substantial quantities.

The rise of the jute industry in Dundee and elsewhere in Europe saw a corresponding increase in the export of raw jute from the Indian sub-continent. World production reached one million tons per annum by 1900. By independence in 1947, production grew to over 1.5 million tons and jute was one of the leading producing and export sectors in the sub-continent. The coming of independence to India and the partition of Bengal into part India and part East Pakistan (later to become Bangladesh in 1971) can be seen as a major watershed for the industry.

Hitherto East Bengal had provided raw jute for mills the British had set up in Calcutta. Following partition, in the 1950s and 1960s many new mills were set up in East Pakistan to process the locally grown jute. One consequence was development of jute growing throughout West Bengal and in due course, more widely in Assam and in other Indian states. This was done to satisfy Indian demand locally in India.



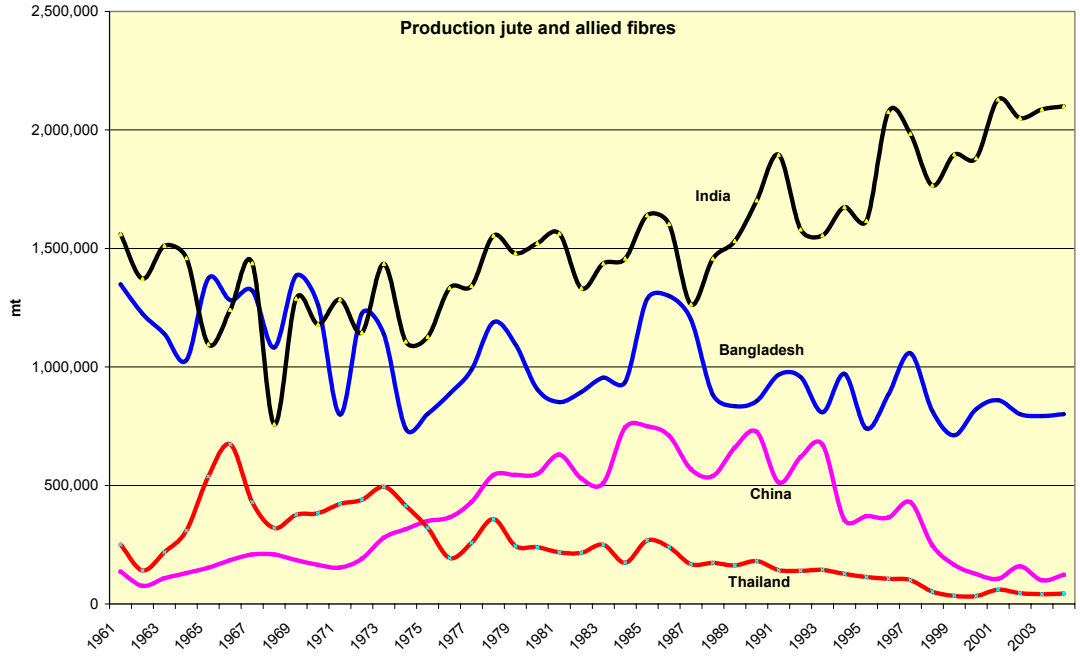
The post-war period 1940-60 saw the fastest rates of growth in jute production. It rose from 1.5 to 2.7 million tons per annum. Also countries without a prior history in jute manufacturing especially China, Thailand, Brazil and others, expanded their jute and kenaf crops and established processing industries primarily to make textile sacks and bags. Overall jute Production steadily increased with minor glitches in 1970 and in 2000, it is now around 3 million tons and there is reason to assume growth could continue.

Global Jute & Allied Fibre Production

	1999/20	*2000/01*	*2001/02*	*2002/03*	*2003/04*
Bangladesh	731.5	814.7	924.7	793.3	963.0
China	164.0	126.0	136.0	155.0	165.0
India	1,404.0	1,620.0	1,890.0	2,060.6	1,977.3
Indonesia	7.5	7.0	10.2	6.8	7.0
Myanmar	26.5	27.8	50.8	41.9	42.0
Nepal	15.7	15.2	16.4	17.0	17.5
Thailand	47.2	29.7	56.0	41.0	57.0
Vietnam	11.3	14.6	14.6	20.5	12.5
World	**2,496.3**	**2,698.3**	**3,144.9**	**3,185.6**	**3,292.0**

Source: FAO in '000 metric tons

What has changed is that India is now by far the leading producer, Bangladesh lost its lead role in the mid 1970s, and the gap between the two has been widening since then. The more recent growers like China and Thailand decreased output in the 1980s and 1990s and are now minor producers. Amongst the other smaller producers are Myanmar, Nepal, and Brazil which all continue some production.



Source: FAO

Both India and Bangladesh have a matrix of regulatory measures and Government policies that impinge directly or indirectly on the production, trading, processing and export of jute fibre and products. The jute sector is considered socially and politically too important to be left entirely to market forces.

The increase in Indian production since 1970 has been mainly due to rising consumption of jute sacks within the domestic economy. The jute sector was and is of very considerable importance to India and Bangladesh. Four million farmers with 20 million dependents earn their living from its cultivation and hundreds of thousands work in the sector.

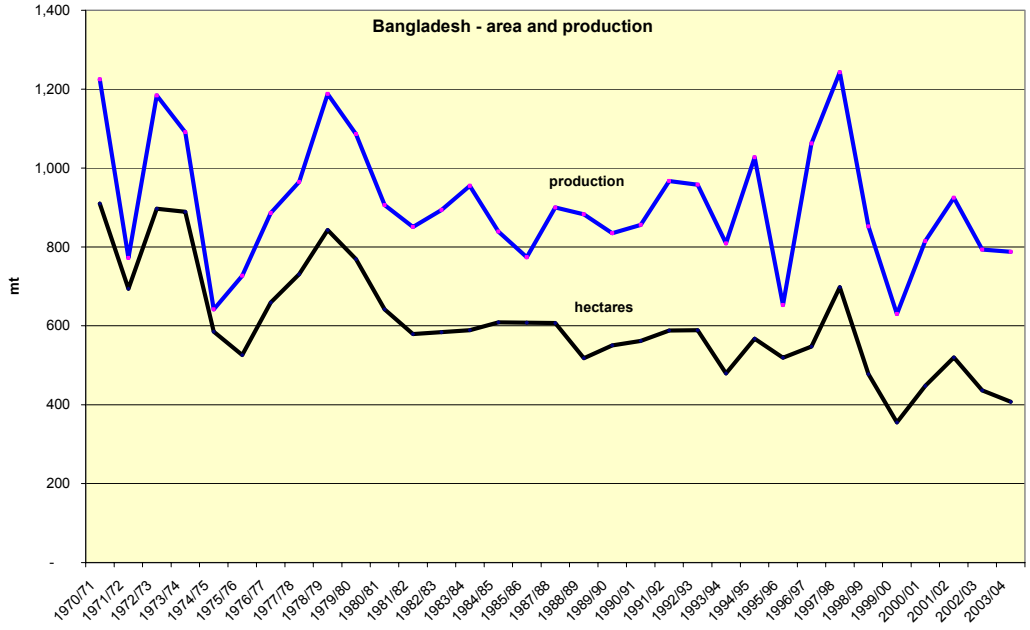
BANGLADESH

In Bangladesh, there is no Minimum Support Price (MSP) for jute. However there is a large publicly owned mill sector, the BJMC, which sets the price, buys and processes jute fibres. There is also a history of accumulated losses and debts that a World Bank loan in the early 1990's had intended to tackle. In Bangladesh there is an official price support for rice, which has lead to stronger domestic prices for rice, and this brought about a national surplus with farmers switching from jute to rice. In consequence there has been a long-term reduction in area devoted to jute, although with a less than proportionate reduction in output volume. This is explained by rising yields of fibre per hectare.

In 1972 following independence the Government of Bangladesh nationalised the country's jute processing industry at a stroke. Without adequate investment in management and maintenance, the nationally owned mills suffered a gradual decline in productivity, quality and efficiency. The Jute Sector Study[1], which surveyed all the BJMC and BJMA mills in depth in 1992/3, noted that the deterioration in mill

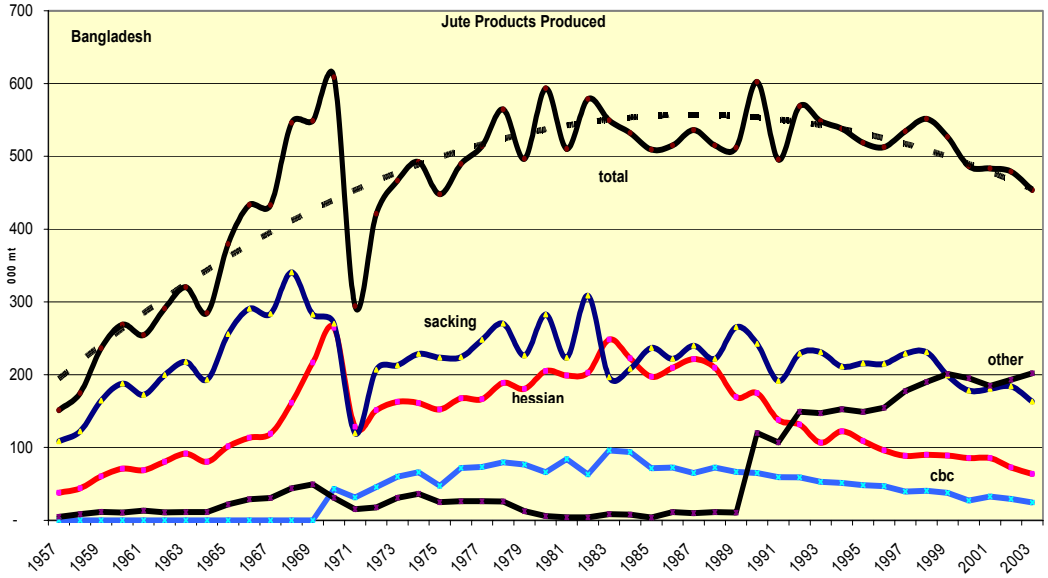
[1] JUMS- written by John Mitchell and Gordon Mackie

performance had reached crisis levels and that nominal productive capacity was far in excess of export market demands.



Source: FAO

There has since been some gradual rationalisation since then with a reduction in nominal capacity, including the closure of the Adamjee Jute Mills. Other measures are either being implemented or are planned.

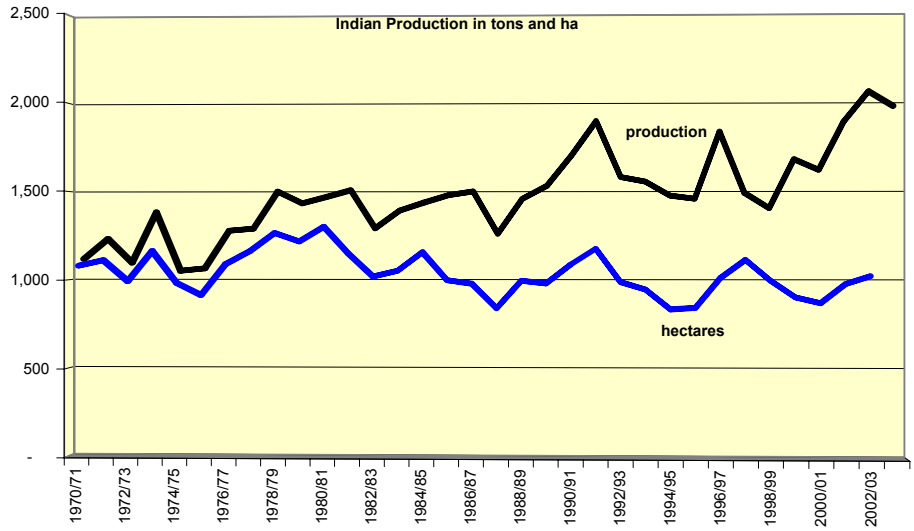


Source: FAO

Although production of jute products in Bangladesh declined from the mid 1980s, there has at the same time been a major product re-orientation. In particular, output of yarn for export increased very substantially with much of the former European spinning machinery moving to the country. At the same time, production of Carpet backing Cloth (CBC) and Hessian cloth declined while sacking remained the leading sub-sector.

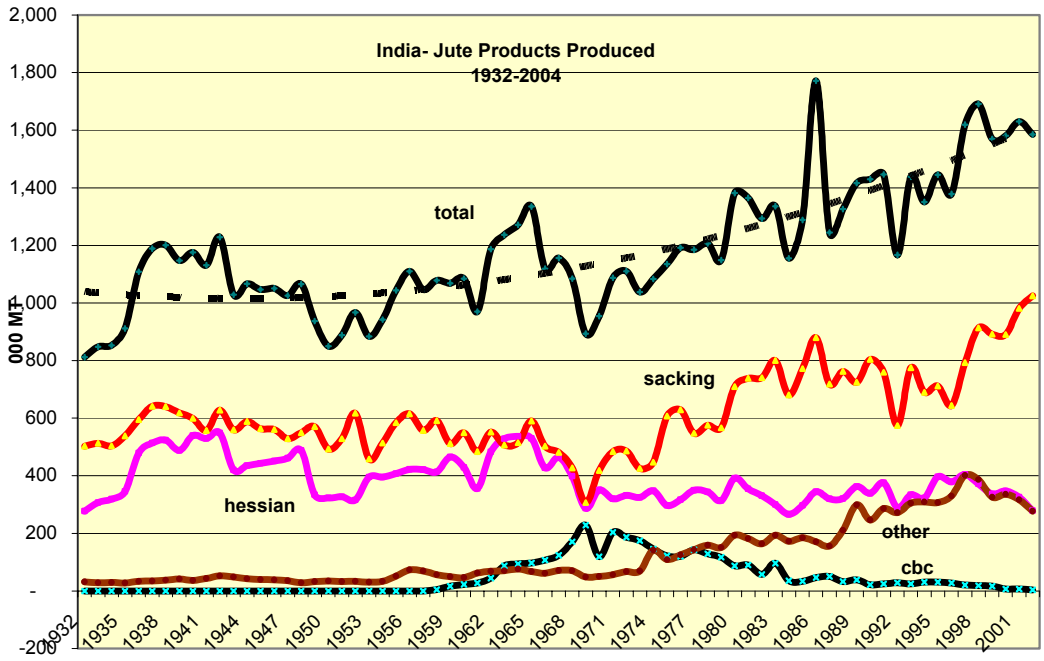
INDIA

There has been a marked increase in yield rates in India with production steadily rising from 1970 levels while the land area devoted to jute has not grown.



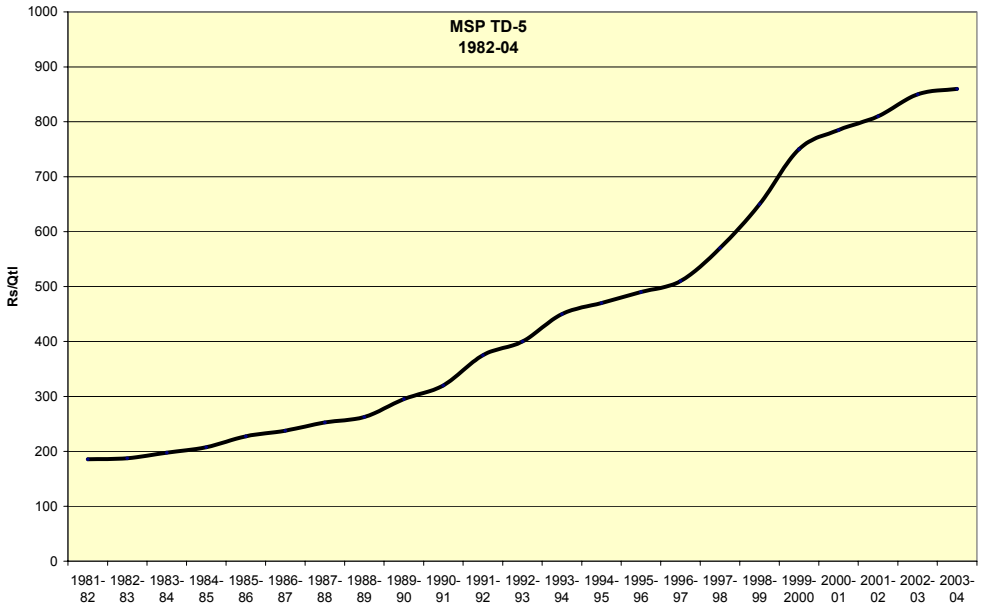
Source: FAO

In India, demand for jute sacking continues to expand. As population and food grain output grew, so did the demand for textile packaging. Indian consumption of locally made sacking was 200,000 tons in 1960, 327,000 tons in 1970, 626,000 tons in 1980, 781,000 tons in 1990 and 900,000 tons in the year 2000. The increase in production of sacking (along with yarn and other items) accounts for the substantial increase in production of jute products.



Source: FAO

Together with other agricultural commodities, jute has enjoyed minimum support price, MSP, in India since the 1960s. MSP has actually been increased at a very similar sort of rate to which the rupee has devalued against the US dollar.



Farmers have the right to sell any quantity of jute fibre at the prevailing MSP. In practice, it works a bit differently but the spirit of the measure is to assure what is considered a viable price. The Jute Corporation of India, charged with implementing MSP tends to intervene mostly at harvest and tries to limit its market intervention. Its activities are increasingly targeted at smoothening seasonal price variations.

The MSP combined with the mandatory packaging order has encouraged demand and led to increasing volume production through higher productivity rather than area under jute. Production has increased through higher yielding varieties and the increased use of nutrients. The same phenomenon was earlier observed with Chinese production, which also increased fibre output without a commensurate change in area.

The threat from cheaper locally made Polypropylene and High density Polyethylene woven plastic bags largely from imported feedstocks led the jute industry to lobby the government successfully for protection by having the textile packaging of food grains, sugar and cement made into a reserved market for jute sacks. The instrument used by the central Indian Government was the mandatory packaging order, first implemented in 1987. However today, cement and fertiliser are no longer widely packed in jute sacks.

This Order reserves use of jute sacks for stipulated produce and this together with the fact that the public sector buys 66% of sacks made by the jute industry, has led to healthy and growing demand for jute sacks. The legislation creates a market situation where the MSP can be used sparingly and without a high cost to the Exchequer. The local price for sacks may at times be higher than it would be otherwise but the premium helps the living standards and viability of millions of very poor farmers while protecting the environment against degradation.

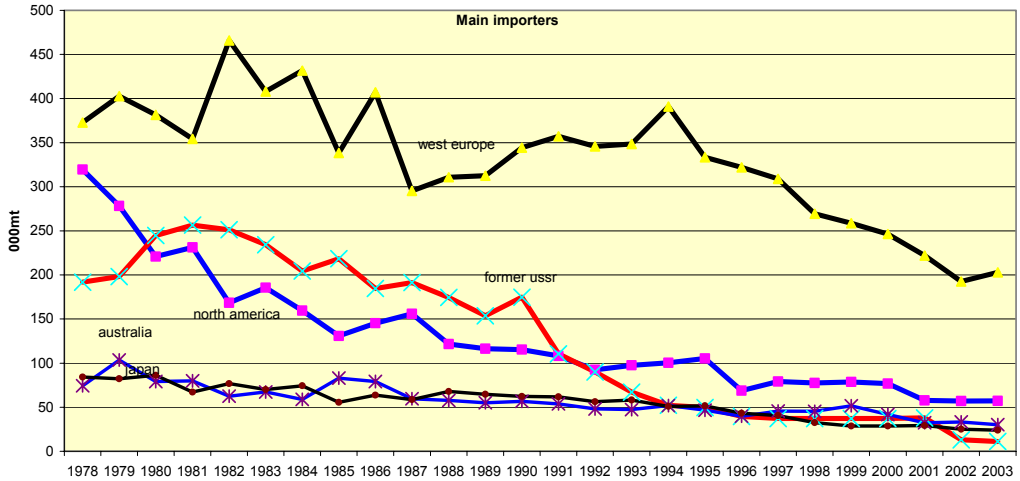
2.1.2 Trade

The search for value addition led to replacement of production in Scotland and Europe by that in jute growing countries. This process was already under way at the same time as the arrival of low cost Polypropylene polymer on world markets. This new material, made from feedstock priced arbitrarily, was easily and cheaply extruded into thin filmstrips and woven on wide looms for carpet backing or woven on circular looms to make sacks and bags. Loss of production in Europe also led to loss of markets with many former producers and distributors diversifying into synthetic bag production.

Carpet backing was the first major casualty to the competition from synthetics (especially primary backing) although there were other factors to blame as well such as unreliable deliveries. Jute had been favoured both as primary and secondary backing for tufted carpets as well as use in woven carpets. Tufted carpets grew in popularity in the 1960s. They were an important end-use for jute at one stage in the early 1970s amounting to 240,000 tons of exports but today use is down to below 25,000 tons. The decline in use of jute primary and then later secondary CBC is reflected in the sharp decrease in exports to USA and later to Europe.

With widespread Polypropylene polymer availability, PP resin prices fell rapidly relative to jute, and by the early 1970s it was apparent that jute textile packaging would lose much of its market share to PP. A 1-kilo jute sack to carry 50 kilos of contents could be replaced by a PP circular woven bag weighing 90 grams, costing a quarter of the price of a kilo jute sack. In China and Thailand woven PP bags were allowed to compete freely, and this was largely responsible for the collapse of the Chinese Jute sacking industry from an annual peak of 1,000,000 tons in 1984/86 to about 165,000 tons in 2004.

Loss of market share for sacking is a long-term process. Sacking is the most important traditional use for jute. In fact, the fibre had almost become synonymous with that end-use. It was the growth in sacking that had initially propelled jute production, and in the case of India, is still doing so. In the 1970s jute sacking was increasingly substituted with that of PP worldwide and the process is still continuing today in most developed countries except for the fact that replacement by bulk handling is also contributing to the decline.

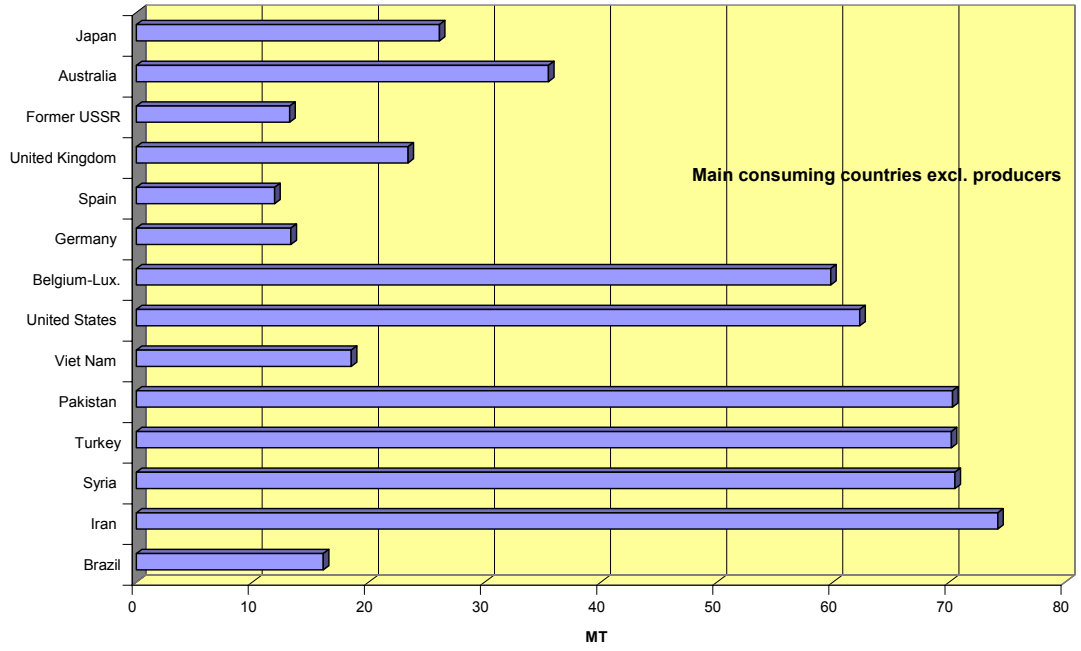


Source: FAO

The decline and collapse of the Soviet Union was another major market reversal for jute resulting in a loss of market of the same proportion as that of CBC in USA. From a peak of 250,000 tons in 1981, imports had fallen to below 25,000 tons in 2003 although they now show some signs of revival. Together with the continued decline of the North American market and markets in Africa and South America, the overall impact was a major reduction in jute goods trade.

The closure of jute mills in Europe (those that had remained in the jute spinning business) using imported Bangladesh fibre for the production of yarns used by the woven carpet industry was already under way by the 1980s. As mills closed, the spinning machinery was transferred, some to India, but mostly to Bangladesh during the 1980s and 1990s.

More recently, there has been an accelerated decline in exports to Western Europe. This became more pronounced after 1995 in all major end-uses including transfer of part of the yarn market away from Europe towards carpet weaving countries in the Middle East. However, overall the export market for jute yarns combining both Europe and the Middle East and elsewhere, of about 120,000 tons in 1980, had grown to over 300,000 tons a year by 2004.



Source: FAO

The cumulative effect of developments in North America, the former Soviet Union, Western Europe, Africa and Latin America has been a steady and substantial erosion of the export market for jute and jute goods for both Bangladesh.

3 Workshop Contributions

Emerging from information disclosed at the workshops, the next section is Sub-divided under four major headings.

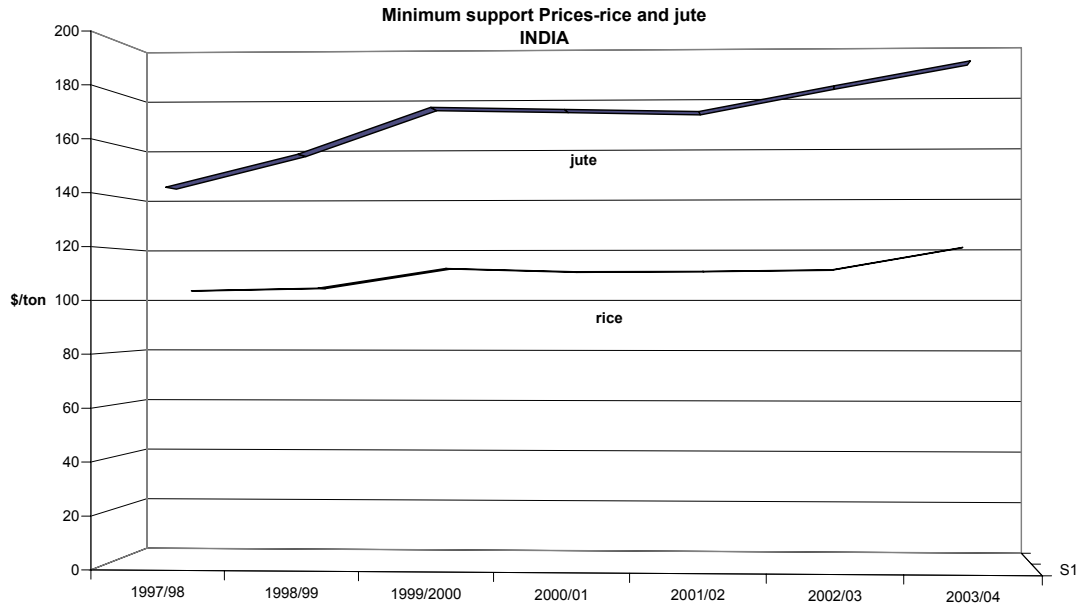
1) Agricultural progress and raw material supply trends.
2) Mill use of jute and the availability of appropriate grades.
3) Mill processing technology now and in the foreseeable future.
4) Existing product evolution and new product development.

3.1 Jute Agriculture

Jute cultivation requires an estimated 215 man-days of work per ton of fibre, and the cost of labour represents between 60% and 70% of total production costs.

Farming activity based on jute has many components. Farmers allocate land, labour time and other resources between alternate activities and uses. Part of what they cultivate is for subsistence and part for sale. Only labour expended in cultivation of commercial crops is of commercial value. Jute brings a particular opportunity for selling labour time. Jute based farming systems nearly always include rice and are categorised either rice based or as jointly jute/rice based.

The purpose of growing jute is primarily for sale to provide cash income. Part of the rice grown is eaten but jute not only provides cash, it also serves a number of other functions: jute sticks provide fuel for cooking as well as additional supplementary cash income. Fibre finds a variety of uses and when prices are low and needs a rise it has even been reported as being used for fuel. Leaves and biomass left on the field serve to enrich the soil and; the high demand for labour during harvesting and retting affords an opportunity for commercial use of family labour inputs.



For the farmer in jute/rice based system regions, the choice is essentially between the proportions of land to be devoted to the two main crops during the two seasons. In the wet season, jute is favoured. Average rice yields, like average current jute yields are around 2 tons per hectare per crop. The nominal world market farm value of rice is

around $150 per ton. There are differences in costs of production with much more labour being used in the harvesting of jute than in rice. Farmers very rarely obtain nominal commodity producer prices; the reward they actually get in their hand depends very much on the deductions or credit arrangements made during the crop cycle.

Few if any farmers only grow jute. Nearly all do so in rotation with rice. The farmer's decision on whether or not to plant Jute in a given year is governed by a multiplicity of factors, but in reality there is little choice for those who live in rainfall conditions where jute is the most realistic crop for the wet season.

The converse is true for India. The area planted to jute has not changed but instead, farmers use higher yielding seeds, extra fertiliser and other inputs to give higher yields when prices are particularly favourable.

There is price support for rice production but not for jute in Bangladesh, and although the public sector mills do set a price, the general trend has been for the area used for jute cultivation to decrease. Jute has been steadily retreating to those core areas most suited to its cultivation. The two main factors behind this trend have been the relatively poor income returns to the jute farmers, and secondly, since jute yields have increased less land is required.

The seeds used in India are of Indian origin and mostly grown by specialist seed producing farmers in the states of Andhra Pradesh and Maharashtra. In Bangladesh increasing amounts of Indian seed are being sown as they provide higher yields than the local varieties and importantly they are available in times of seed shortage. The downside is that although it gives higher fibre yields per hectare this is obtained at the cost of lower fibre quality. This decline in the availability of better qualities jute in recent years has become a major concern for spinners in both India and Bangladesh.

Availability of water in some regions for the seeping and retting process has long been a concern. To counter this, equipment to strip the inner stick from the plant has been developed in India. Although such equipment greatly reduces the amount of water needed for retting, even such simple machines are beyond the financial means of most farmers. It reduces the labour time required but apparently not enough to be an attractive investment.

The cost differential is that in favourable growing areas farmers obtain between 1.7 and 2 tons of fibre per hectare. In less suitable growing areas yields are in the range 1.2 to 1.5 tons per hectare. Agricultural research in India (The Central Research Institute for Jute and Allied Fibres) has produced higher yielding varieties of jute claimed to yield up to 3 tons per hectare. However the quality attributes of these latest varieties are as yet unknown, and could well be worse than the presently used varieties. Jute plant strains capable of high yields coupled with improved fibre fineness, better strength, and lower lignin content are also claimed to exist but their commercial application has yet to be demonstrated.

There are no reliable figures available on farm gate prices in India although there is a nominal MSP. Some at the workshop claimed that generally speaking the farmer receives about 70% of the fibre price paid by the mill of 1,200 rupees/quintal (equivalent to US$ 285 per ton). Such claims are not unusual with commodities.

The implication is that the farmer would in this case theoretically receive in cash roughly $200 per ton.

Based on the above assumptions, and since labour represents between 60% and 70% of the small farmer's average cost of production, the notional income for the farmer per man day of work can be estimated as 750 rupees per quintal of jute including the value of its associated stick Based on 215 MDT, then it follows that the farmer earns about 35 rupees per day when working on his jute crop, (roughly 80 US cents per man day).

There are those who have researched value chains in jute based farming systems in Bangladesh and who claim that actual farmer incomes are far lower. This is often the norm as far as commodity production in the regions is concerned. The figures given above must remain nominal until more detailed field research is undertaken which reveals a more accurate value chain analysis.

An Indian farmer's rice crop (grown during the same period of the year) requires about 145 man days per ton to grow and harvest and the rice earns him about 450 rupees a Quintal, about 31 rupees per man day. (Approx US$ 74 cents per MD)

In India a kilo of jute is worth about 2 kilos of rice at the grower level. In Bangladesh the situation is less favourable for jute growers.

If in fact in Bangladesh jute is earning the farmer about 1,100 Taka per quintal at the farm gate, (US$175 per ton) and rice 1,200 Taka per quintal, (US$ 190 per ton)
he is faced with a differential of 50% in the reward for his day's labour, and his interest in growing jute is bound to be reduced. Of course his jute crop plays an important part in the crop rotation cycle and provides a readily cashable product, but as alternative crops become available and are developed, the farmer is becoming less locked into jute cultivation.

The main thrust in the past two decades has been to improve the jute grower's income by encouraging the use of higher yielding seeds. This has definitely improved the cash returns to farmers but at the cost of pulling down overall levels of fibre quality, in other word's its spinning ability.

3.2 Mill Use of Fibre

Jute mills are very sophisticated in their use of raw materials because it accounts for about half the product cost. Each yarn or end product is allocated its own special grades of raw material in a blend tailored to fit its needs.

An important appraisal of the Indian raw jute quality situation was presented to the Kolkata IJSG workshop by a jute mill located in Andhra Pradesh. It may be summarised a follows.

"The Indian jute crop can cover in general the volume requirements of the industry, but there is a serious mismatch in the availability in quality terms between availability and industrial needs. Indian industry is short by about 200,000 tons of superior grades needed to make high quality goods both for export and the home market. The industry has been offsetting this problem by importing higher grades of fibre from Bangladesh.

There is heading towards the same problem. For example grade BTB, the top grade in Bangladesh used for fine count high quality export yarns, in 2000 made up about 7%-8% of the purchasing order that over the long term, say the last 25 years, that average quality had declined by about 33% while average yields per hectare had increased by some 36%.

Volumes of top grades have shrunk at a time when the industry in both India and Bangladesh wish to move decisively towards higher quality value added products. In turn these items demand higher grades of raw material in their manufacture.

The deterioration in earnings for jute farmers over time has been dramatic. In 1960 the jute farmer received the equivalent of about US 20 cents per kilo for D grade fibre. In 1990 values this was equivalent to roughly US$ 1.0 per kilo. In the year 2000 he received in current currency values about 30 cents per kilo, and in real adjusted income, based on 1990 levels, this was the equivalent of about $ 26 cents per kilo.

3.3 Mill Processing Technology

Ever since it was first mechanically spun in Dundee jute has used a modified version of flax carding preparing and spinning technology. Jute, like flax is demanding in its processing requirements. The last major technological change was in the 1950s when the industry adopted sliver spinning instead of spinning from twisted 'rovings.'

Jute is spun too much heavier counts of yarn than cotton and modern short staple technology allows a typical cotton yarn to be spun using only 100 worker hours per ton. Jute by contrast requires about 200 worker hours per ton to spin a yarn that is five times thicker than the average cotton one.

As mentioned on many occasions during the workshops, the industry is seeking a new generation of improved technology machinery capable of performing efficiently under jute mill conditions in the Indian sub-continent. The present jute process machinery was largely designed and made in the UK prior to the 1980s, although jute-spinning machinery has been made Calcutta since 1954.

In broad terms the existing jute conversion process from raw material to finished yarn or fabric requires about 40 man-days per ton of product. The three workshops identified an industry wide target to reduce the labour content by half, in other words to double labour productivity in the jute spinning and weaving process.

A start has been made to develop more efficient and productive jute processing equipment in India. A modest portion of the UNDP/Indian government funded programme in the early 1990s was given to jute machinery developers in India but more of the US$ 22 million aid programme was spent encouraging the use of short staple cotton spinning technology for jute.

The main thrust of mill modernisation for the industry during the last decade and more has been import of second hand equipment designed for jute or which can be modified for jute processing. One can note the import into India and Bangladesh of a large amount of UK jute machinery previously installed in Europe, Thailand, South America, Pakistan, Indonesia, and Africa. In addition some used machinery of

Chinese manufacture (originally copied from earlier UK designs) has been imported into India during the last few years.

In the case of machinery which can be adapted to work with successfully with jute, are ring twisters of various makes, precision winders of German and local Indian or Bangladesh manufacture. Today out of the fifty or so thousand looms operated by the industry in India and Bangladesh about 800 are shuttles looms originally constructed in Germany or in Switzerland. They were purchased second hand but had been originally delivered to weave jute or similar fibres in Europe and other countries.

About 100 machines made to 1960s & 1970s UK designs have been made each year in Kolkata during the past several decades. In the past carding machines and shuttle looms and winders were made in volume in India. Given new more productive designs and a demand from the industry such machines could be made locally in India or Bangladesh.

Much of the jute machinery operating in India and Bangladesh has been running for three shifts since it was originally built in the 1960s. Some machinery is even older dating from the 1930s. Many individual components have been replaced many times.

Any new process technology has to surpass what exists by a generous margin to justify its investment cost. It will have to double the productivity of the workforce and yet remain simple, efficient and practical to operate. That is the challenge that faces machinery designers and manufacturers. Up to now it has proven too difficult or too daunting a challenge for Indian machinery makers who are aware of the huge investment and effort needed to finance and complete new machinery designs and their commercial development.

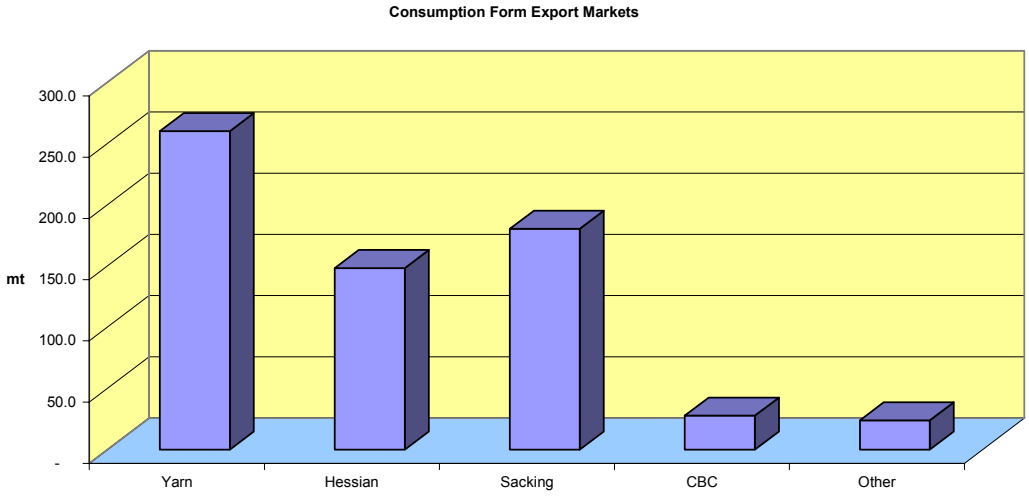
To develop new jute machinery the manufacturer has to be confident he will have buyers and a willing market prepared to invest in the future of the jute industry. There is no certainty that efforts will not simply be copied and thus there would be no return on his R&D investment

A leading Jute machinery building company in India expressed the present situation to the IJSG in the following terms. “Machinery development requires adequate funding and gestation time to incubate and commercialise new equipment. It is difficult for a company like ours to develop the envisaged new spinning and weaving technology by itself without assistance from either national or international agencies.”

It was pointed out by a delegate attending the Geneva workshop and also by in paper presented at the Kolkata workshop that significant reductions in manpower requirements and improvements in machine running efficiency can also be made through improved management and better maintenance. This strategy can only take the industry part of the way towards a doubling of its labour productivity. New equipment will have to work in tandem with the old as no mill can afford to change all its jute preparing or spinning for example in one move. Modernisation is inevitably going to be a step-by-step affair with leaders and laggards.

3.4 Existing Products and New Product Development

The specifications and standards of classic jute products have been unchanged for tens of decades. First comes sacking, which is used to make heavy bags for food grains and other commodities, generally each sack weighs about one kilo net and is used to transport or to hold fifty kilos of produce. This most important item represents about half of the industry's output. In the last decade or so an improved 'food grade' of sack has been developed, produced and marketed. This sack is physically very similar to the conventional one but does not contain any mineral oil. Importers of Cocoa and Coffee beans specify the use of 'food grade' bags. This issue of the promotion and use of non-mineral oil content jute sacks will be mentioned again later in the report.



Next the so called 'Hessian,' which is a cloth made from finer yarns than sacking and which generally weighs half as much per square metre as sacking. Some Hessian is used to make sacks and bags and the rest is used in a wide variety of applications from wrapping plants or collecting grass cuttings to furniture and as a support cloth for linoleum flooring. Hessian cloth represents a little less than twenty percent of the total output of the world jute industry.

Yarn and twine are also major traditional products. The yarns are primarily exported to carpet weavers in Europe and the Middle East where they are woven into the back of the carpet to provide bulk and stability. Jute sold on in the form of yarns for carpet or twines represents close to twenty percent of total industrial out put.

Wide Hessian cloth, known as carpet backing cloth is used on the back of tufted carpets. At one time it was used for both, primary and secondary backing but has been phased out of primary backing altogether. This application once consumed far larger volumes of jute than it does today when it accounts for less than two percent of output and a very minor part of the market.

The remaining ten percent or so of output is taken up by a wide range of small amounts of specialist products. Among these one can mention 'soil saver' an open weave construction using very heavy yarns used for geo-textiles, which are laid on the ground. Jute woven matting or carpets and used as household floor coverings.

Shopping bags made from the better qualities of Hessian cloth. Furnishing fabrics, and rope-soled shoes are also produced from jute and find consumer acceptance.

Considerable emphasis has been placed by the jute industry on the production of non-traditional products. These are the so-called diversified products. Mostly this term can be taken to mean the ten percent or so of items mentioned just above and similar products.

The Indian jute industries product mix may well move in this direction by two or three percent over the next five years, but the likelihood of a major transformation in the industry's product balance is remote. The central Indian government, it appears, would like to reduce the level of protection given to jute sacks under the mandatory packaging order, however to prolong the current level of protection the industry has compromised itself by suggesting a significant move towards a more diversified product mix.

The intention to move towards 'diversified' products made wholly or partially from jute fibres has important consequences for the industry. The yarns used in such applications are generally finer in count and considerably higher in quality than those used in the 'traditional' products. Significantly finer counts will mean a move to ring spinning and away from the conventional flyer spinning.

In the case of Bangladesh, there is the additional problem that banks are generally over exposed to the sector due to a very lengthy period of losses and bad debts. They are extremely reluctant to increase their exposure. The borrowers, for their part, often lack credit worthiness due to a history of inadequate loan performance.

In short, the manufacture of diversified jute products require the use of the best grades of raw jute, more capital investment, higher 'textile' levels of design and marketing skill, more capable and focused mill management, a degree of entrepreneurship above and beyond that usually found in the traditional industry, and on top of that, considerable R&D expenditure. High value addition inevitably means high levels of R&D expenditure. It is thus not at all surprising that diversification has so far proved to be an elusive goal.

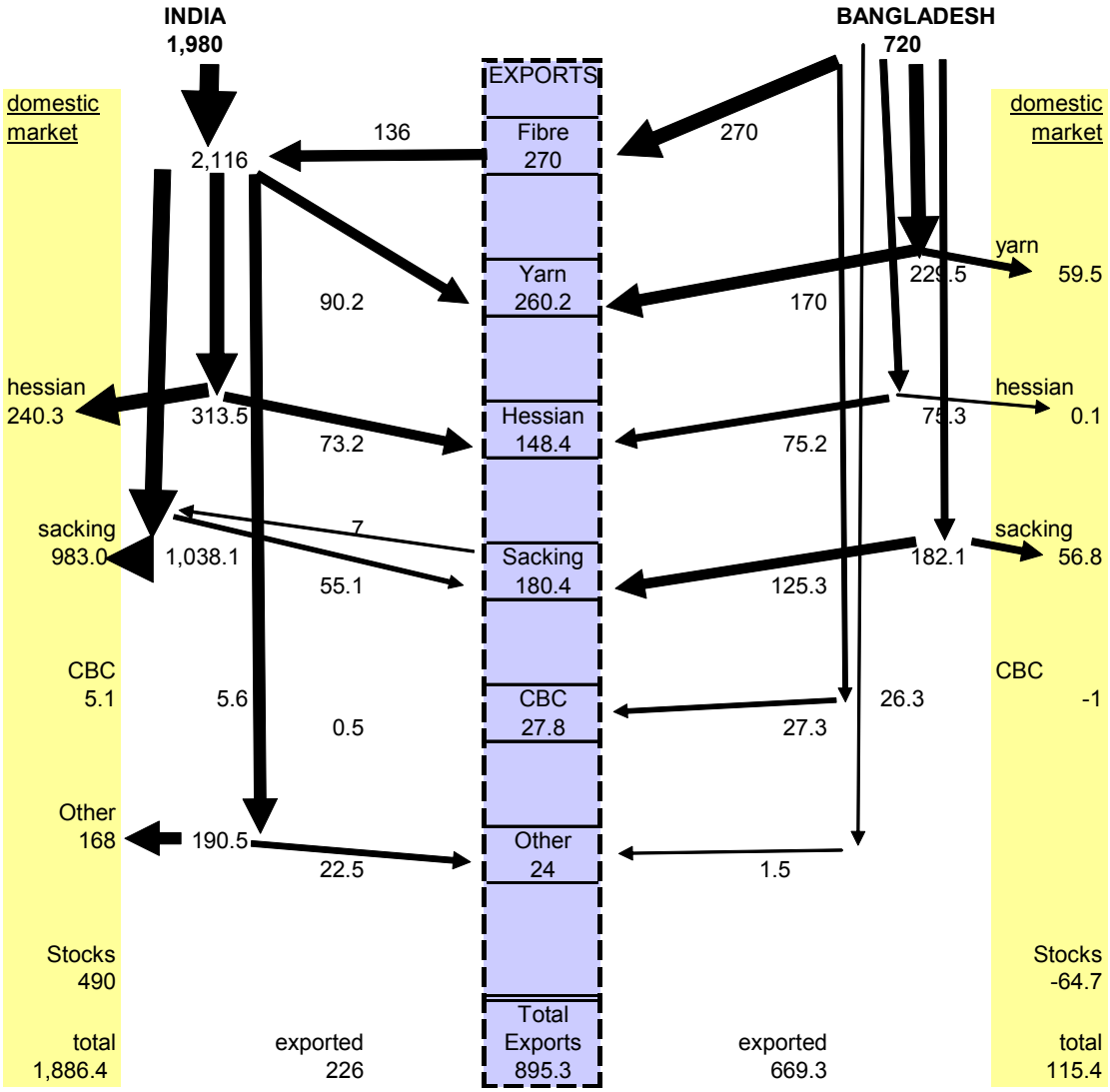
One area of product development attracting attention is the use of jute fibres to reinforce plastic mouldings, either via non-woven mats or dispersed in plastic resin used for injection moulding. Small quantities of more or less processed jute fibres are now being used in these applications. However the potential is arguably very considerable and in ten years time these applications could provide a market for between one hundred and two hundred thousand tons of jute fibres.

Use of whole jute stems or of low-grade jute fibre for pulp and paper manufacturing has been under active consideration for twenty years and more. Although technically feasible the economics are marginal and since modern pulp mills have a minimum economic size of around one hundred tons a day the logistics of supply and the relatively high cost of jute stem as raw material for pulp manufacture have, up to now, proved to be the major problems. The global market for superior grade papers made from natural fibres such as flax, abaca (Manila hemp) and true hemp and jute, has not been increasing. (This information provided privately to the consultants by Hurter Consult of Canada).

3.5 Markets

3.5.1 Markets and Market Shares of Jute Goods Producers.

DISTRIBUTION OF JUTE in Bangladesh and India (in mt)



INDIA.

- Sacking bags for agricultural produce. Average total 900,000 to 1,000,000 tons of which government purchases represent about 625,000 tons or 66%.

- Hessian cloth Annual output 300,000 tons. Internal consumption is 250,000 tons. Exports range from 50,000 tons to over 100,000 tons. Major export markets are USA +- 30,000 tons. Europe +- 25,000 tons. In second rank are Africa, Australia, Latin America and Middle East each taking between 5,000 and 10,000 tons a year.

- Yarns and twines. Annual output averaging 200,000 tons. Indian internal consumption is about 140,000 tons and exports between 60,000 and 70,000 tons.

- Other products. Mainly canvas, decorative fabrics and soil saver. Output ranges from 80,000 to 90,000 tons a year. Internal consumption +- 60,000 or 70,000 tons and exports some 15,000 to 20,000 tons.

- The balance of markets for India's production of jute goods is heavily slanted towards home demand, which consumes about 80% of output.

BANGLADESH

The jute industry in Bangladesh is primarily export oriented. Raw fibre is exported as well as jute manufactured goods. The range of products produced is similar to India but the structure of the industry is different. On the one hand there is the Government owned BJMC with 22 or so mills, running the bulk of the operational looms and the semi-privately owned BJMA with 12 operating mills. On the other hand there is the BJSA with over 40 mills. This is an association of private sector yarn producers. In statistical terms the BJMC and the BJMA output all of which are composite fabric mills) are here shown together.

- Bangladesh provides over 90% of the world's raw jute and allied fibre exports. Raw jute exported each year ranges between 300,000 and about 350,000 tons. India, Pakistan and China between them take about 250,000 tons with India accounting for half.

- Jute fibre availability in Bangladesh is generally in the range 750,000 to 850,000 tons in recent years. As noted earlier about 300,000 tons is exported and about 45,000 tons is consumed in village consumption, which leaves about 500,000 tons for use in the national mills.

- Depending on availability of finance and thus how many mills are operating, the BJMC and BJMA mills now use an estimated 250,000 tons of the national crop of raw material. The BJSA mills (which year on year continue to increase output), will soon use about a similar amount for yarn production.

- During the early 1990s the combined output of the BJMC & BJMA was around 450,000 tons and the BJSA (Yarn mills) was less than 100,000 tons. In effect during the last decade the manufacture and export of yarn has largely substituted for the decline in the production and export of Sacking, Hessian, and Carpet Backing Cloth.

- The internal consumption of jute goods in Bangladesh is about half the amount per capita compared to that of India.

- The amount of jute goods consumed internally in Bangladesh is in the range 100,000 tons per year. There has been a slow build up of internal consumption over the years, in 1970 – 30,000 tons, 1980 – 40,000 tons, 1990 – 50,000 tons

and in 2000 – 80,000 tons. It would be reasonable to anticipate a little over 120,000 tons by the year 2010.

Broadly the current annual Bangladesh jute market profile is:

Local consumption of fibre at village level,	- 45,000 tons.
Local consumption of mill manufactured jute goods	– 90,000 tons
Total local/internal consumption	145,000 tons
Export of Jute in baled fibre form,	300,000 tons.
BJMC&BJMA exports of Sacking,	100,000 tons
Hessian,	50,000 tons
Carpet Backing,	20,000 tons
BJSA Export of yarns	230,000 tons*
*(Includes BJMC yarn shipments)	
Total export of jute goods in manufactured form	400,000 tons
Total raw Jute & jute goods export	700,000 tons.

In contrast to India, and including fibre exports, Bangladesh exports 80% of its jute production.

BANGLADESH INTERNAL MARKETS FOR JUTE GOODS

Bangladesh yarn supplies account for about 75% of world imports. India supplies the bulk of the remaining 25%. The world import market for jute, the Report strongly supports continuation of the Indian mandatory packaging order and its possible extension to other jute yarn imports can be expected to reach 400,000 tons. Subject to jute yarn prices remaining at or near their 2005 price relationship to Polypropylene yarns, there is not expected to be any significant loss of potential share for jute yarns used in the woven carpet industry.

Reliable trade information on the export markets served by BJMC & BJMA supplies of Sacking Hessian and CBC is not available.
Major shipments of sacking have been made to India but the amounts are not well documented.

In the Geneva workshop the European imports of Hessians including CBC and Hessian bags from Bangladesh were shown to have declined significantly during the 1990s. Europe now takes only about 25,000 tons a year of Hessians from Bangladesh.

One of the papers presented at the Geneva workshop argued that given the large ratio between fibre costs and their value in final use, there was sufficient potential leeway to reduce costs and compete for secondary carpet backing. There has been a recent initiative from USA, which mentions volumes in excess of 30,000 tons, but there do not appear to be any takers under existing prices.

A recent development in the USA has been that one of the major Carpet manufacturers; Shaw Industries of Georgia has diversified backwards down the production chain by taking over the existing Polypropylene primary and secondary carpet backing manufacturing facilities. The likely reason that they have done so is firstly because the assets were available at low cost from Amoco and secondly a major player like Shaw needed a backing supply source that it could reliably control.

PAKISTAN

Pakistan imports most of its raw jute needs from Bangladesh and occasionally some from Myanmar.

Over the last few years' production has been relatively stable at 50,000 to 60,000 tons a year of Sacking. 10,000 to 14,000 tons of Hessians, and 10,000 to 14,000 tons of yarn and twine. The overall output of the Pakistani mills has remained for many years in the range 75,000 to 85,000 tons despite very keen competition from Polypropylene woven bags.

The vast bulk of production is sold to markets within Pakistan but some yarn and Hessian is exported to Afghanistan, Iran and Middle East markets. Pressure from competition in the domestic market is necessitating a change in orientation towards export markets.

CHINA

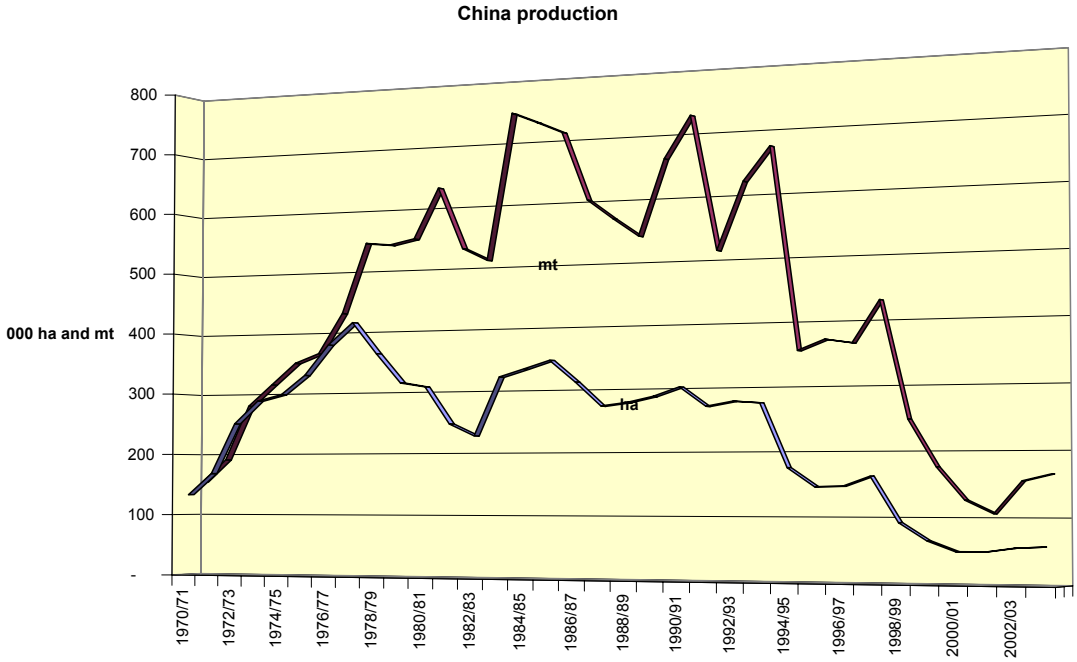
The Chinese jute growing and manufacturing industry reached its zenith in 1985 when output was over a million tons. By 2000 FAO figures suggest a production of 126,000 tons with some recovery by 2003 to around 165,000 tons and the number of mills remaining in active production had fallen dramatically. The process machinery from several of these closed down mills was sold to Indian jute mills.

The reason for the collapse of the Chinese industry was the widespread use of locally woven sacks made from Polypropylene and High-density polyethylene. Formal statistics on the number of woven plastic bags currently being made and used each year in China do not exist, but a conservative estimate would be about five billion bags or half a million tons of polymer. (Equivalent to five million tons of jute sacks).

Reliable information on the jute industry in China is not easily available but in recent years the jute and kenaf crop has continued to decline. In 1999 the harvest was 260,000 tons taken from 100,000 hectares and in 2003 according to FAO and the Chinese agricultural statistics, about 150,000 tons from 60,000 hectares.

The crop is predominantly grown in Hunan, Sichuan, Hubei, Henan, and Anhui provinces with an average yield of 2,500 kilos per hectare.

Since 2003 China appears to be importing about 30,000 or 40,000 tons a year of raw jute primarily from Bangladesh. China also imports a little jute yarn from Bangladesh (in addition to raw jute) but volumes are small, of the order of 1,000 tons a year. Together with a slight recovery in production since 2000, it appears that there is still some significant demand for jute sacks in China although nowhere near the levels of the mid 1980s.



Source: FAO

The majority of the Chinese mills are in the fibre producing regions and manufacture sacking. The jute mills production profile is not published but an educated guess would be: Sacking to represent 75% of output or 110,000 tons. Hessian cloth accounts for 10% of output, or circa 15,000 tons. Finally yarns and twines probably comprise15% of output or 25,000 tons.

Almost all the Chinese output of jute products is consumed within China and
Although China did export jute sacking in the 1990s, exports since 2000 have been less than 10,000 tons a year.

OTHER COUNTRIES WITH JUTE INDUSTRIES

Thailand, Myanmar, Nepal and Brazil continue to grow and produce jute and or kenaf products, as do Vietnam, Indonesia and Cambodia. With the exception of Thailand and Myanmar, which also export some fibre, these countries consume most of their locally grown fibre internally.

The aggregate amount of fibre processed in these countries can be estimated at between 100,000 tons and 120,000 tons a year. The end product profile is probably similar to that in China with sacking being the predominant item.

A few remaining countries retain a traditional jute goods manufacturing capability based wholly or partially on imported fibre; the most notable examples being the Ivory Coast, Brazil, Egypt and Cuba. These countries in aggregate use about 50,000 tons of fibre. End products are primarily sacks and bags for internal use.

As the world market for jute goods shrinks and consolidates, the experience of the past has been that the jute industries outside the main competitive producers in the

Indian subcontinent drop out and close down. Jute manufacturing is consolidating into its heartlands of India, Bangladesh, Pakistan, Myanmar and Nepal. How long the jute textile industry will continue to be viable in the 'Other' counties is a matter of debate, but they will probable continue to survive in some countries, especially south East Asia for another ten or twenty years.

3.5.2 Competitors and Trends in Major Markets

The jute industry is primarily based on the manufacture and supply of sacks and bags for agricultural produce. About 1.5 million tons worldwide out of a total output of 2.8 million tons or some 53% of production flow into this application. Of this world textile packaging market using jute India accounts for 1 million tons. What happens in the Indian market will crucially affect the rest of the world jute industry.

China encouraged substitution of jute packaging by cheaper oil based woven olefin plastics. The result was that the Chinese jute industry all but collapsed.

India has about a million hectares under jute; it provides a cash income and jobs for 4 million farmers. The mandatory packaging of agricultural products in jute sacks and the Indian government sack purchasing policy has provided stability and continuity to the industry and to the millions of poor jute growers. This remains the rock to which the industry is anchored. A collapse in the internal Indian jute use of sacking would put huge pressures not only on growers but also on export markets.

The price differential in favour of woven plastic sacks has narrowed as crude oil prices have climbed and, given enough time, is likely to narrow further substantially. The main competing products are a plastic sack weighing 80/90 grams versus a 1000-gram jute bag. Both can contain fifty kilos of contents, such as grain. Before the recent price increases for PP resin a jute bag was generally priced at about 40 US$ cents and plastic at +_ 15 cents.

The current position has a jute bag at about 45 cents and plastic at around 20 cents. In the case that crude oil climbs in price to US$ 100 per barrel and olefin resins climb in response to the same degree that they have in the past, one can anticipate the sale of plastic bags at almost 30 cents each versus jute at say 50 cents. The price ratio will have changed from around 3.3 to 1 to about 1.7 to 1. This would be favourable for jute but not yet favourable enough. A table in the Geneva workshop annex describes the present and likely future relationship of crude oil prices and woven PP sack prices in India during the next two decades.

Another important factor in the reduction of market possibilities for jute has been the growth in favour of bulk handling.

Sacks can also be made from kraft paper, widely used for animal feeds, and from blown film plastic which are commonly used for chemicals and fertiliser.

Underdeveloped economies with a weak transport infrastructure and large populations provide market opportunities for jute bags. Despite the 'green' or ecology friendly arguments which favour jute, and the fact that jute sacking will outwear and outlast woven plastic by on average 7/8 transport uses as compared to 3/4 for plastic these have not been factors which have had a significant impact in favour of jute. More

important has been stack-ability where jute holds the advantage in terms of stability and ease of handling.

In contrast to the discouraging situation for jute in packaging the future use of jute yarns in the world carpet manufacturing industry has a growth profile. The problem is that growth in this area cannot remotely make up for the declining international market for jute in packaging.

Other diversified textile products which represent new applications for jute can be exploited, however to grow jute for pulp and paper seems unlikely to be economic except on a small and specialist scale such as is being done in Myanmar to supply the eco-market for pulp in Japan.

A prospect, which has the potential to use large volumes of jute fibre, is in the replacement of glass fibres for plastics reinforcement. This opening exists both for compression moulding and for injection moulding. The replacement of even ten percent of the glass fibre used in plastic reinforcement would open up a potential market for several hundred thousand tons of fibre. The problem with this market is that it provides little or no value added for existing jute mills.

4 OBJECTIVES AND TARGETS

4.1 Background

The trend at present is for the world market, excluding jute producing countries, to be decreasing at anything up to 50,000 tons per annum but for this to be compensated by decreasing Bangladesh production (by up to 30,000 tons per annum) and for the Indian market to absorb up to an additional 50,000 tons per annum. The result is gradually increasing global jute production.

However, within this overall growth in global production, there are important nuances. The most important is the growing importance of India, both as a producer and as a consumer. India used to account for 32% of production in 1961 but today accounts for 60% and accounts for just below 50% of global annual consumption.

At the same time exports to non jute producing countries have moved in the opposite direction from 1976 when half of the annual production was traded. Today the volume traded is one-third. India used to export 28% of national production in 1976; today it is below 14%. Jute is now far less dependent on exports than it used to be.

Production is also becoming far more concentrated with India and Bangladesh, always the leading producers, but who have had their dominance reinforced with the decline in production in China and in Thailand. Myanmar and Nepal continue to remain producers.

There is a general recognition that this increasing level of concentration of consumption in the domestic Indian economy is an inherently unstable development and that it would be better if it were reduced. This is accompanied by a conviction that a reduction in costs in the conversion process could enhance both the internal competitiveness of jute and in export markets for higher value diversified products.

4.2 Strategy Options

There are three main potential directions that can be set as objectives, namely:

(1) Extend regulatory protection
(2) Continue as at present
(3) De-regulate

4.2.1 Extend regulatory protection

India has a regulatory packaging order, which presently mandates that a stipulated proportion of commodities such as food grains (100%) and sugar be carried in jute. With the growth of the Indian economy, demand for jute sacks has been increasing for these end-uses. In Bangladesh, there is no such legislative act as yet, but there is a campaign for limiting the use of PP carrier bags on environmental grounds.

The packaging order in India leads to those wishing to transport designated commodities having to use jute sacks, even when they could use cheaper PP sacks. They make best of the present situation and maximise the numbers of times jute sacks are re-used. The small extra cost of sacks is absorbed by the buyers of the contents and passed on where possible to consumers.

One way of helping the rural community which both, India and Bangladesh are anxious to do, would be for Bangladesh to adopt a similar regulation as India and if possible, to extend the list of designated commodities. The measures would lead to increased demand in the domestic market.

There is some sentiment that there should be an organised effort to try to persuade countries to follow the republic of Ireland and to ban the use of blown film shopping bags as an example of what can be done. It is, however, unclear how many other countries would go as far as this, although the idea can be used in an international marketing campaign for reusable jute shopping bags. This campaign would appeal to environmentally aware consumers.

Pollution from PP sacks and bags and in particular disposal problems are attracting more and more attention. The State Government of Maharashtra has decided to ban use of synthetic shopping and other bags. There was already a campaign in Bangladesh to promote the same idea there.

If it were the policy of India and Bangladesh to extend regulatory cover for jute, it is likely that in a 5 year period there could be additional demand for over 250,000 tons and over a 10 years period, over 500,000 tons of jute sacking. But at the same time it has to be recognised that such a policy would represent a substantial reversal of direction for the two countries.

4.2.2. Continue As At Present

The most likely strategy is going to be a continuation of current policy. No changes in direction are required and the political, social, and. economic forces that have brought about the current situation are likely to continue and to determine what happens in the future.

BANGLADESH

As already noted, support for rice prices has led to a gradual reduction in hectares devoted to jute in Bangladesh and this has helped to achieve self sufficiency in rice for the country and, indeed, a surplus now available for export.

A no-change policy would probably lead to a continuation of the trend with falling production and a further reduction of the area under jute. This would exacerbate the situation regarding capacity utilisation particularly in the public sector and increase pressures on government to rationalise the public sector mills.

4.2.3 De-regulate

There are those who have long advocated de-regulation of the jute industries in Bangladesh and in India. The World Bank undertook a study and then tried to finance a loan for the purpose of rationalising the Bangladesh public jute sector. It was in the end not possible to proceed in a timely fashion with the JUMS and JSAC programs but the process has been proceeding albeit at a slower rate than visualised under the original loan programme.

In the case of both countries there is no shortage of advice from some donor countries and organisations which would like to further the cause of liberalisation, as they see it, through the de-regulation of the two economies.

In the course of the discussions at the workshop it emerged that there was a tacit understanding between the industry and the Government of India that the packaging order would remain in force but over a five-year period there should be a shift from sacking for the domestic market to exports of diversified products. A figure giving a 20% reduction of sacking use within 5 years with subsequent further reductions on the same scale was mentioned, and this would amount to around 200,000 tons in the first period. However, although a 20% reduction over 5 years may sound like an achievable figure, it would represent a 100% increase in exports and a ten fold of diversified product exports, which is most unlikely.

There is a growing woven plastic bag industry in India, which lobbies hard for relaxation and abolition of the purchasing order, which restricts end-use of non-jute sacks. There has indeed been a gradual relaxation of restrictions and it is official policy to liberalise the economy. However, it is not likely at the peril of disruptive dislocation in the jute sector.

There are at least 30 Companies producing woven plastic sacks and containers in India. The number of jute sack equivalents producer by these companies per annum is not known. A rational assessment of probable overall production capacity indicates that over a billion bags are now being made each year. If so, that means one woven plastic bag for each jute sack.

INDIA

The Indian Government has announced the National Jute Policy 2005 of India. A basic objective of the policy is to increase the quantity of exports of jute and jute products by achieving a CAGR of 15% per annum. The policy takes into account the strong environmental arguments. It is also designed to enable jute farmers to produce better quality jute fibre for the production of higher value added jute products and to enable them to enhance their per hectare yield of raw jute.

The policy proposes the creation of a National Jute Board, which will subsume, merge or integrate as soon as possible the functions of the various institutions currently operating in the jute sector. The Jute Board will seek to rectify the systemic ills of lack of coordination among the several jute related organizations under different ministries of the government and is intended to be a facilitator rather than a regulator for the jute sector.

The jute board will pro-actively explore the possibility of establishing a National Institute of Natural Fibres with the objective of harmonizing development and promotional activities pertaining to all natural fibres.

A Jute Technology Mission, approved earlier by the Planning Commission, is intended to make the jute sector an intrinsically competitive and integrated entity. The Mission will encompass the sub-systems pertaining to agricultural research and seed development, agronomic practices, harvest and post harvest techniques, the

primary and secondary processing of raw jute, diversified product and market development and marketing distribution.

The Policy Statement also noted to develop the next generation Jute Machinery through a comprehensive technology benchmarking (after a technology audit), five year plan for machinery development, and establish R & D set-up in the area of a public private partnership. The five-year plan will cover machinery development for both the organised and decentralized sectors (and also for the cottage industry). Professional benchmarking will be needed to assess the present technological status of the jute industry.

The National Jute Policy 2005 calls for a new commodity development strategy to focus on positioning jute as a superior and green material, to enhance the productivity of raw jute, increase exports through innovative marketing, and better the working conditions of the workers engaged in the jute industry.

Considering the ongoing potential of jute products in the domestic market, focused attention will be given to untapped sectors. The thrust will be on adopting suitable market promotion programs for increasing consumer awareness, and highlighting the environmental advantages of jute by working closely with environment groups.

The government aims to increase the exports of jute and jute products to nearly Rs. 5,000 Crores by 2010 from the current level of almost Rs.1,000 Crores. (1 Crore = 10 millions). For this, a multidisciplinary institutional mechanism is to be established to formulate policy measures and to suggest specific action plans, creation of a new equity fund for jute products consistent with the WTO norms will be needed, and also incorporation of the present Export Promotion Council in the proposed Jute Board.

4.3 Consensus

There was a general degree of consensus at the workshops. It was acknowledged that important export markets had been lost and were being eroded further due to competition from synthetics, the growth of bulk handling and that there had been a loss of credibility with overseas buyers in the past.

Equally, both, the Bangladesh and Indian industries remained convinced that things could be turned around in a positive way and that there was enough time to do so. The Packaging Order in India had afforded much needed protection to the industry and a degree of protection was expected, or at least hoped for, from Bangladesh.

It was recognised that there was a growing concentration of jute consumption in India and that this largely accounted for the growth in global demand. While all concerned were keen to see the regulatory regime in India maintained, they realised that there was too much dependence on this factor.

The future survival and growth of the industry depends on becoming more competitive and in developing new market opportunities. Both these objectives require a number of priority steps to be taken:

1. Adequate supply of improved seeds, which give higher, yields of superior fibre preferably with lower lignin content.

2. A substantial reduction in conversion costs.
3. Developing diversified markets.
4. Continued compulsory Packaging Order protection.

How big an improvement that could be made depends on detailed value chain analysis to reveal the potential for savings. It is clear that on average yields are now approaching 2 tons per hectare, and they could be increased further, but that there was a particular need for higher quality fibres even at the expense of less than the maximum possible yields.

Potential conversion cost savings are available at every stage, from retting to carding to spinning to weaving and finishing. There is a consensus that these savings must be achieved for the sake of the future of the industry and that although the task was difficult with many obstacles, ways can be developed to achieve it.

Markets are the most important single factor since there was no point in undertaking new investment without market incentives to do so. The traditional markets are in decline save for yarn. There are measures that can be taken to delay the rate of decline in use for Sacking and Hessian and there might be scope for recovering part of the CBC market. Given the degree of importance of traditional markets, there is no immediate way to improve the global situation for jute other than by taking action to lower the rate of loss of markets. It is diversified markets that must provide new scope but this strategy is a much longer term one.

Finally, the importance of the domestic markets in jute producing countries cannot be under estimated. The Indian demand for jute sacks and, the factors, which help sustain it, has countered declining global markets. Bangladesh internal consumption too has been growing and can grow further. In addition, there is something of a wild card in the form of consumption in China. Production has stopped going down and is perhaps recovering slightly. China is importing more raw jute fibre and could import far larger quantities if it were public policy to do so.

4.3.1 Agriculture

In the absence of a detailed value chain analysis, there is no easily accessed information on the farmers except that jute is part of the jute/rice farming system of East and North India and Bangladesh. There are normally two crops and where jute is being cultivated; farmers generally grow one of rice and one of jute. Interestingly, average yield rates of both crops are around the 2 tons per ha level. Farmers cultivating the two crops therefore obtain 2 tons of jute and 2 of rice but with the jute they also obtain 2 tons of jute sticks.

In India, jute is quoted at a MSP price just above $200 with rice $150. While in Bangladesh, jute has been reported at $160 and rice at above $180 per ton. What only field surveys can tell is what farmers actually get in cash after taking into account various credit transactions and the role and mode of rural finance and other deductions have been made.

The processing industry is quite rightly concerned to secure its raw material supply. Jute provides a cash crop for several millions of small scale and mostly impoverished farmers in India, Bangladesh, and to a lesser extent in China, Thailand, Myanmar and Brazil.

The road map workshops in Kolkata and Dhaka dedicated a significant proportion of their time to agricultural issues and the ensuing discussions produced a fair degree of consensus about the most pressing problems and gave outline guidance about the steps that could be taken to solve them.

In broad terms, and despite the occasional year with a smaller harvest than normal in East ands West Bengal, the problem is not simply one of supply or of price to the jute mills or exporters, but of quality. The rate of decline in raw jute quality has notably speeded up over the last decade in both India and Bangladesh. (China and Thailand have seen a collapse in volumes rather than in quality).

The reason for this phenomenon lies in the introduction of higher yielding varieties of jute (including similar plants such as mesta). The farmer benefited from the higher yields, which over time have increased the amount of dry retted fibre from one hectare of land. This was on average about 1.1 tons back in 1960. In the period 1980 to 2000, yields increased from 1.4 tons to an average of 1.9 to 2 tons. This is now the current yield today in the 'best' districts of West Bengal and Assam. One should note that in India only about 15% of the areas in which jute is grown falls into the category of 'best' district, so the accuracy of official statistics of jute yields per hectare may well be suspect.

In Bangladesh for example the amount of land under jute cultivation dropped from 600,000 hectares in 1991 to about 400,000 today, even though average yields climbed from 1.4 Tons/Ha to 1.9 Tons/Ha during that period.

Farmers face a long litany of perennial problems, but the first among them is the fact that for about 215 man-days of work (assuming a 7 hour day) per hectare of fibre grown, the farmer generally earns the equivalent of less than US$0.7 per day for his labour. On top of that the grower is poorly rewarded for the production fibres of superior quality. This favours delaying harvesting, which increases the yield (the weight) of fibre per hectare, but it also lowers quality as the fibres become stiffer and more highly lignified.

Other important factors, which have a negative impact and handicap the jute growers, typically are,

1) The availability, supply and distribution of good quality jute seeds.
2) Late rainfall and consequently delayed sowing.
3) Pest attacks on the plants,
4) Scarcity of retting water at harvest time.
5) Access to a seed drill instead of broadcast sowing.
6) Seed production in many jute fibre-growing areas is no longer economic.
7) Lack of awareness of optimum techniques to improve quality, especially in retting.
8) In Bangladesh jute is officially considered as an industrial crop and is barred from the incentives paid to grow food crops.
9) Traditional loan finance leads to farmers selling early at low prices.

In India there exists a longstanding Minimum Support Price for jute growers.
It has climbed steadily from a base level of 110 rupees per quintal in 1972-73 to 953 rupees per quintal in 2004-2005. On the surface this would appear to be a substantial improvement in the minimum prices for the jute growers. However it can be seen that

in real purchasing power (inflation adjusted rupees) the value of minimum support price for the Indian jute grower has fallen by 20% since the late 1970s.

In Bangladesh there is no Minimum support price and so from a theoretical point of the farm gate price is the current mill (or fibre baling buyer) price less the cost of intermediaries and transport. The cash price at grower level for a middling quality was claimed to be about 400 Takas per maund, (nominally US$ 170 per ton)).

It is not possible from this information to arrive at reliable farm gate price data. A commodity chain study is required to be able to tell it with accuracy. There are various claims as to what happens but they are all somewhat theoretical.

The fibre quality issue is a major concern in India and is becoming a major concern in Bangladesh. In the Kolkata workshop a prominent jute spinner from South India presented numbers to show that in overall terms the Indian jute crop was short of 210,000 tons of the higher-grade fibres.

Over the last seven years the fibre imports by India from Bangladesh have ranged between 70,000 and 150,000 tons per year. The competitive pressure to buy superior grades of Bangladesh raw jute has had knock on effect as it puts pressure on the availability of those same superior grades for the important Bangladesh yarn mills and CBC mills. They now require something like 250,000 tons a year of the better sorts, and will require even more as time goes by and they continue to expand output.

The Bangladesh jute and mesta crop averages some 750,000 – 800,000 tons a year, so bearing in mind that 200,000 tons are exported to countries other than India (for example Pakistan and China) and that high grade fibre is also exported to those countries, then we may say that the demand for high grade jute grown in Bangladesh is probably like this.

Bangladesh mills 250,000 tons plus Indian mills 100,000 tons, and exported to third countries 100,000 tons. In total, this means some 450,000 tons or a bit over half the Bangladesh jute crop has to be of the higher grades to satisfy current demand.

An Indian survey reported to the Kolkata road map workshop expressed the Indian quality jute shortfall in different terms although amounting to a similar, although almost certainly, understated conclusion

RAW JUTE GRADE	AVAILABLE	REQUIREMENT
1 & 2	2%	3%
3	9%	12%
4/M2/s.MID	25%	35%
5/M3/MID	33%	33%
6/M4/BOT	16%	12%
7/M5/B.BOT	11%	4%
8/M6/X.BOT	4%	1%

The conclusion reached by the Indian contributor to the road map papers appears to be valid for both India and Bangladesh. “Concentrate on producing jute in areas which

traditionally produce high quality fibre and motivate farmers in those areas by paying remunerative prices for their quality produce."

The shortage of high-grade fibres was discussed at a meeting of leading Indian jute mills on 25/05/04. The consensus at that meeting was that there was a shortage of about 400,000 bales or some 70,000 tons of superior grade fibre; (this is almost certainly an underestimate of the actual requirements).

The jute industry in general is concentrating much of its emphasis and attention to moving towards so called diversified products. These diversified products, if they are in the textile realm, will, almost inevitably, require high-grade fibres.
Which are the issues that should have top priority to alleviate the coming quality crisis?

First and foremost there is the seeds and varieties question. The variety of jute employed to increase yields of fibre per hectare has undoubtedly boosted the amounts of fibre produced per hectare or per Bigha sown, (25 Bighas = one hectare). However this has been at the cost of having more low quality fibre.

New jute varieties are under development or have already been developed at the Central Research Institute for Jute and allied fibres in India, (CRIJAF). The Institute claims to have available and ready for wide spread trials and dissemination, new jute varieties which can further increase yields to 3 tons per hectare and yet others which can produce finer fibres with low lignin content. (This an essential property from the point of view of spinning the fine jute yarns to be used in diversified products for consumer markets).

At present the 3 major varieties of seed used in India are Navin - JRO525, Vaisakhi - JRO630, and Basudev - JRO 7835. These varieties were first developed some 25 years ago. The seed in India is grown in quite another area that the main fibre producing areas, which are North Bengal, Assam and Bihar; the main seed production is in Maharashtra and in Andhra Pradesh.

There seems to be a real problem in getting the new jute seeds developed and available. The reluctance of farmers to risk on new things undoubtedly plays a part. At present the seed programmes in both India and Bangladesh are not delivering satisfactory results to their farmers. In the final analysis unless the farmer has with a fair degree of certainty the assurance of higher cash returns, there is no incentive to change.

In Dhaka a submission to the workshop suggested that the seed issue in that country could be addressed as follows, "The Bangladesh Jute Research Institute may take up programs to produce increased quantities of good quality breeder seed and supply it to the Bangladesh Agricultural Development Corporation so that ultimately the total seed requirement of about 4,000 tons a year may be gradually achieved." The submission goes on to say that the private sector should be able to handle the seed issue independently.

Jute farmers need a variety of improved inputs and conditions; if they are not forthcoming the farmers will continue to vote with their feet and walk right out of jute cultivation wherever they can. This has already become apparent in many of the

marginal jute growing areas in Bangladesh. Those who remain and have no other alternative crop will be reluctant producers and the quality as well as the availability of jute will continue to decline.

There are millions of jute growers and their families affected by this issue. Taking average +_ 215 man-days to cultivate a hectare of jute and extract the fibre, and average yield of 1.75 tons/ha, 120 man-days of farm work per ton of jute are needed.

At this point it is useful to be reminded that the average amount of labour currently needed to convert a ton of raw jute to finished product is 40 man days per ton and that the road map will indicates ways in which this can(in the longer term) be halved to 20 man days. A farmer who harvests 400 kilos of jute fibre has the benefit of about US$ 50 worth of jute stick either as extra income, if sold, or as benefit in kind if used as fuel. Stick income/benefit is thus worth about a quarter of fibre income.

If the case for more active investment and intervention in jute agriculture is accepted, what should be done to address the agricultural problems facing the industry?

An outline of the issues to be addressed will have to include the following,

1) Establish clearly which of the available new varieties is most suited to provide both high yields per hectare and fine strong fibre.
2) Encourage seed growers and seed merchanting companies to multiply the best newly selected varieties and bring them to market.
3) Extend the availability and improve the distribution of good quality certified seed. To do this one necessary step may be the establishing a series of small (40 foot container sized) cold stores in the more remote jute growing areas.
4) Should seed buffer stocks be considered essential, the current major seed stockists should be paid to hold strategic seed stocks rather than some less than competent government agency.
5) The jute agricultural research bodies could be given the additional function of Establishing and administering a programme of education and advice to farmers on the best methods of cultivation, harvesting, and retting. If this is not practical, some other body should be set up to perform this function.
6) An institutional or micro-credit programme to make simple in-line seed drills available to small groups of farmers would benefit the sector.
7) Weeding is a major and time-consuming activity in jute cultivation. Research to find a cheap and eco-friendly pre-emergence herbicide is indicated.
8) Mechanical extraction of the jute fibre in ribbon form is being worked on by the CRIJAF and the NIRJAFT in India and the BJRI in Bangladesh. There appears to be a duplication of effort.
9) The Indian machine is claimed to keep the stick intact, to require only a one horse power motor and to give as good a quality fibre after retting as would whole stick retting of the equivalent quality stem. As ribbon retting requires Significantly less water and still be effective than does whole stem retting, this technique should now be put into practice, (and subsidised if necessary) to obtain irrefutable proof of concept
10) At present few farmers practice the balanced use of fertilisers at the correct stage of plant growth and many do not use plant protection measures against pest attack. Instruction and education would go part of the way to improve this situation.

11) The more that can be done to improve primary market structures and thus improve the farm gate fibre price for the farmer, the better.
12) Price returns for higher grades of fibre will have to be improved and this fact made transparent to the farmer. Shortages are likely drive prices up at mill gate and this mechanism may be enough on its own, if not support is needed.

4.3.2 Processing or Conversion

During all three workshops, great emphasis was placed on the need to improve the efficiency and output of jute mill machinery. Assuming that the representative average for the present processing of raw jute into conventional yarns and fabrics is now 40 man days per ton, a target figure was proposed of half that amount or 20 man days per ton. This ambition was considered realistic and desirable by experienced specialists in the industry.

In achieving this major advance in labour and machine productivity certain important constraints have to be observed. For example, the new machinery must be affordable by the industry, which means it will have to be efficiently made in low cost countries such as India, Bangladesh, Pakistan and China. The improved machinery and process should not demand a higher quality of raw material, (the more expensive grades of fibre) to operate efficiently. It should be no less energy efficient than the currently used technology, and occupy less mill floor space per ton of output. It should require generally similar levels of operator skills in its running and maintenance.

Higher speed machinery will certainly bring with it higher maintenance costs than at present but the benefits will be large enough to compensate for higher maintenance costs. At present jute mill machinery maintenance costs are in the range of 4% to 6% of turnover. A fully modernised mill could find that these costs increase to 8% to 9% of turnover. Finally the quality of jute yarns and fabrics produced on higher output equipment must not be inferior and preferably superior to the present output for a given grade of raw material input.

To double machine/labour productivity whilst meeting all of the above performance parameters represents a formidable challenge to textile machinery designers and builders and one which will require a major investment of time, effort and money. Some new technology machines, mainly purchased second hand from Europe and America have already been adapted for use by jute mills with reasonable success. Nearly all the jute spinning machinery that had originally been installed in non-jute fibre growing countries such as Europe has been relocated in Bangladesh with some going to India. Machinery from other countries has followed as has machinery originally installed in Africa, Central and South America, Pakistan, Thailand, Indonesia, and China. This impressive volume of equipment has been used to create a major export yarn spinning industry in Bangladesh and to a far lesser extent in India. It is fair to say that this second hand machinery, virtually all made by the Mackie Company, still has plenty of economic life left in it.

Textile machinery builders from developed economies have now nearly all followed the market to have their designs of machinery built in those low cost countries which have built up major textile processing industries. The jute industry has particular and

specialised machinery requirements, which can rarely be met by using designs originally produced for other long staple textile fibres such as flax or wool.

A programme to develop the next generation of affordable jute machinery will have to be undertaken if only for cost reasons in the countries where the machinery is needed, namely India, Bangladesh, Pakistan and China.

The existing machinery builders in these countries have not had the design capability, nor have the financial resources to develop the wide range of machinery, which will be needed to achieve the agreed target of doubling jute mill productivity. Previous government assisted jute machinery development schemes to meet this challenge in India have had little positive impact. The US$ 23 millions UNDP assisted project in the 1990s funnelled money to short staple jute/cotton blend spinning rather than to jute machinery developers.

A new start and new impetus is needed to meet jute industry's future machinery requirements. At present the main sources of available supply are a machinery company in Kolkata and one in China. Both companies make the jute machinery designed and perfected by a UK Company in Belfast (UK) during the years 1960 to 1970. The fact that machinery built during this time and which has been in operation for the last forty years is a testament to its durability and outstanding efficiency but now it is showing its age.

The industry would like to have available a new and more efficient generation of jute spinning and weaving equipment. The design and development of new concept jute machinery is a time consuming and expensive business and machinery builders soon find out that the risk reward ratio is not in their favour. There is a clear lack of knowledge among machine builders on how to evaluate and select the appropriate technology that is technology that will succeed in mill use and an understandable unwillingness to pile up company debt in the attempt to design, manufacture, and develop new technology.

An overall constraint is the lack of incentives to undertake any of the above developments. A declining global market, low margins and uncertainty are no incentives to undertake new investment.

4.3.3 Markets

1 Traditional

The meaning of 'traditional markets' for jute goods is well understood. It is taken to describe the classical products such as sacking, hessian cloth, and variants such as the wider Hessians used for the secondary backing of tufted carpets and as well as support cloth for linoleum. Jute yarns are also a traditional jute product and were first used to replace flax/linen yarns in the backing structure of machine woven carpets over seventy years ago.

Evidence was presented at the workshops to show the longstanding decline in the traditional markets for mass produced jute products. The reasons behind this decline are well understood. The most affected market has been that of jute used as textile packaging for agricultural crops and other bulk commodities.

The advent of low cost polypropylene plastic resin in the 1960s and 1970s made the efficient manufacture of low cost lightweight bags possible and these bags now dominate world woven bag consumption with the exception of India.

The recent dramatic increase of crude oil and PP polymer prices, if maintained in the longer term, will push woven plastic bags prices into a price range from US$ 25 to US$ 35 cents each. By comparison jute-sacking bags are sold in a range from US$ 45 cents to US$ 55 cents each.

The increasing use of bulk handling and containerisation by road and sea has also significantly reduced the market scope for both jute and woven plastic bags and it is a transport trend which continues to grow. The market for Hessian cloth which is used both for lighter weight bags and for all sorts of loose wrapping and packaging protection has also been declining as alternative options take its place.

In the carpet manufacturing industry the performance of jute yarns has been very positive. There remains the threat that as the speeds of the latest designs of carpet weaving looms increases and if jute fibre qualities decline further that jute yarns even when coated will not meet the strength requirements the new higher speed looms and lose market share to PP slit film yarns on that account.

The vast bulk of jute goods production remains in the classical product lines of sacking bags, Hessian cloth, and yarns for the carpet weaving industry. World wide the current annual breakdown may be assumed as follows.

Heavy sacking bags,	India	1,000,000 tons
(700- 1,100 grams)	Bangladesh	180,000 tons
	China	100,000 tons
	Pakistan	45,000 tons
	Myanmar	30,000 tons
	Nepal	20,000 tons
	Ivory Coast	10,000 tons
	Others (est.)	15,000 tons
	TOTAL	1,400,000 tons
Hessians, (includes	India	320,000 tons
Cloth or bags,	Bangladesh	70,000 tons
and wide or	China	30,000 tons
specialised fabrics).	Pakistan	10,000 tons
	Brazil	10,000 tons
	Others (est)	20,000 tons
	TOTAL	460,000 tons
Jute Yarns & Twines	Bangladesh	240,000 tons
	India	140,000 tons
	China (est)	15,000 tons
	Pakistan (est)	10,000 tons
	Others (est)	10,000 tons
	TOTAL	415,000 tons

World jute and allied fibre output generally runs between 2.5 and 3 million tons a year, with a current median of around 2.8 million tons. About 0.2 million tons of the output is used at village level, so the amount annually available for local mill use or export is some 2.6 million tons. As can be seen above, the 'Traditional' or 'Classic' jute products amount in overall to a total of roughly 2.2 million tons of output. This production of jute goods requires the input of about 2.4 million tons a year of raw jute and similar fibres.

Thus the traditional products represent some 85% of raw jute consumption, village use about 7%, and other uses including non-wovens and diversified products, the remaining 8%.

The lesson that must be drawn from the above numbers is that the immediate future of the industry will continue to depend on traditional markets. There can be no doubt of the efforts the industry has made and is making to diversify its product range and to move towards higher value added products but progress has been slow since the challenges are formidable.

The first battle has to be retaining existing markets for jute goods and to defend them by using whatever marketing resources, which can be brought to bear. In parallel with this defensive strategy there must be a concerted effort to improve fibre quality, to retain the farmer's interest in growing the crop and to reduce agricultural costs in ways that benefit the farmer. Secondly jute mill productivity can, and has to be improved and processing costs reduced. To do this, investment in machinery design and development is clearly needed. To establish the need for funding for these industrial and agricultural objectives is an essential part of the road map's purpose and has helped shaped its basic assumptions.

To set a defensive or market retention strategy as is the one outlined here does not and should not mean neglecting the pursuit of 'diversified' or added value product development and marketing. As has been pointed out several times, active encouragement for the production of increasing amounts of higher grade fibres will prove essential for the manufacture of added value products.

Equally, the search for new markets, which can use the lower grades of available jute and kenaf fibres, should be a fundamental part of the road map. In the case of the latter, special attention will have to be given to have jute service the growing market for natural fibres to replace glass fibre in the reinforcement of composite materials.

It is apparent that both defensive and expansionist policies have to be employed in tandem, as in the case of the jute industry, these policies will turn out to be mutually self supporting.

In looking at the current markets for jute goods, two facts stand out. One is the overwhelming reliance of the Indian industry on the production of sacking used in the internal market; the other is the striking success of the export yarn manufacturing business especially in Bangladesh.

The Indian sacking market is underpinned by the Government of India packaging legislation which mandates the packing of food grains and of sugar in jute containers, most of which are purchased and distributed through the GOI agency. As long as the

present level of official support remains the use of jute sacking will be maintained and even increase in volume in India. The GOI wishes to move towards a freer market in packaging materials and has in mind a gradualist approach to future reductions in the amount of food grains that have by law to be packaged in jute sacks.

On economic grounds there is very little to choose between a jute sack costing US 50 cents and which has a lifetime use of say 5/6 journeys to carry produce and the utility of a woven plastic sack costing US$ 25 cents and which is used for 3/4 journeys.
The first cost of a bag is important, no doubt, but for a national economy the overall lifetime utility is even more decisive.

In environmental terms jute wins the competition hands down. Provided jute, a renewable resource with a very low environmental footprint it is to be greatly preferred to using plastic packaging, which for the next few decades will inevitably be based on mineral oil, a non-renewable resource and one which costs India valuable foreign exchange.

In social terms, the arguments are also almost all in jute's favour. We can note the part time employment jute gives to about 4 million farmers in India and to the several hundred thousand employees in the mills and also needed for raw jute transport and jute goods distribution. As we have noted in the case of agriculture these may be arduous and poorly paid jobs but they are available to people at the bottom of the income scale and for that reason alone these jobs are all the more important for social reasons.

The Indian government recognises that the jute industry occupies a 'special' position in its national economic priorities.

We can turn now to the undoubted success that the jute export yarn industry has had in both Bangladesh and India. In Bangladesh there is general acceptance that the nationalisation of the jute mills in 1973 has left problems that have yet to be resolved. The cumulative financial losses of the earlier BJC and of the BJMC mills (jute & jute Mills Corporation) are very substantial.

By concentrating on the export yarn market, the private sector mills in Bangladesh have shown that the jute manufacturing can be profitable. The BJSA (Bangladesh jute spinners association) receives a small export incentive per ton, which has certainly been a great help, but it has not been the decisive factor in the success of the yarn mills. They have relied mainly on their own management expertise. The yarn spinning industry continues to expand its capacity and its overseas markets are growing although more slowly than the present rate of capacity expansion.

2 Diversified

When it comes to describing 'diversified' products the meaning is less clear, as many of the items so described, like rope-soled shoes or espadrilles and floor or wall coverings have been made from jute fibre for at least the last seventy years. Perhaps a more concise description of where the diversification efforts of the jute industry should be aimed could better be called 'value added products.'

The use of mineral oil free jute bags for coffee and cocoa and edible nuts is often referred to as a diversified product. The mineral oil used to soften jute is replaced by

an edible vegetable oil so that such bags are 100% food grade. It costs a little more than using mineral oil but buyers for such bags usually pay a small premium.

Having looked at the products which dominate the traditional or classical jute goods scene, what is the current state of play in the 'diversified' or added value sector?
This is an area in where India has set the pace, assisted by its own large internal market for a wide range of consumer products some of which can, or could be made using jute.

Output of Indian diversified/added value products
Estimated sales for 2004 -2005 year are -

	Sales in millions of Rupees	Estimated jute content
		metric tons
Shopping & Hand Bags	1,400	14,000.
Floor Coverings	1,200	14,000.
Decorative & Household fabrics	900	7,000.
Geotextiles	450	13,000.
Composites & reinforcements	150	5,000.
All others	800	16,000.
(including canvas webbing and		
unspecified).		
TOTAL	4,900 millions	69,000 tons

As the 'official' published statistics are expressed in terms of sales in rupees rather than by weight, the amount of jute contained in the various products has had to estimate. The actual numbers could be -10% to +20% of the above estimates. In addition some of the yarn and Hessian cloth used for the value added products might be already included under the earlier Indian production numbers. In any case it appears that the volume of value added products being sold to non-traditional markets for jute products amounts to about 5% of the overall total of jute goods sold by Indian producers.

Of the total sales value of 4,900 million rupees the export market is worth about 3,200 million rupees or about 65%, so the rate at which sales of this value added products can grow is at present, and likely to remain, heavily dependent on exports.

5 STRATEGY PROPOSED TO ACHIEVE THE OBJECTIVES

Future demand for jute fibre as a raw material stems primarily from the requirements of mills in India, Bangladesh and Pakistan and to a lesser extent in China. Even if overall demand declined by 50,000 tons a year that amount represents less than 2% of the average Indian and Bangladesh crop volumes. The jute farmers can accommodate a slow decline in demand but the mills would find themselves increasingly competing in price especially to secure the higher grades of fibre they require.

The basic dilemma remains that higher farm gate prices for jute would encourage farmers to produce more or better quality fibre, but at the same time the resultant higher prices for manufactured products would shrink the available markets for jute goods. It may be possible depending on the detailed commodity chain analysis to strengthen the prices that farmers obtain in hand as opposed to nominal ones without increasing jute mill prices.

In India formal industry projections have been published which propose a twenty percent reduction in sacking output. This is to be compensated by a corresponding twenty percent increase in diversified products by the year 2010.

The key element in any Road Map is markets and marketing. The industry has long concentrated on trying to reduce prices through higher yields and cutting processing labour costs combined with trying to develop techniques that would make jute more like other fibres with larger market demand. In doing so, there has been considerable success. Yield rates have gone up with falling real fibre prices for farmers increasing competitiveness. There has been some reduction in processing costs. A considerable effort has gone into developing higher quality yarns and fabrics that potentially could increase end-use applications.

5.1 Markets

Markets and marketing remain the weak point. Lower real costs of jute fibres have not arrested the global decline in exports of traditional products such as sacking, hessian, and carpet backing. There was no way costs could be reduced enough to compete on price with substitutes. Too much concentration on this aspect, and neglect of other supply side and marketing weaknesses have together resulted in a high level of dependence on markets in jute producing countries, particularly in India.

The impact of lower cost synthetics has gone through a cycle. The initial affect was that it gave buyers an alternative that they exercised as much due to unreliability of supply and prices as falling synthetic prices. Although in the case of sacking at least, substantially lower prices were very important. Rising oil prices now offer a substantial reduction of the price advantage held by synthetic substitutes.

At the same time, environmental considerations that favour use of natural fibres such as jute are gathering ground even if they are not yet strongly reflected in consumer buying decisions. For example ‘Soil Savers’ are heavy open woven fabrics made with the lowest grades of mill sweepings and can contain 4/5% of mineral oil. These soil savers are sold as being environmentally sake and friendly. There seems little doubt that the only safe course for the jute industry over the long term is to progressively switch over to the use of mineral oil free fibre lubrication in the spinning process.

This transition will clearly take time but it cannot be put off indefinitely especially for products destined to contain foodstuffs without a high risk of losing market share in export markets.

Estimated Global Scope for Jute
in tons per annum

Item	Jute	5 years Trend	5-10 years Potential Jute
Sacking	1,400,000	- 250,000	1,400,000
CBC seconday backing	25,000	- 1,000	60,000
Yarn - jute relevant	322,000	75,000	450,000
Hessian	483,000	- 10,000	473,000
Carpets - jute relevant	10,000	- 2,000	30,000
Decoratives & household furnishings	500	2,000	20,000
Other textiles	10	1,000	30,000
Geotextiles	10,000	- 2,000	20,000
Felt	2,000	1,000	6,000
Tarpaulin	38,000	- 2,000	40,000
Canvas	50,000	- 2,000	48,000
Webbing	600	-	2,000
Twine	100,000	10,000	120,000
Shopping bags		20,000	60,000
Plastic reinforcement	-	1,000	60,000
Market Garden Products	3,000	1,000	10,000
Total	2,444,110	- 158,000	2,829,000

The current trend for most end uses is declining demand with the exception of Indian demand for sacking and yarn in export markets. Assuming that the target of reducing Indian consumption of sacking is valid, even with some return to jute in China and Thailand and a defensive campaign, all other actions would have to compensate for such a development. The current trend appears to lead to a reduction in demand for jute of around 160,000 tons with much depending on demand for sacking in India.

5.1.1 Traditional Products

(1) Sacking

The use of jute as sacking to carry commodities is what led to the growth of the industry and the end-use still dwarfs all other uses. There is no sense in developing a strategy for jute that does not address this application. No other potential end-uses or a combination of them could adequately compensate the volumes being used for the purpose in the foreseeable future.

The analysis presented in this report leads to the conclusion that the margin of advantage enjoyed by synthetic packaging over that of jute has been and is declining. At some point in the future, the price advantage of synthetics over jute is likely to be very substantially reduced.

Given the sensitivity of the sector to use as sacking in the Indian market and the importance of protecting the geo-enviro-culture of the millions of farmers and dependents growing jute, the Road map strongly supports continuation of the Indian

regulatory packaging practice and its possible extension to other jute producing countries. Demand for jute sacking is in any case not entirely due to the mandatory order, jute sacks are in fact often favoured by many end-users over alternatives. At the same time the consensus reached between the Government and the industry to try to reduce the proportion being consumed within the economy while increasing exports of diversified products is approached in this section of the report.

The recent floods in Mumbai in 2005 and a campaign in Bangladesh are leading to consideration of bans on plastic bags out of environmental concerns and although this does not automatically favour jute, it does offer an opportunity for the fibre. The 'green' credentials of jute bags and fabrics are excellent. There is rapidly growing world wide awareness of environmental problems and of the need for sustainable development. The use of plastics in packaging and in man-made fibre textiles, are increasingly seen as part of the problem and not as part of the solution.

There is very little that can be done in the face of replacing jute sacks through bulk handling except perhaps to focus on part of the distribution chain where sacks are more useful. Aggressive lobbying and publicity in favour of jute growers has been suggested as one means of raising public awareness of the replacement of jute sacks by bulk handling in the Cocoa and coffee trades. So far there has been little resolve by the jute industry be more confrontational on this issue.

Jute sacking has traditionally been simply offered for sale rather than marketed in export markets. This leads to miss opportunities. An example is provided by the recent floods in New Orleans in the USA following the hurricane Katrina in 2005 where large plastic sand bags were used to try to patch up the break in the levy while jute sacks may well have been technically more effective. Similarly, when plastic sacks are dropped by air in regions suffering acute food shortage, they burst far more easily than jute sacks, yet there is no attempt to promote jute for these applications. In an emergency, much is determined by rapid availability and this issue has to be addressed.

The consumer market is a somewhat easier target as buyers of carpets or shopping bags are increasingly prepared to pay a small premium for eco-friendly and recyclable goods. Industrial users or those in the food grain or agricultural packaging business want value for money and a textile container that will protect and not damage the contents put inside it. The action of the coffee and cocoa processing industry who pressed for and obtained the specification and use of mineral oil free bags, is a clear indication that packaging standards continue to become ever more stringent. If jute bags want to protect their clean safe and eco-friendly image, and the same goes for jute geo-textiles, then the sooner the industry switches entirely to mineral oil free batching lubricants the better.

Some commodities that offer fresh opportunity for use of jute packaging include rubber and cotton where there are many technical problems caused by slivers of plastics contaminating during its transport and processing. An application based marketing approach could target such end uses, particularly for mineral oil free packaging.

Some former markets for jute sacking have been badly neglected. The relatively rapid decline in consumption of jute sacking in Africa and South America is a case in point.

There have been no thorough studies for decades on the two markets and distribution and availability of jute sacks. Without market information, it is difficult to develop strategies to minimise rates of replacement and hopefully build on sales.

(2) Hessian

One problem in analysing the declining trend in hessian exports is that we know relatively little about many of the end-uses for which it is used. Hessian is a general-purpose long established fabric which is used often to produce lighter sacks and for other forms of packaging. But it finds its way into many other market applications and there is a need for greater information on the latter in order to target the fabric at potential growth areas and away from declining markets.

Market potential is often largest where a product is sold to end-users who select it for applications that are entirely defined by immediate market needs. Use of hessian for grass clippings or to place under cars to be repaired, geotextiles, landscaping, indoor plant displays, as insulation material, substrate for lamination, and for a myriad of other applications we know nothing about represent spontaneous product-market developments that could be taken advantage of.

Despite its importance in volume terms, exports of hessian have rarely been followed up by market research and sales strategy. It has been left to a largely market driven demand for a value product.

(3) Carpet Backing Cloth (CBC)

For a long time many have advanced explanations or the decline and in the end virtual demise of the application that used to account for 250,000 tons at one time. Technical explanations seek to explain why jute was no longer the best material for the application and that once carpet manufacturers had changed to synthetics it was impossible to get them back. In addition some consider that CBC production is not profitable enough to be interesting. Some of these arguments are myths. There are seldom market developments that are not irreversible.

The former buyers offer a slightly different perspective. They emphasises that in the 1970s when their demand was rising, producers defaulted on contracts, leaving them in the lurch, and that is why they approached synthetic suppliers. After the process of change had started, the new suppliers were able to invest in technical improvements and economies of scale that made the decision to switch ever more justifiable.

However, the synthetic suppliers are now in trouble. Their products too have become commoditised and are no longer profitable. The pressure on them too is to cut costs. Many suppliers are in financial straits and some leading ones are on offer for sale. This is clearly a window of opportunity for jute suppliers but the latter appear not to be interested because production of CBC is not profitable at historic prices.

Given the fact that there appears to be some leeway on prices that buyers say they are willing to consider and the possibility of cutting costs through higher yields and lower conversion costs, it may well not be wise to leave this window of opportunity unexplored.

5.1.2 Diversified Products

Looking ten years ahead to and forecasting world market potential for non-traditional jute products and jute fibres, one could reasonably anticipate the following market profile.

Shopping and hand bags	60 thousand tons. (250 million units a year).
Floor coverings	30 thousand tons.
Decorative and household fabrics	20 thousand tons. (Jute content).
Geotextiles	30 thousand tons.
All other textile end-uses	
both industrial and consumer	30 thousand tons.
Jute fibre used in composites and	
plastic reinforcement	30 to 100 thousand tons.

The use of jute fibre in composites will add little or no value to the turnover of most existing jute mills as the composites will generally be produced in the user countries, which means primarily in the USA, EU, and Japan. The benefit may be felt at mill level by an external increase in demand for some of the lower grades of fibre, which are not ideal for spinning.

Jute mill made non-traditional products by 2015 could reach some 150,000/200,000 tons a year. One can expect the bulk of these items to be made in India with Bangladesh following in its footsteps and possibly Pakistan, diversifying away from sacking for domestic use. China and other jute processing countries are likely to play a minor role in the manufacturing and marketing of these products.

The Indian government purchases on its own account about 600,000 tons a year of jute sacking, it pays the equivalent of US$ 45 to 50 cents for each 50 kilo contents bag, depending on market circumstances. It is reported that the GOI wishes to reduce the scope of the packaging order and gradually to liberalise the market for food grains sacking. The plan for the next five years is that about 20% of the current output of Indian jute sacking be switched from sacking to value added products.

This would require a switch of about 200,000 tons from the bottom end of the jute products value index to the top end of the scale. In other words to retain the same overall volume throughput across the industry, the value added sector would have to quadruple in size. This begs the question of whether enough superior jute fibre can be quickly made available to fill the quality needs that such a sudden and dramatic change implies. It is most unlikely that world value added markets can be expanded with such rapidity; it would mean a 30% annual compound annual growth rate.

What then could be a feasible target for the Indian jute processing industry to aim for in ten year's time bearing in mind both the raw material issue and the machinery and technology and competition issues involved? A doubling of the volume of jute goods used in value added products to 150,000 tons would be ambitious as such a target implies an annual compound growth rate of about 8%.

During the next few years the Indian producers of value added jute goods could expect to encounter additional competition in export markets for value added goods made in Bangladesh.

No one at present can foresee for how long or in what form the Bangladesh Jute Mills Corporation (GOB owned) or the mills of the Bangladesh Jute Mills Association (partly privatised but largely government owned mills many of which are semi-bankrupt), will continue. If many mills are fully privatised, some may redeploy their efforts away from traditional products and into the value added sector. Bangladesh with its higher availability of superior grades of jute is well placed to enter and compete in export markets for value added jute products.

In the world textile industry, jute fibres are one of a wide range of competing fibres. Around 3 million tons a year of jute in an overall marketplace that process and sells 30 million tons of natural fibres plus another 40 million tons of man made fibres and filaments (including Polypropylene). As a long staple fibre made from the stem of a plant, jute's nearest competitor in technical terms is flax/linen. Flax/linen fibre has a world output of 450,000 tons annually, but it is superior in its performance in consumer textiles as compared with jute. In these applications jute is the poor relation so to speak.

Flax/linen used to hold major markets in industrial textiles as jute does now but over the last fifty years it has declined in overall volume and its use is now concentrated in the apparel and clothing sector and in the household furnishings sector. Jute can follow flax/linen into some of the home furnishing uses but it will not easily penetrate the apparel market. This is because its much higher lignin content (than flax) makes it difficult to finish in fabric form. Lower lignin content jute fibres are a possibility, and may well become a market reality, but flax is capable of being spun to much finer counts than jute and will continue to retain an important competitive advantage for this reason.

Finer jute yarns do open up the tantalising prospect of developing fabrics of mixed yarns and there are a large number of SMEs in India offering resulting products. Although the cost of these finer yarns is high and this looses some of the natural competitive advantage they may have otherwise enjoyed, denim jeans in India do use jute and there are prospects of developing niche sales based on natural characteristics of the mixed fibre products.

In Bangladesh emphasis was on producing a finer softer fabric and a NORAD Project has developed modest sales of very high value hand finished cushion covers and the like. Initial market investigation indicates good prospects but this requires up scaling production to reduce costs sufficiently to take these products into the mainstream markets.

The potential for jute to be used for the manufacture of pulp and paper is likely to remain an area for academic research rather than practical application. In the opinion of the IJSG road map consultants the application and development of jute fibres for plastics reinforcement is of more immediate commercial concern.

5.2 Agriculture

Very little has been published on the part that jute plays in the portfolio of farmer activities and land use allocations. No 'Road Map' can be complete without including such analysis. Farmers are traditionally price takers in commodity production. They are offered prices by buyers and have to make their own decisions on future plantings.

In the case of jute, it is not so simple since India has a MSP and sellers have a theoretical right to sell at the MSP to the Jute Corporation of India. In Bangladesh, public sector mills offer prices and sellers have the security of these published prices for which the Government can be held responsible.

Reality for smallholders is very different from how things are meant to work in theory. Everything depends on the loan structure being used by the farmer and options on channels he can sell to. Some are within structures of co-operatives or other associations, which can help, raise finance or act as sales channels. Because of the paucity of farmer system information, we can only guess at what motivates farmers to grow jute or even particular varieties of jute. We know only that the allocation of land area to jute is remarkably consistent even if it is falling in Bangladesh, China and Thailand.

Ever since jute has been traded in world markets there have been efforts to increase yields. The objective of doing so has always been to reduce prices by reducing costs. Although this can be justified as being designed to make the farmer richer in terms of output per area unit, the farmer must weigh it against additional incremental costs attendant with such policies. The balance has favoured increasing yield rates because the latter have risen in most jute producing countries as they have in the production of most agricultural commodities. The improvement has not been enough to prevent a decline in real income from jute.

Availability and cost of certified seeds is an area that is normally addressed in the search for higher yields. They have obviously been available and bought and used because yields have increased. Unfortunately, higher yields have been accompanied by lower quality fibre mix. The farmer is not given sufficient monetary incentives to opt for better quality fibre and has no reason to choose any other course of action than maximising fibre production.

Those producing breeder seeds are now aware of the need to balance yields with fibre quality and claim to have developed lower lignin higher quality fibre seeds. It is then a matter of getting these to the farmer in sufficient quantity and providing incentives to go for these newer seeds than those that give him higher yields. Unless there is an adequate premium for producing a better mix of quality, and there has not been one so far, the farmer is unlikely to use these new seeds.

The workshops held to prepare the jute road map highlighted the need for action to improve the jute seed situation. Most of the seed linked factors, which limit jute fibre yields, reduce fibre quality, and which increase the cost of fibre production were identified, and they can be briefly summarised as follows.

1. The widespread use of relatively old and obsolescent seed varieties, (20-30 Years since initial introduction), has reduced seed yields when the plant is

grown as a seed crop and has made jute plants more susceptible to disease and pest damage, whether grown as a seed crop or a fibre crop.

The newer varieties of high yield seed, which have been released for use, are not reaching the seed producing farmers or the fibre crop farmers.

2. The seed crop in India is grown mostly as a rain fed crop and is dependent on timely monsoon rains. Any late rains or inclement weather has a major impact on the seed harvest, and this in turn impacts on seed availability in Bangladesh

3. The seed growers in both countries often do not conform to best growing and harvesting practices

4. The market for jute seed is notoriously volatile. The result is that either seed prices are too low to properly reward the growers or so high that they inhibit fibre growers from planting.

A series of strategic actions targeted to improve the jute seed situation.

- Actively encourage the replacement of obsolete seed varieties in favour of new varieties which are available. These are of high yielding types and include varieties capable of producing the higher fibre grades, which are in increasingly short supply.

- Make sure that the new seed varieties are suited for use in zones best suited to seed as well as to fibre production. In practice this will mean away from existing high humidity areas towards drier zones. In Bangladesh this strategy may not be applicable as there are fewer areas suited to specialist seed production

- The new seed varieties when released must be well adapted to regions of more divergent weather extremes especially in India.

- Encourage the rapid uptake and widespread dissemination in use of the selected new varieties by giving price premiums or other worthwhile incentives to encourage more farmers to take up jute seed cultivation.

- Supply subsidised and/or free starter Mini-kits to progressive seed farmers, for trial purposes. The purpose of the exercise would be to establish seed yields in practice, to discover the resistance in the field of the new varieties to disease and pests, and to establish how adaptable the new variety is to divergent weather conditions.

- Develop buffer stocks of seeds to be held in India and Bangladesh. Preferably located to assist both fibre and seed growing regions. Localised portable cold stores may be one answer to getting good certified seed out and into use in the more remote growing regions.

- National seed certification agency enforces purity norms and varietal isolation techniques before being permitted to issue certificates for top quality seed. Where such norms have or cannot be enforced seeds can only be certified with a quality reservation.

- Encourage the jute agricultural research and development institutions in India and Bangladesh to play a pro-active role in getting new varieties speedily out and into commercial use. They should be strengthened to play an important and vital part in teaching and demonstrating the advantages of new varieties to farmers.

The above would improve the often precarious seed situation and bring new varieties into full commercial use as soon as practicable. Improved seed quality and supply will not however on its own solve the fibre supply and quality issues described in the road map. A broad approach is recommended which includes financial incentives, instruction to farmers on improved growing and retting techniques; practical demonstrations and effective information packages given out along with the new seed varieties are absolutely essential.

Farmers are slow to adopt new practices unless these can be shown to work reliably in their own local environment and lead to higher incomes. The jute industry is the most directly interested body in better fibre and improved performance. In the past the industry has adopted the view that agricultural issues were not directly their problem. It was left to government departments and institutional agencies to handle the raw jute production issues. It is apparent that more direct intervention and encouragement in agricultural matters by the jute manufacturing industry would pay off with important and valuable long-term dividends.

If jute is to become more competitive, it is necessary to increase yield rates at farmer level and this has largely been happening and is still being developed with the provisos mentioned above. The other side of the equation is to greatly reduce conversion costs.

These start at farm level. There have to be measures to reduce labour inputs in the retting, harvesting, and extraction of jute. Good planting practice in terms of spacing and broadcast of seeds, minimising need for water for retting and in extraction, and mechanised stripping through use of mechanical ribboners that have been covered in the report.

5.3 Conversion

There was consensus at the workshops and in submissions that there is a need to reduce the cost of conversion. Again, it is difficult to be precise as to potential gains without a detailed commodity chain analysis, but the industry is convinced that there are substantial gains possible. Some have already been experimenting with changes designed to halve labour inputs but it was felt that there were gaps in availability of suitable machinery and spare parts and maintenance levels that had to be overcome as well as a need for assistance to motivate the changes. At the end of the day, only potential profitability would lead to investment.

A wish list of new technology machines was presented to the Geneva workshop by a member of the IJSG private sector consultative group. It proposed that a series of machinery be developed over the next decade to 2015. Whilst addressing some of the technological details of the new machinery requirements, the submission did not give any indication as to what this programme might cost nor which companies might carry it out.

This subject will be addressed below, but due allowance should be made for the fact that the development costs indicated are strictly estimates only and that the companies mentioned may or may not want to play any part in the proposed programme of machine design and development.

5.3.1 High output Spreaders.

By comparison with current technology effective output per machine of the new design will be increased by fifty percent. This productivity improvement will however be offset by moving from one spreader passage to two sequential passages. This will improve sliver evenness by thirty to forty percent, and allow more even distribution and penetration of batching emulsions. Finally the proposed system permits cut or uncut jute to be presented root first to the pins of the breaker card.

Since heavier morah weights (handfuls of raw jute) can now be used the extra labour of managing the feed and automatic doffing of the second passage is more that compensated by savings in morah piecing out work and higher individual machine output. Electrical power input per kilo output will be 25% to 30% higher than the present single passage norm.

Estimated cost of developing the machinery to proven mill production standard is US$ 1,000,000.

Possible applicants for a grant aided or soft loan aided machinery development programme include three from Kolkata and one from China.

5.3.2 New design high output Breaker and Finisher cards

By comparison with current technology, the effective output per carding machine will be doubled. The sliver regularity produced and fibre fineness to length ratio will be at least equal to or superior to current breaker followed by finisher card technology. Under card waste and caddis will be the same as for any current grade of raw material. The finisher card may be fitted with twin drawing heads at the delivery. Short-term sliver evenness will be similar to the usual standard emerging from the front of a first spiral drawing frames using present day technology. However with the fitment of an electronic auto-leveller to the drawing heads will allow long-term levelness to be improved by 33%. In the first stage of development the breaker-carding unit will be fitted with a roll former at the delivery. At the second stage of development the breaker card will be linked to feed the finisher card directly by means of a lapper transfer device. Power consumption per machine hour will increase by sixty percent but in terms of per kilo output, power consumption for the new two stage carding and draw head process will fall by 10%. Under card waste (Caddis) will remain in the same proportion to fibre throughput as in current technology cards.

Estimated cost of developing the new complete two card process with drawings head with auto levelling and card delivery feed linkage to mill production standard is US$ 2,200,000.

Possible applicants for a grant aided or soft loan aided machinery development programme. There are potential applicants from Kolakata, Coimbatore, China and possibly Chittagong.

5.3.3 High speed & high output drawing frames

The present multi-head spiral drawing frames for the first, second, and or second intermediate passages will be replaced by single head delivery machines fitted with large cans, which will run at 250/350 metres per minute effective delivery speed. One head will have the sliver output of at least five heads of the current screw gill design. Labour productivity will be double or triple the current levels. The second passage machine will be fitted with an electronic sliver evenness autoleveller.

Sliver quality in terms of evenness and parallelisation will be 10% better than the equivalent amount of working over screw-gill drawings due to better short length fibre control.

Finisher drawings will be redesigned as multi-head delivery machines but with twice the can size at delivery and with ten instead of twenty deliveries per machine. Running speed will be doubled and output twice that of today's machines which operate on 12 pounds per 1000 yards sliver weight at delivery.

Estimated cost of developing a three stage chain-gill series of drawings and a rotary (or other gill propulsion system) multi-head finisher to mill production standard is estimated at US$ 1,500,000.

Possible applicants for a grant aided or soft loan machinery development programme include 3 from Kolakata and one from china.

5.3.4 Large package ring spinning

The machine will be optimised for jute spinning and will have a variety of special features among them are large feed cans, double draft zone, long yarn collection pirns. The machines will be either made as single or double-sided frames with 200 spindles or more depending on pitch and ring diameter. Electronic stop motions will be developed to suit jute with frictionless contact and the frame drive will be variable throughout the length of the ring build.

In the initial stage of development will be manually doffed but the design will made in such a way as to permit the subsequent adoption of a doffing robot.
Speeds will be those normally encountered in large diameter ring spinning and typically between 5,000 and 6,500 rpm. Assuming two sides per spinner labour productivity will be doubled. Yarn quality will be strictly comparable with conventional slip draft or apron draft flyer spinning the yarn will be slightly hairier than flyer spun. This defect can be countered by a modification to be fitted (if needed) to the precision winding stage of the sales yarn process. Electrical power consumption per kilo of yarn output will improve by 15%.

Estimated cost of machinery development to full mill acceptance standard excluding the doffing robot is US$ 2,600,000.

Possible shortlist of contenders for the design and development programme under a grant/soft loan aid programme, include two from Kolkata and one from China.

5.3.5 Automatic spool winding from ended flyer bobbins or from ring spinning rings

This machine will be an adaptation of the existing technology used mainly for winding pirns of conventional heavy count textile yarns. Running speeds will be 20% higher than current jute machinery winding speeds when working from pirns and 10% higher when working from solid ended bobbins. The machine will have 24 or 32 winding spindles arranged on one side and attended by one or two operators instead of four or eight as at present. The labour content per kilo produced on the new machine is thus quadrupled. The cost offset to this large labour saving is that capital costs will be ten times that of today's manual winding machines per spindle. On the positive side is the fact that all yarn will be automatically cleared for slubs and thin places. When these are detected they are removed and the spindle recommences winding automatically. The power requirements will be 15% higher per kilo produced than manual winding and maintenance costs per spindle significantly higher than manual winding (but within the extra costs anticipated for overall mill parts and maintenance as a percentage of turnover mentioned earlier). Spool package quality will be significantly better than that produced by manual winding.

Estimated cost of development to full jute mill acceptance standard is US$ 2,000,000.

Shortlist of contenders for has not yet been established but the eventual supplier is likely to come from outside the current jute machinery-manufacturing sector.

5.3.6 Large package ring twisting frames

A large number of these machines have been imported second hand from Europe and North America. There are now few suitable machines coming onto the market and the future needs of jute mills will at some point during the next 5 years have to be satisfied by low cost locally made machinery. The technology and machine design parameters are well known and a working design can be copied by any capable textile engineering concern. The opportunity for labour saving is limited as this type of machine is already in use in many jute yarn mills. To build such a machine, it must first be drawn up and component-manufacturing specifications established by any would be manufacturer. That costs a significant amount of money and to date no machine builder in the Indian subcontinent has come forwards with a good enough design at a price that competes with second hand machinery. Some initial financial aid would pump prime a potential machine builder and get a better machine on the market within a couple of years.

Estimated funding needed for a jute yarn twister design and manufacturing programme is about US$ 400,000. Potential builders are to be found in Bangladesh, China and India.

5.3.7 Precision winders for sale yarn

These machines are already built to the industry's satisfaction. There are two suppliers one in India and another in Bangladesh. To combat the yarn hairiness issue mentioned under ring spinning it is recommended that a new and improved design of yarn shearing device be created. This will improve sales yarn quality and the weaving performance on the carpet looms used by the jute yarn industry's customers. The envisaged device would be attached to the precision winder and an extra fitment and would improve quality without and noticeable extra labour or energy costs. Capital

cost per unit would be low enough to make it an attractive investment if made in the Indian subcontinent.

Estimated cost for development of a shearing device for jute yarn to mill acceptance, circa US$ 100,000.

Potential suppliers would be any capable precision engineering company.

5.3.8 Shuttleless loom for Hessian to replace the current overpick shuttle model

There are several designs of flexible gripper rapier looms currently under trial in Kolkata mills. In addition there is extensive jute mill experience on running Sulzer, Dornier shuttleless looms in India. The experimental looms currently on trial have been supplied by two competing Chinese manufacturers. Also under trial is a modified version of the Mackie MLS loom (originally a 1980s design) as modified by an Indian machinery builder. One or other of the trial looms may find some degree of mill acceptance but that remains to be seen.

The current mill preference would be for a Dornier quality machine made new in India but priced at the cost of the second hand Dornier looms currently imported from EU or USA. More certain of customer acceptance would be a Dornier design loom or similar made specifically to suit jute at an economic price in India. Productivity by using this technology will be four to six times the present level, which is achieved by two conventional shuttle looms being operated by one weaver. (This calculation assumes a double width shuttleless loom with centre tuck in running at 300 picks per minute, 80% efficiency and having four looms operated by one weaver).

Power requirement per metre of hessian cloth woven on such a machine will be about 20% higher than the current shuttle loom. Working conditions will be greatly improved. The main area of contention will be the redesign and development of the Dornier style loom to enable it to handle the lower quality hessian yarns commonly produced in most jute mills.

To date a good commercial performance on low-grade Hessian cloth has not been achieved and in fact it may never be fully achieved. However, provided the yarn raw material cost is not more than say 3 to 5% higher than that used for shuttle weaving and that some of the other new spinning technology improvements discussed above are in place, the shuttleless weaving for hessian can become a viable commercial proposition for ‘common’ hessian cloths. Up to now the shuttleless weaving units in the industry have concentrated on manufacturing the more expensive lino hessian grades of cloth which use higher grades of raw jute which in turn produce a better yarn quality than that affordable by a mill for what one can call ‘common’ hessian.

Estimated development cost for a machine builder to customise and modify a Dornier style loom design for the jute industry in India, Bangladesh, Pakistan or China will be US$ 1,000,000.

Possible list of contenders for the Hessian loom development programme, again are primarily from India and China.

5.3.9 Sacking loom for narrow sacking fabrics

This machinery design problem has not been solved to the commercial satisfaction of jute mills in India and Bangladesh. But it is a problem that had been solved many years ago with the introduction of shuttleless loom technology in many other countries. Mills were installed successfully using shuttleless weaving for heavy sacking in Thailand, Indonesia, Cambodia, a number of African countries, and Cuba. The reason for this apparent contradiction was that in sack markets outside India where local manufacturing unit was set up, bag users were prepared to accept and use a bag woven in a slightly different way to the standard Indian or Bangladesh specification.

In a typical B Twill or heavy C bag the conventional construction of the fabric calls for the two ends of finer warp yarns to be placed on the warp beam and the 'heavy' or 32 pounds per spindle weft yarn to go into the shuttle of an overpick shuttle loom and be woven in tightly making what are known as 'true 'selvedges.

Starting in 1958 a series of shuttles looms made by the Mackie Company, the One Mack series were designed to work with the heavy yarn on the beam as warp and the light yarn inserted as weft in a series of double shots. The latest version, called the MLS loom, came on the market in the 1980s. It runs two cloths at a time and can just about handle the low quality yarns commonly used in the conventional shuttle using sacking looms. With some minor re-design and improvement this machine would run effectively in Kolkata mills or Bangladesh jute mills. Productivity per weaver would increase by 2.5 to 3 times using MLS looms. Power consumption would be lower per metre of cloth woven, and the current qualities of yarn would have to be marginally improved.

The most inexpensive and practical way forward would be to officially allow the so called 'reverse weave' sacking construction, to be sold on the same terms as the current specifications of classic B Twill bags of similar density and weight. The Indian government buys an immense amount of sacking each year. It can be demonstrated that 'reverse weave' B Twills or heavy C sacks will perform as well in use as the conventionally woven ones. To allow this weaving technology to take off it only requires that the official bag specification be widened to include reverse weave. With that simple step the door could be opened to using this new technology.

Estimated funding needed to perfect the MLS for commercial mill use in Indian or Bangladesh mills is US$ 750,000. Possible suppliers of the MLS technology looms are from India and China.

5.3.10 Automatic jute bag sewing unit

This new development is apparently under way with an Indian company. At present jute sack sewing although highly efficient, is very labour intensive. The objective is to radically reduce unit labour costs per sewn bag, in effect to replace labour with machinery. The amount of labour requires to sew 100 bags per hour will fall from about one person (One sewing plus one piling and handling) to perhaps one fifth of that number. The task of automating bag sewing has been attempted in the past by a French company which did not succeed in making a commercial design as the job took longer and was more difficult than anticipated. It can be expected that the present effort will also take longer and cost more than anticipated and thus require additional funding.

Estimated additional funding in prospect is US$ 300,000.

The most likely participant would be the existing company presently undertaking the current machine development programme.

The time horizon for the design and development work in the overall programme will depend on the willingness of the parties to move ahead and more importantly on the availability of finance. In some cases manufacturing licences or partnership agreement may have to be obtained from overseas participants in Europe and elsewhere. Generally mill trials will be underway with prototypes in mill use within 3/5 years and full availability of mill-worthy equipment freely available within ten years.

5.3.11 Summary of the machinery development programme

A grant/soft loan/aid programme as outlined would create a range of new technology jute processing machinery which would enable jute mills to halve their labour requirements per ton of yarn, cloth or bags produced. The cost and raw material quality required to do so would remain substantially in line with today's levels, Power costs would be marginally reduced, but the cost of parts and maintenance would increase as this higher speed more sophisticated machinery will prove more demanding in upkeep.

After allowing for the increased interest and depreciation costs the end result will be to reduce jute conversion costs per ton of yarn or fabrics by between 10% and 15%. The relative cost and quality of the raw jute input (the raw material) used by the proposed new technology would remain at the same levels as currently used.

The total value of the machinery development programme outlined in the Road Map is about US$ 11,000,000. (Allowing for inaccuracy in these estimates, the range of financing involved could range from US$ 10 millions to US$ 14 millions).

6 ACTION PLAN

6.1 Recommended programmes

6.1.1 Further Information Required

In order to allow for detailed commodity sector strategy, there are gaps in the information currently available that need to be met.

- **Detailed commodity chain analysis**

  There is a need for greater transparency in the value commodity chain. Most of the information required is probably available and at least one corporate participant at the workshops claimed to have undertaken it. However, although there is published information on various stages, there is not enough disaggregated data to allow for a full chain analysis and transparency.

  Only when information is available on the farmer portfolio of activities and land allocation and choice of inputs in jute based farming systems and field data as to how much is received at farm gate and the cost/price determination up to and beyond mills will it be possible to see precisely what leeway exists to lower costs of fibres while providing farmers adequate incentives and how much if any leeway there is in conversion costs.

  The chain analysis could then be extended to competitive analysis of markets in jute producing countries such as the critical one of sacking in India as well as in export markets.

- **The synthetic bag market in India**

  One part of the missing information is on the size and distribution of the Indian market for woven plastic sacking in various end-use sectors and the buyer criteria for choosing to use it. This would allow an assessment to be made of the competitive posture of jute and to likely future demand and regulatory policy implications and the best way of liberalising the market.

- **Market for jute sacking in Africa**

  The market for jute sacking in Africa has all but collapsed. Yet there is no published market survey as to requirements, distribution and costs in a Continent which used to be an active major buyer of jute packaging and has substantial production of commodities, some of which are using jute which is the case for coffee and cocoa and others such as cotton that could profit from doing so.

  There may well be opportunity for regaining and developing markets through better distribution, sector targeting and promotion.

- **Market for jute sacking in South America**

  Similarly, the market demand for jute packaging has all but collapsed in South America, which also used to be an important market for jute. A market survey is required for much the same reasons as those given for Africa above.

- **End-use applications for hessian**

  Hessian has always been a major export category and traders in particular do know the major end-uses. Hessian was often imported for further processing into lighter sacks aimed at specific market requirements. This end-use has declined in line with that for imported sacking.

  There are, however a large number of minority end-uses for hessian that little is known about and thus little can be done to develop. As a general-purpose fabric, hessian is long well established and it is likely that there are end-uses for which it enjoys a strong comparative advantage but which have not been targeted for development and promotion.

- **Feasibility of use of jute in plastic composites**

  There have been frequent reports of major initiatives to develop use of jute fibres for glass fibre substitution and plastic composites in general. Few of them have been implemented and yet there is market sentiment among many that this end-use offers a good potential opportunity for a major use of lower grade fibres, which would alleviate the current dependence on sacking for their use.

  One international corporate developer has undertaken a feasibility study as well as a commodity chain analysis and has allowed the Consultants access to their findings. The latter are very interesting and establish a case for further examination. The findings are rather more disturbing about what farmers get paid in real terms.

6.1.2 Market Development Initiatives

- **Explore possibility of re-capturing some part of the secondary carpet backing market in USA**

  The suppliers of synthetic carpet backing for tufted carpets in USA have recently changed hands. The profitability of cheap synthetic backing and sacks has resulted in low profitability and the end-use had become less attractive for plastic manufacturers.

  The largest carpet producer in USA has recently acquired the carpet backing interests of Amoco, which were on sale for the above reasons. There appears to be a window of opportunity for jute to be re-considered for secondary backing. This would require various steps to assure the carpet industry of reliability of supplies, price stability and quality controls.

However, the profitability of exporting jute carpet backing at historic prices does not appear attractive enough to motivate the jute sector. This may change with the strategy that has emerged from the Road Map where that if higher yields are combined with lower conversion costs, it may be possible to compete in this end-use once again. The advantage is that a substantial volume of value added fabric could be absorbed.

- **Apparel and household applications for new finer jute fabrics**

  The UNDP Project in India encouraged production of finer yarns that a number of users are combining in intimate and union blends with yarns from other fibres. The weak point has been market development and marketing and further assistance would be well advised.

  In Bangladesh the finer yarns have been combined with further treatment to result in fabrics that appear to offer market opportunity for use in the large and for jute largely untapped apparel and household furnishings market segments.

  Production of these, higher quality, higher value fabrics needs to be further improved and scaled up to develop these opportunities. An investment of around $4 million is estimated as being required and market reaction has been very positive. There will also need to be a market development programme, which will probably entail a further outlay of $ 500,000.

- **Market development of jute sacking**

  Following up on the greater information already recommended in the above section, there will need to be a market development and promotion programme for jute packaging in Africa and South America.

  There are specific potential end-use markets that could be developed for jute in much the same as those for food grade sacks in coffee, cocoa and groundnuts.

  The rubber sector is one of these opportunities that could be developed. This is a particularly interesting prospect given the fact that there is familiarity with the fibre in Indonesia, Thailand, Malaysia and Vietnam, which would be among the major consumers.

  There have been complaints of contamination of cotton in West Africa from synthetic slivers that can be eliminated by use of cotton packaging. Equally, this is an area where jute has been favoured in the past and could be promoted further.

- **Development and promotion of jute geotextiles applications**

  Jute early established a strong market penetration of the geotextiles and landscaping market. At one stage end-use exceeded 10,000 tons. It has since rather lost its way and coir has supplanted its leading natural fibre position. However, there is general consensus that jute has unique characteristics, such as ability to absorb moisture that make it particularly suitable in some

applications such as in landscaping and it needs to be promoted to regain some of the lost momentum.

6.1.3 Agriculture

- **Higher yield, low lignin and better fibre seeds to be developed**

  Emphasis has been on increasing yields in the past even at the cost of lower quality mix. Farmers had a clear financial incentive to pursue higher yields and have done so but the incentives to use seeds that lead to better quality fibre need to be given as well as availability of proven seeds that will increase net incomes while giving the industry the higher qualities they need to develop higher value diversified products.

- **Measures to ensure adequate supply of suitable seeds**

  There are frequent shortages of seeds and there needs to be an effort to improve the supply chain so that better seeds are developed, multiplied, certified and distributed. Most of all that the issue of farmer returns from adapting these better seeds need to be addressed.

- **Premiums for better grades of jute**

  The best incentive farmers could be offered to consider adapting improved seeds would be a system of premiums that reward such practice. Without that, farmers have no logical reason to meet what the industry needs.

- **Action to ensure higher farm gate prices**

  Much is said about the need to alleviate poverty amongst jute farmers. India seeks to accomplish this through MSP and other regulatory means, Bangladesh sets mill prices for the public sector and both rely on a stronger market to do so. However, there needs to be a detailed analysis to ensure that farmers are actually getting higher nominal prices and a programme to ensure that any obstacles to that are overcome.

- **Trial of warehouse receipts system**

  The concept of warehouse receipts is in vogue in development circles but evidence for success so far limited. The Jute Corporation of India Ltd. intervenes at the time of the harvest and performs some of the function that warehouse receipts aim to accomplish. The problem is that small farmers have financial pressure to sell quickly and this pressure can be alleviated where there are co-operatives who can increase the time before farmers have to sell as well as by the market intervention of JCI. The warehouse receipt system would probably benefit co-operatives and traders rather than small farmers unless and until the access to finance is improved.

- **Introduction and promotion of stem ribboner**

  This would reduce conversion costs at farm level and would thus be likely to benefit small farmers in a direct way as well as increasing the efficiency of the supply chain.

- **Efficiency in use of water**

  Water is a scarce resource and any steps that improve efficiency of use of water or reliable supply of water over a longer period would also increase the efficiency of the value chain as well as farmer incomes.

6.1.4 Furnishings and Apparel

There have been two programmes with important long term implications directed towards developing high value added diversified projects. The earlier one was the UNDP US$23 million project that has led to finer yarns that mostly small and medium enterprises have been developing into products. However, they individually lack the capacity to develop export markets and technical assistance is required to help them develop product-markets.

The second was the NORAD Bangladesh Jute Development Project that built on developments of finer yarns into higher quality softer fabrics. An evaluation of the NORAD Project proposed additional investment to upscale the pilot project and a recently completed review by SEDF has recommended further investment of US$4 million.

6.1.5 Machinery

There are long standing problems of availability of suitable machinery, spares and technical management that need to be resolved to allow the conversion process to be made substantially more efficient and jute to be made more competitive. They have been covered adequately under the machinery section earlier in the previous section of the Report. The recommendations are summarised below:

- Technical Assistance
- Design and adaptation of machinery
- Assistance to capital investment in machinery design
- Selection of capable and interested companies for machinery development
- Tender process to allocate development funding to interested companies

The total value of the machinery development programme outlined in the Road Map is about US$ 11,000,000. (Allowing for inaccuracy in these estimates, the range of financing involved could range from US$ 10 million to US$ 14 million).

6.2 Estimated Costs of Recommendations

Costing is of an indicative nature only at this stage:

Estimated cost of Action Plan

US$	International	local	Total
1. Further Information			
Detailed Commodity Chain Analysis	40,000	20,000	60,000
Synthetic Bag Market in India	-	20,000	20,000
Market for Jute Sacking in Africa	60,000	-	60,000
Market for sacking in South America	60,000	-	60,000
End use applications for hessian	60,000	20,000	80,000
Feasibility in plastic composites	100,000	20,000	120,000
Sub-total	**320,000**	**80,000**	**400,000**
2. Market Development Initiatives			
Secondary carpet backing in USA	100,000	20,000	120,000
Apparel and household applications	100,000	20,000	120,000
Market development jute sacking	500,000	5,000	505,000
Market development geotextiles	250,000	5,000	255,000
Sub-total	**950,000**	**50,000**	**1,000,000**
3. Agriculture		Public	Public
4. Furnishings and apparel programme			
Bangladesh continuation NORAD project	3,800,000	200000	4,000,000
India mixed fibres market development	300,000	100,000	400,000
Sub-total	**4,100,000**	**300,000**	**4,400,000**
5. Machinery			
TA design and adaptation	500,000	1,500,000	2,000,000
High output spreaders	100,000	900,000	1,000,000
Breaker and finisher cards	200,000	2,000,000	2,200,000
Drawing frames	150,000	1,350,000	1,500,000
Ring spinning	260,000	2,000,000	2,260,000
Ring twisting frames	40,000	360,000	400,000
Shuttless loom for hessian	100,000	900,000	1,000,000
Sacking loom	50,000	700,000	750,000
Jute bag sewing	100,000	300,000	400,000
Sub-total	**1,500,000**	**10,010,000**	**11,510,000**
TOTAL	**6,870,000**	**10,440,000**	**17,310,000**

The above package could be developed as a project. One source would be for Bangladesh and India to ask for an EC Mission to prepare a regional jute sector project. There are various Trust Funds that could be approached. Or it could be approached as an investment by IFC, EDF, or others.