REJUVENATION OF JUTE INDUSTRY : ROLE AND POTENTIAL OF DIVERSIFIED PRODUCTS

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Abstract

For more than a century, jute industry occupied a very important position in the national economy of India. However in late 70's a serious jute imbroglio started and large number of mills have closed down or are running at losses. the demand-supply gap, raw jute price fluctuations, synthetic substitutes and reliance on government sheltered demand contributed considerably to the present serious problems facing the jute industry. While the decreasing trend in demand of traditional jute products is inevitable, the emergence of non-traditional diversified jute products offer possibilities, to an extent, for rejuvenation of jute industry. This paper considers the role and potential of diversified products for rejuvenation of jute industry.

A most important feature of diversified jute products as opposed to traditional products is the large number of item variety and customer segments. The production, marketing and cost structure of diversified products is entirely different compared to traditional products. The production is characterised by small lots, marketing by innovation and quick response to changing customer demand and cost structure include considerably high value addition over raw jute in comparision with traditional products. These characteristics of diversified products require the jute mill project structure to be highly flexible and dynamic. It is analysed and argued that a five tons-per-day(tpd) jute mill project integrated with small handloom, handicraft or cottage industry consuming yarn and fabric from the mill for end-product conversion is financially viable and operationally suitable. Extensive scenario analysis suggests that the project is highly sensitive to large changes in some crucial variables

such as wage rate, raw jute prices, capacity utilisation and selling price. Thus, while the unit is financially viable, it is not in such a rosy business to be profitable under unimaginative and inefficient management. It is concluded that though a small 5 tpd diversified jute mill project is financially viable, the management practices at project implementation and operations stages shall ultimately decide the success of the project.

1.0 Introduction

For more than a century, jute occupied a very important position in the national economy of India.Jute was traditionally and mainly used as a cheap packaging material, largely for grains, all over the world. In fact, in undivided pre-independence India, jute has been one of the principal export items. Even after independence, with the increasing demand of fertilizers, cement, chemicals and foodgrains etc. and more consumption of packing materials for transporting parcels jute industry in India, particularly in Eastern India, maintained its viability with annual foreign exchange earnings of about Rs. 3000 millions till recent years. The dominance of traditional agro-based jute industry in the national economy in India could be discerned from the fact that it employed 200 thousand workers and supported about 4 million farmer families.

Inspite of favourable domestic demand in post-independence period, a serious jute imbroglio started in late 70's and it continues in a still more vicious scale.The fact that more than half of the jute mills were running at losses for consecutive years and a large number of them were closed down was itself an alarming phenomenon drawing serious state concern. A quick review of jute scenario in India points towards some major factors contributing to this continuing imbroglio such as discussed in subsections 1.1 to 1.4.

1.1 Demand-Supply Gap

First, the partition of Bengal in 1947 had serious consequence for the country's jute economy in the sense that it lost 75 per cent of jute producing area, growing about 80 per

cent of the total crop of undivided India. Interestingly, while the majority of the jute growing area going to East Pakistan, the jute mills were largely situated in West Bengal. The production of jute in India in 1947/48 was only 1.67 million bales as against the pre-partition output of 8.05 million bales in 1945-46. After partition, therefore, the immediate goal of the government was to expand jute acreage and production to meet internal as well as buoyant global demand. Table 1.1 gives jute production, area and productivity.

It is evident that in recent years there is a sluggishness and stagnancy and the jute production is characterized by yearly variations. Expansion of jute acreage combined with scarcity of good land created a mix of production in which the proportion of low quality jute variety (about 60 per cent presently) increased over a period. On the other hand, the pattern of jute consumption in jute mills changed substantially towards higher grades of fibre, thus creating imbalance between production and demands from the mills.

1.2 Raw Jute Price Fluctuation

The cyclical [illegible] variations in raw jute production is essentially a feature determined by slumps and upheavals of fibre prices. The raw jute prices in India is characterized by wide variations both between and within years. Commenting on the pronounced gyrations of raw jute price Sarkar[1] observed :

"From this secular decline in the real prices and terms of trade of jute it appears that India's jute agriculture has been subjected to a trend situation of price disincentives, although one should acknowledge that there are major differences and changing differentials between the wholesale prices and the producer pricers of the commodity - temporal as well as spatial in character".

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1. Sarkar, Gautam K.: Jute in India; An Economic Analysis, Calcutta, Oxford University Press, 1988.

TABLE 1.1

PRODUCTION OF RAW JUTE

Period	Jute			Mesta			Jute & Mesta	
July-June	Area	Prod.	Yield	Area	Prod.	Yield	Area	Prod.
1976-77	737	5353	7.3	352	1746	5.0	1089	7099
1977-78	797	5361	6.7	365	1793	4.9	1162	7154
1978-79	884	6470	7.3	380	1863	4.9	1264	8333
1979-80	834	6072	7.3	383	1890	4.9	1217	7962
1980-81	941	6508	6.9	359	1652	4.6	1300	8160
1981-82	826	6788	8.2	324	1583	4.9	1150	8371
1982-83	737	5949	8.1	287	1224	4.3	1024	7173
1983-84	760	6325	8.3	294	1399	4.8	1054	7724
1984-85	833	6531	7.8	296	1256	4.2	1129	7787
1985-86	1146	10886	9.5	348	1761	5.1	1494	12647
1986-87	803	7353	9.2	265	1273	4.8	1068	8626
1987-88	698	5800	8.3	262	982	3.7	960	6782
1988-89 (Estimated)	667	5913	8.9	224	1243	5.5	891	7156

Unit: Area-000/Hectares Qty.-000/Bales Yield-Bale/Hectare

Source : Ministry of Agriculture, Govt. of India

The impact of wide variations of raw jute prices contributes largely to the reigning imbroglio of jute industries in India both in terms of profitability of jute goods manufacturing units as well as competitiveness of jute goods in the internal and external markets. Raw jute prices at Calcutta for the two decades - i.e. from 1967-68 to 1986-87 is shown in Table 1.2.

1.3 Substitute Products

The prices of raw jute and manufactured jute goods are basically the functions of supply and demand. In recent years, jute industry has been facing serious challenge in its traditional markets of packing materials by various synthetic substitutes both in domestic and export market. Interestingly, in spite of serious challenge of synthetic substitute, the internal consumption of jute goods over the 15-year period is marked by an uptrend with a compound growth rate of about 5.5 per cent per year. The rising trend of demand in the domestic market is largely explained by the expanding output of India's industrial and agricultural sectors.

Traditionally, the jute in India has been largely supported by a wide base of booming export market. Over the decade since 1970's, the volume of jute goods exports declined as a whole by an annual compound rate of about 3.5 per cent mainly as a result of the sharp decline in the exports of carpet backing and sacking. Volume, value and unit value of exports of jute manufactures is given in Table 1.3.

TABLE 1.2

RAW JUTE PRICES AT CALCUTTA

(Rs. per quintal)

Year	Maximum	Minimum	Average
1967/68	134.00	96.48	112.24
1968/69	210.38	134.00	183.26
1969/70	198.38	112.56	142.31
1970/71	171.52	132.64	153.38
1971/72	166.16	128.64	147.51
1972/73	193.28	144.72	168.95
1973/74	158.12	129.98	139.84
1974/75	206.36	147.40	175.87
1975/76	214.06	174.20	187.92
1976/77	240.01	180.00	209.47
1977/78	24 .00	198.00	222.91
1978/79	236.01	203.00	216.44
1979/80	241.00	206.00	212.44
1980/81	217.50	200.00	216.56
1981/82	283.10	217.50	241.29
1982/83	313.00	240.00	272.50
1983/84	693.00	285.00	384.84
1984/85	1010.00	600.00	817.28
1985/86	595.00	296.00	314.01
1986/87	319.50	308.50	308.50

Prices are of Assam Bottom W/5 variety. From 19/6/77 they relate to States other than West Bengal.

Source : A.N. Nair & Co s Opening Quotation.

TABLE 1.3

VOLUME , VALUE AND UNIT VALUE OF EXPORTS OF JUTE MANUFACTURES

(financial year)

Year	Volume (Thousand Tonnes)					Value (Million Rs.)					Unit Value (Rs. Per Tonne)				
	Hessian	Sacking	Carpet Backing	Others	Total	Hessian	Sacking	Carpet Backing	Others	Total	Hessian	Sacking	Carpet Backing	Others	Total
1970/71	268.2	86.5	153.8	50.5	559.0	916.3	223.3	639.2	120.5	1899	3416	2582	4156	2386	3398
1971/72	276.3	115.0	225.6	52.7	669.6	1146.5	326.3	1028.0	146.3	2647	4149	2837	4559	2776	3953
1972/73	256.4	91.0	162.6	68.4	578.4	1167.9	284.5	850.3	187.9	2491	4555	3126	5229	2747	4306
1973/74	225.2	91.7	170.3	74.7	561.9	992.2	260.4	819.3	196.0	2268	4406	2840	4811	2624	4036
1974/75	265.2	130.4	119.8	67.8	583.2	1579.6	492.0	674.6	202.9	2949	6017	3773	5626	2993	5056
1975/76	248.1	79.0	149.7	39.5	516.3	1210.5	316.3	803.9	162.6	2493	4879	4004	5370	4116	4829
1976/77	248.0	63.5	107.7	33.5	452.7	1075.7	204.4	567.2	145.1	1992	4338	3219	5266	4331	4401
1977/78	267.1	33.3	136.9	64.1	521.4	1371.5	112.9	709.0	247.5	2441	4777	3390	5179	3860	4680
1978/79	164.2	8.3	90.8	44.8	328.1	936.2	34.3	479.5	207.3	1657	5082	4132	5279	4627	5051
1979/80	254.2	59.9	145.2	33.0	492.4	1860.8	276.5	992.8	216.9	3347	7321	4614	6837	6573	6799
1980/81	285.6	44.2	60.1	46.0	439.9	2277.6	236.7	449.2	310.7	3274	7830	5353	7472	6756	7420
1981/82	239.2	68.0	76.0	21.6	404.8	1448.8	308.6	499.9	135.9	2393	6057	4538	6578	6292	5912
1982/83	214.1	36.0	51.4	28.0	329.5	1330.2	178.1	341.4	168.6	2018	6213	4947	6642	6021	6125
1983/84	157.7	17.2	30.0	28.6	233.5	1126.0	101.8	222.8	186.5	1637	7140	5919	7427	6521	7011
1984/85	200.1	26.6	39.0	25.3	291.1	2336.3	274.0	471.4	244.6	3326	11676	10262	12087	9668	11426
1985/86	174.4	32.3	20.0	24.6	251.3	1878.2	303.2	220.6	265.8	2668	10769	9387	11030	10805	10616
1986/87	179.1	45.5	49.0	24.2	276.9	1516.9	149.7	471.3	184.1	2322	8469	3290	9618	7639	8386

Source : Jute in India, An Economic Analysis by Gautam K Sarkar,
Oxford University Press, 1989

1.4 Sheltered Demand

An important aspect of jute industry is its utter dependence on protected government-led demand for traditional goods. Nurtured and lulled by this sheltered domestic market, the jute industry has remained stagnated with lack of capital investments, modernization, new products development and agressive marketing efforts. Even when facing a sure and serious challenge of synthetic substitutes both in domestic and world markets, the jute industry mainly responded by asking more and more government interventions and protections of market share in traditional product lines instead of diversifying product base.

1.5 Response to Jute Imbroglio

A brief overview of the scenario of jute industry in India clearly indicates that one of the main issues about the future of jute industry in India is of financial viability of jute products manufacturing units and evolving suitable mangement practices including marketing, production flexibility etc. It is recognized that manufacturing and marketing of non-traditional diversified jute products presents altogether different problems compared to that for the traditional jute products. The rejuvenation of jute industry in this context requires a reformulation of the industrial policy for jute with a dynamic response to the emerging scenario. The diversified products is one of the major potential area in this regard.

2.0 Diversified Jute Products

Trends in global as well as domestic jute scenario indicate clearly that the use of jute for traditional uses would stabilise at a much reduced level in the coming decades. The process of

stabilization of demand at a reduced level would have hastened considerably if the fate of jute goods were left completely at the hands of competitive free market forces. In the long run one would expect a process of rationalization in terms of reduction in jute production base.

2.1 Role of Diversified Products in Rejuvenation of Jute Industry

It is in this context the role of diversification of jute products can be understood as one of the ways to rejuvenate jute industry in India. Apart from organised jute industries, there has been in India historically various jute products being manufactured at decentralized levels and marketed informally as cheap wage-goods. The existence and persistence of these informal jute goods market indicate the potential demand. In addition, there are also some encouraging favourable trends for certain non-traditional jute goods in the world market. To illustrate, market prospects for jute cotton-bale covering is likely to improve following the 1985 imposition of stringent requirement on synthetics covers in order to protect against contamination from fibrillation, which in turn will raise costs of synthetics. Similarly, the technical advantages of jute secondary carpet backing point towards expansion of share of jute tufted production, even its share relative to synthetics may suffer decline. Still, another encouraging feature is the likelihood of commercial acceptance of fabrics from new processes for producing ribbon-type yarns developed with the assistance of a Dutch organization.

There is also an encouraging trend of development in relation to increasing jute-goods exports in the form of jute

wall coverings and other decorative fabrics in recent years. The possibility of using jute fibre or cloth as sandwitch material for reinforced plastics is yet another promising product line. In fact, in the long run the competitiveness of jute goods vis-a-vis synthetics can be enhanced by bringing about freight economies, and reducing the jute content in the end-product without affecting the basic parameters, lighter and improved blended fabrics including decorative fabrics. In the process synthetics can be turned into a complementary rather than competing fibres for jute goods.

2.2 Promotion of New Diversified Product Development

The market potential to be realised needs not only modernization of equipments and technology, but also the innovative and deliberate planned attempt for new products development, organizing production of diversified jute product-mix, effective marketing and demand promotion policies. In recent years government has shown considerable keenness and active policy support for promoting diversification of jute products. In fact, all major concerned R&D institutions have been employed in developing and market testing of a number of non-traditional products, such as, carpet matting, furnishing fabric, door mats, wall covering, bags, hammock, briefcase, lamp-shades, jute carpets and blankets, jute garments, geo-jute and various gift items.

2.3 Diversified Products Potential

It is obvious that the route of diversified jute goods production is not going to compensate fully the declining demand trend of traditional end-use of jute for packaging in the short

run. However, if carefully planned and promoted, the diversification of jute product-mix would certainly minimize the declining trends by widening the demand-base both in domestic as well as in the world market. In fact, the Sub-Group on Jute Industry for the 8th Five Year Plan(1990-95) seemed to be quite aware of the potentiality of diversified jute products as well as its problems of development and market promotion in the short run. The Group, in fact, projected modest growth rate of these products to the tune of 0.81 lakh tonnes by 1994-95, i.e. about 6 per cent of the total demands of jute good production during the end of 8th Plan as shown in Table 2.1. There is thus a considerable unexploited potential in terms of developing new products with the help of designers and design institutions. Diversified product development is still informal and unorganised in the sense that there is no formal involvement of designers.

2.4 Government Support and Enterprenueral Response

Unfortunately, in spite of positive government support and incentives, very few entrepreuners in jute industry have shown active interest in diversification of jute product-mix. Perhaps the government led sheltered domestic demand of traditional jute goods have created the complacent psyche among most of the existing jute industries. This is not to suggest that there is no risk involved in shifting to diversified product-mix. For business in such product mix will require reasonable stability in raw jute supplies and prices and effective market promotion policies backed up by continuous and intensive R&D programmes.

TABLE 2.1

PROJECTION OF DEMAND FOR JUTE GOODS IN THE DOMESTIC MARKET DURING THE 8TH PLAN PERIOD.

('000 tonnes)

Items	Year (April-March)				
	1990-91	1991-92	1992-93	1993-94	1994-95
Hessian	140	145	150	155	158
Sacking	840	880	920	960	1001
Tarpaulin	165	180	195	215	235
Decorative & Other Jute Specialities	10	20	35	55	81
Geo Jute	3	4	5	8	10
Yarn & Twine	30	32	35	40	45
Canvas & Others	15	17	19	20	26
Total	1203	1278	1359	1453	1556
Rounded off	1200	1280	1360	1450	1550

Source: Report of the Sub Group on Jute Industry for the 8th Five Year Plan (1990-95), Minstry of Textiles, Government of India, (February, 1989.)

A most important feature of diversified jute products as opposed to traditional products is the large number of item variety and customer segments. Thus the production and marketing of diversified products is entirely different compared to traditional products. The production is characterised by small lots and marketing by innovation and quick response to changing customer preferences. Diversified products also have entirely different value addition and cost structure. New products are being added continuously to the portfolio of diversified products.Financial viability of each of this is an independent issue. Also each unit has a limited range of product-mix possibilities.Entirely different class of products such as jute reinforced plastic panels for apple chest etc. need independent financial assessment. Similarly applications such as geo-textiles which may need large volumes of uniform product shall have entirely different financial implication. For manufacturing a generic product mix consisting of yarn and fabrics, we have proposed a project structure for the manufacturing of diversified jute products.

3.0 Diversified Jute Mill Project Structure

The proposed jute mill structure is primarily to produce diversified products. However, a sacking unit of the same capacity as the diversified yarn unit is proposed to consume jute waste. Unlike traditional jute mill, a diversified unit manufactures large number of products and hence operational flexibility is most important prerequisite for success. It is not possible to predefine a product mix and set up a mill exclusively for this purpose. On the contarary, the mill must have the ability to adjust its product mix rapidly to changing market conditions.

3.1 Integration with Small Converters

Even a small jute mill has limited adaptibility and flexibility and it can never match handlooms, handicraft or cottage industry in these aspects. The best option therefore for the diversified jute mill is to work in close collaboration with these units. In the proposed project structure, the mill manufactures yarn and fabric which these small scale enterprises can convert into final saleable products. Part of the yarn output of the unit will be sold to handloom weavers for conversion to fabric; the rest of the yarn will be processed into fabric in the mill. The finished fabric in turn shall be sold to converters who can fashion it into other end-products. The mill is thus insulated to some extent from primary burden of responding and adapting to rapid changes in market. But this insulation is only partial. The weavers and converters, would buy in small lot and demand a very great degree of flexibility in the selling and distribution function. Not only this, in diversified mill the production would have to be in small lot. One of the greatest difficulties that the large traditional jute mills face in switching over to the diversified products is their inability to do this. This flexibility in the proposed project structure is considered by having small size and close collaboration and proximity of handloom and converters.

Though the large unit has an advantage in terms of project cost due to better economies of scale, the large jute mill will have to pay the industry wage rate even if it is set up in a backward district. A small unit need not have to pay industry wage goverened by large mills. If it is located in a backward district, it can pay wages much higher than the prevailing rate

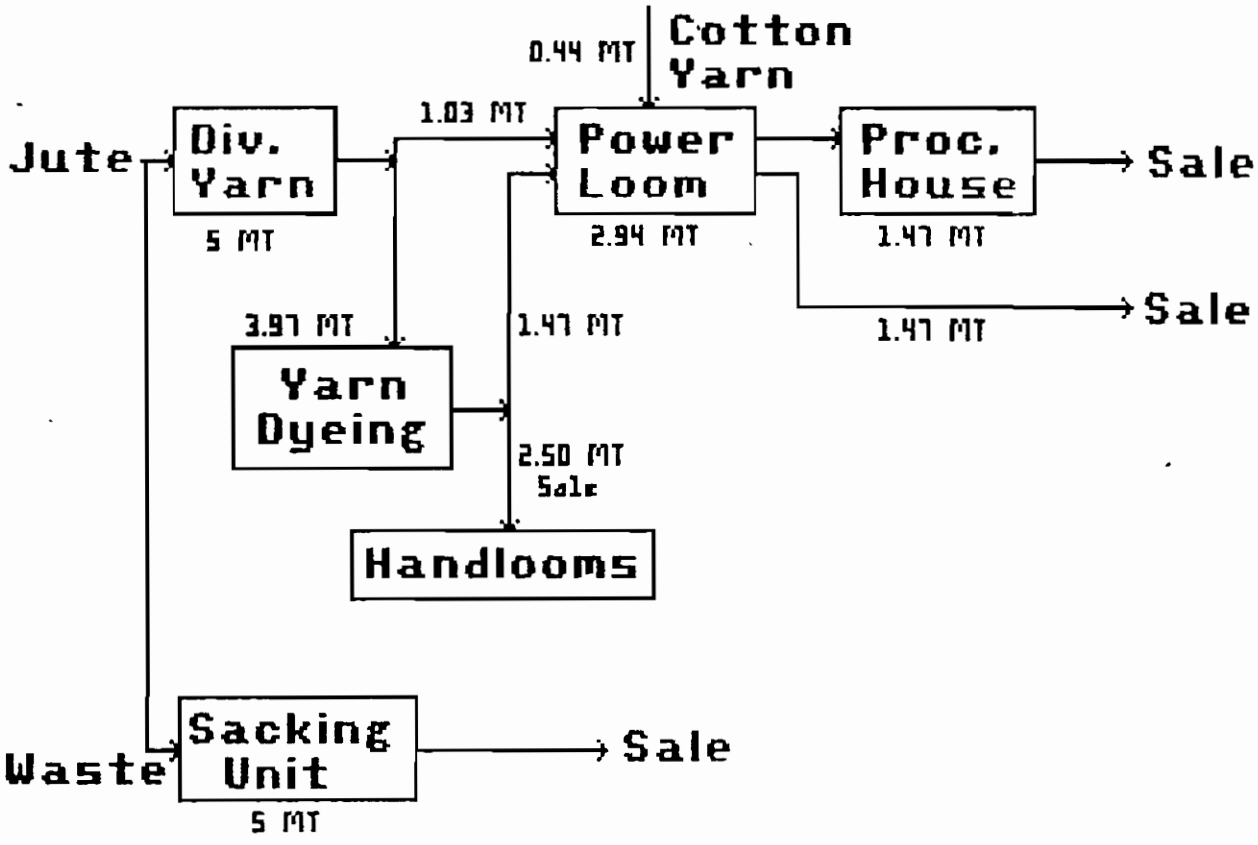
in the district and still gain a substantial advantage over the traditional jute mill. As a result we find that the large jute mill is not financially viable as shown later while the small jute mill is financially quite healthy.

3.2 Size of the Jute Mill Unit

There are technological limitations on the minimum size of a jute mill imposed by the smallest capacity machinery available. Moreover, at small capacities, the problem of line balancing becomes very acute, and there is the possibility of large idle capacity. Considering the prevailing minimum size of various machineries and opinions of technical experts, we have come to the conclusion that minimum technologically suitable size of the mill should be about 5 tons per day (tpd) of diversified products.

3.3 Proposed Project Structure

The foregoing analysis leads to the proposed project structure which is summarized in Figure 1. The capacities mentioned therein refer to the base case discussed later. This model calls for relatively small units (about 5 tpd) which produce diversified products from the raw jute stage onwards. In this model, we have not yet specified the exact capacities of each of the units and the exact product mix. These decisions are combined on the basis of a financial analysis of the alternatives we discuss next.



Project Structure and Capacities for Base Case

FIGURE 1

4.0 Financial Projections for Diversified Jute Mill Project

This section contains the estimate of project cost, working results and financial analysis of the proposed jute mill (5 tpd) for manufacturing diversified jute products. Many of the norms that have been evolved for the conventional jute mills[2] are not directly applicable to the proposed project because of its much smaller size and the totally different range of products. We have modified these norms and standards on the basis of discussions with various experts in the field.

4.1 Product Mix

The mill will sell only yarn and fabric leaving all further processing to converters. Still, it is clearly impossible to work out the profitability of each of the almost unlimited range of fabrics that can be made of jute. We have, therefore, focussed on a few crucial characteristics of the product which determine its cost structure. These include :

1. Yarn versus Fabric : To the extent that the yarn is sold to the handlooms for weaving by them, the entire subsequent processing is completely eliminated.

2. The weight of the fabric : Light fabric (e.g. curtains) is made of finer yarn with denser weave. Its production rate (tons per day) would be lower than heavier fabric (like carpets) and its conversion costs correspondingly higher.

3. Jute Cotton Blend/Union : The decorative fabrics contain cotton in blend or union form. The higher cost of cotton yarn makes the fabric costlier.

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[2] Productivity Norms for Jute Industry, Jute Manufacturers Development Council., 1979

4. Gray Cloth versus Printed Fabric : For some purposes the fabric can be sold in unprocessed form to converters who may themselves get the fabric dyed/printed if necessary. This approach eliminates the investment in the processing house at the cost of a reduced sales realization.

5. Fabric Made of Dyed Yarn : For some products, the fabric is made of dyed yarn and the fabric itself does not need to be dyed/printed.

The effect of various different product mixes can be adequately captured by the above factors. The impact of different product mixes can be determined by varying the ratio of yarn sales to total output, the ratio of heavy to light fabric, the percentage of cotton blend, and the kind of processing done. Each of these factors would change the project cost, selling price and production cost as described in detail later. The analysis, therefore, incorporates several different scenarios in which we assume different variations in the product mix.

4.2 Project Cost

The project cost has been worked out by considering the following sub units separately :

1. The sacking unit (capacity 5 tpd)
2. The diversified yarn spinning unit (capacity 5 tpd)
3. The yarn dyeing unit
4. The diversified fabric weaving unit (power looms)
5. The processing unit (fabric bleaching/dyeing/printing)

The capacity of the first two units has been fixed at 5 tpd each while the capacity of the other units depends on the product mix. As stated above, our analysis considers several different scenarios with different product mixes. The capacity of the other units would, therefore, vary from scenario to scenario. A detailed line balancing to determine the project cost for different capacities is not attempted since such an exercise can be carried out only after a decision is made to go ahead with a particular scenario. The project cost is adjusted to account for the different production rates of different types of fabric; for this purpose, a speed factor is worked out which varies from 0.4 to 1 depending on the product mix. A base case scenario has been identified and analyzed in detail.

4.2.1 Production Costs and Selling Prices

The raw material cost has been worked out on the basis of a TD-5 price of Rs. 450/- per quintal. The raw material cost for sacking is TD-5 less Rs.50/- while for diversified products it is TD-5 plus Rs. 200. Wages cost have been worked out on the basis of a wage rate of Rs. 30/- per day. A summary of project costs and convention costs derived from equipment costs, conversion norms and field experience is given in Table 4.1. Though some of the conversion costs have been taken on a per ton basis, they are, in fact, more closely related to time (labor hours or machine hours) than to weight of output. To account for this, we have adjusted these costs by a speed factor so that those product mixes which have longer processing times are charged higher factors. The speed factor used here is the same as the one used to adjust project costs.

Table 4.1

Summary of Project Cost and Conversion Cost

	Sacking	Diversified Jute Products			
	Spg/Wvg	Spg	Wvg	Yarn Dyeing	Process House
A. Project Cost					
Approximate Project Cost (Rs.Lacs/tpd) (Excluding Working Capital Margin Money)	47	46	28	18	52
B. Conversion Cost					
Labour (Mandays/ton)	52	43	62	31	25
Stores (Rs/ton)	700	450	250	2200	4000
Utilities, Power and Fuel (Rs/ton)	1150	1975	185	185	2500

Notes : Above figures are before adjustment for speed factor as described in the text.

The selling price of dyed yarn to the handlooms has been taken at Rs. 22000/- per ton. The price of fabric varies from Rs. 25000/- per ton to Rs 50000/- per ton. The heavy fabric is priced at the lower end of the scale and the light decorative fabrics at the higher end. All these prices represent the net realization to the unit and exclude sales tax and excise duty.

4.2.2 Financial Expenses and Taxation

The equity component has been taken at 30% of the project cost. Interest on term loans has been taken at a rate of 13% with installments spread over 8 years after a 2 year moratorium. The exact terms of the loan finance would of course depend on the category of the promoter and other factors. Interest on working capital has been taken at 16.5%. Taxation has been worked out after considering investment allowance and tax concessions under S.80HH and S.80I at corporate tax rates.

4.3 Results of Financial Analysis

Profitability and cash flow projections (for 10 years) were made for several different scenarios; of these, the most reasonable one is referred to as the base case scenario and is discussed in detail below. Subsequently, the other scenarios representing the implications of different assumptions on environmental variables and the impact of different plant capacities and product mixes are discussed.

Base Case Scenario

Detailed statements of project cost, and financing are given in Table 4.2. Details of base case assumptions, project cost and financing and cash flow are shown in Table 4.3 to 4.5 respectively.

TABLE 4.2

Financial Projection

Capacity tpd	Base
Diversified Yarn	5
Sacking	5
Power Loom	2.94
Yarn Dyeing	3.97
Process House	1.47
Tot. Proj. Cost Rs. Lacs	755.62
Sales Rs. Lacs	630.88
Pretax Profit Rs. Lacs	180.59
Pretax Proj IRR %	15.73
Posttax Proj IRR %	14.12
IRR Without Subsidy	18.84
IRR With Subsidy	47.13
Employment	895

TABLE 4.3

BASE CASE ASSUMPTIONS

A. Capacity

Diversified Yarn Capacity tpd	5
Sacking Capacity tpd	5
Power Loom Capacity tpd	2.94
Yarn Dyeing Capacity tpd	3.97
Process House Capacity tpd	1.47

B. Product Mix

Hand Loom Sales (% of Div. Yarn Cap)	50.00%
Heavy : Light Fabric Ratio	50.00%
Jute : Cotton Blend Ratio	70.00%

C. Raw Material Price

TD5 Jute Price (MT)	4500
Cotton Yarn Price Rs/MT	42000

D. Selling Prices

Yarn Selling Price Rs/MT	22000
Heavy Fabric Selling Price Rs/MT	25000
Light Fabric Selling Price Rs/MT	50000
Sacking Selling Price Rs/MT	9000

TABLE 4.4

PROJECT COST AND FINANCING

Project Cost (Rs. Lacs)

Plant & Mach		523.07
Land & Building Including Land Deve. and Fire fighting		173.86
Contingencies		34.85
Margin Money for Working Capital	30.00%	23.83
Total Project Cost		755.62

Working Capital

Raw Material	3 Months	53.27
Finished Goods	1 Month	19.09
WIP	1 Week	4.41
Stores	1 Month	2.68
Total		79.44

Financing Pattern

Equity	30.00%	227
Term Loan	70.00%	529
No of Installments	8	

Employment

Employment	895

Detailed Cash Flows and Financial Projections

Year-->		1	2	3	4	5	6	7	8	9	10
Sales		315.44	630.88	630.88	630.88	630.88	630.88	630.88	630.88	630.88	630.88
Raw Material		106.54	213.09	213.09	213.09	213.09	213.09	213.09	213.09	213.09	213.09
Stores		32.13	64.25	64.25	64.25	64.25	64.25	64.25	64.25	64.25	64.25
Raw Material Cost											
Utilities, Power & Fuel		31.22	62.44	62.44	62.44	62.44	62.44	62.44	62.44	62.44	62.44
Wages		40.29	80.58	80.58	80.58	80.58	80.58	80.58	80.58	80.58	80.58
Factory Overheads (excluding stores)		7.85	7.85	7.85	7.85	7.85	7.85	7.85	7.85	7.85	7.85
Administrative Expenses		7.89	15.77	15.77	15.77	15.77	15.77	15.77	15.77	15.77	15.77
Sales Expenses		3.15	6.31	6.31	6.31	6.31	6.31	6.31	6.31	6.31	6.31
Total Cost of Production		229.07	450.29	450.29	450.29	450.29	450.29	450.29	450.29	450.29	450.29
Profit Before Interest, Depriciation & Tax		86.37	180.59	180.59	180.59	180.59	180.59	180.59	180.59	180.59	180.59
Interest on Term Loan	13.00%	68.76	68.76	68.76	60.17	51.57	42.98	34.38	25.79	17.19	8.60
Interest on Borrowings on Working Capital	16.50%	9.18	9.18	9.18	9.18	9.18	9.18	9.18	9.18	9.18	9.18
Depreciation		191.73	131.88	91.58	64.34	45.85	33.23	24.55	18.52	14.29	11.27
Profit/Loss Before Tax		-183.29	-29.23	11.08	46.91	73.99	95.21	112.48	127.11	139.94	151.55
Income Tax		0.00	0.00	0.00	0.00	0.00	0.00	6.69	37.75	60.45	65.47
Profit After Tax		-183.29	-29.23	11.08	46.91	73.99	95.21	105.79	89.36	79.48	86.08
Cash Flow, IRR, NPV etc.											
Pretax Project Cash Flows	-755.62	77.20	171.42	171.42	171.42	171.42	171.42	171.42	171.42	171.42	171.42
Pretax Project IRR		15.73%									
Posttax Project Cash Flows	-755.62	77.20	171.42	171.42	171.42	171.42	171.42	164.72	133.66	118.96	105.95
Posttax Project IRR		14.12%									
Posttax Cash Flow : Equity	-226.69	8.44	182.65	36.54	45.13	53.73	62.32	64.22	41.76	27.66	124.77
IRR : Equity		18.84%									
Posttax Cash Flow : Equity : Sub	-95.92	8.44	182.65	36.54	45.13	53.73	62.32	64.22	41.76	27.66	31.24
IRR : Equity with Subsidy		47.13%									
Loan Repayment											
Loan Repayment				66.12	66.12	66.12	66.12	66.12	66.12	66.12	66.12
Loan Outstanding		528.93	528.93	462.82	396.70	330.58	264.47	198.35	132.23	66.12	0.00
Debt Service Coverage Ratio				1.55	1.68	1.81	1.94	1.97	1.63	1.42	2.89

In this scenario, there is a 5 tpd sacking unit and a 5 tpd unit for diversified yarn. Half of the diversified yarn is sold directly to handloom units, and the other half is used for making diversified fabric. The weaving unit has a capacity of a little under 3 tpd (in addition to the jute yarn of approximately 2.5 tpd, it also consumes cotton yarn required for blended/union fabrics). Half of the output of the weaving unit is heavy fabric like carpets and matting; the other half is light (decorative) fabrics. For this mix of products, a yarn dyeing unit of almost 4 tpd and a processing house of about 1.5 tpd are required. The project cost works out to Rs. 756 lacs. At peak capacity, sales will be Rs. 630 lacs yielding a Profit Before Interest, Depreciation and Taxes (PBIDT) of Rs. 181 lacs.

The financial viability of the project can be evaluated by the Internal Rate of Return (IRR). The IRR has been worked out in four different ways :

1. The pretax project IRR 15.73%: This is based on the cash flows before tax and before term loan interest and repayments. Central subsidy is ignored. This measure which is independent of the financing of the project measures the total return from the project to debt and equity holders.
2. The post tax project IRR 14.12%: This is similar to the above except that the cash flows are taken after tax.
3. Equity IRR ignoring subsidy 18.84%: This is based on the post tax cash flows to equity holders but ignores the central subsidy which may be available to new units in backward districts.

4. Equity IRR with subsidy 47.13% : This treats the central subsidy as a cash inflow which effectively reduces the project cost. (There have been some recent proposals to scrap this subsidy, and the non renewal of certain subsidy schemes by the central government has given rise to some uncertainty in this regard).

All measures of financial profitability indicate that the unit is viable and quite attractive. The capacity and financial projections for different scenarios are as shown in Table 4.6.

Scenario 1 : Gray Fabric

This scenario explores the possibility of selling gray fabric to converters who would bleach and dye it themselves. We find that though the project cost drops to Rs. 678 lacs, the profitability and IRR decline sharply due to lower selling price. In house processing is therefore more profitable.

Scenarios 2 & 3 : Handloom Sales

These scenarios examine the impact of changing the proportion of handloom sales. Eliminating handloom sales entirely and processing everything in house raises project cost to Rs. 936 lacs but substantially improves all profitability measures. On the other hand, selling all yarn to handlooms and eliminating the weaving and processing units completely reduces project cost to Rs. 575 lacs at the cost of worsening the profitability measures. As discussed earlier, a balanced mix of products including handloom sales and other diversified products is mandated by the nature of the business; the base scenario of 50% handloom sales represents such a balanced mix and is recommended.

TABLE 4.6

Capacity & Financial Projections for Different Scenarios

Scenarios--->	Base	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
Diversified Yarn(tpd)	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	25
Sacking(tpd)	5	5	5	5	5	5	5	5	5	5	5	5	5	5	0	25
Power Loom(tpd)	2.94	2.94	5.8	0	3.5	2.50	3.13	2.94	2.94	2.94	2.94	2.94	2.94	2.94	2.94	14.71
Yarn Dyeing(tpd)	3.97	3.97	2.9	5	2.5	5.00	4.06	3.97	3.97	3.97	3.97	3.97	3.97	3.97	3.97	19.82
Process House(tpd)	1.47	1.47	2.9	0	3.5	0.00	1.56	1.47	1.47	1.47	1.47	1.47	1.47	1.47	1.47	7.35
Tot. Proj. Cost Rs. Lacs	755.62	678.74	936.2	575.82	977.9	645.00	771.57	755.41	755.82	752.42	755.64	755.63	756.30	759.60	511.99	3263.20
Sales Rs. Lacs	638.88	564.71	796.7	465.00	835.7	487.50	651.56	638.88	638.88	584.71	678.97	649.52	638.88	638.88	396.71	1577.21
Pretax Profit Rs. Lacs	100.59	149.59	232.6	128.54	233.8	132.40	172.53	194.82	167.16	142.90	227.00	198.57	173.09	135.59	115.23	539.84
Pretax Proj IRR %	15.73	13.53	16.7	14.03	15.5	12.06	13.90	17.66	13.72	10.74	22.10	18.28	14.56	8.32	14.77	5.44
Posttax Proj IRR %	14.12	12.25	14.9	12.72	13.9	11.11	12.50	15.77	12.43	10.10	19.54	16.29	13.14	8.32	13.34	5.44
IRR Without Subsidy	18.04	13.52	21.3	14.66	18.4	10.13	14.41	23.64	13.94	7.45	34.66	25.17	15.99	3.10	16.83	-2.83
IRR With Subsidy	47.13	34.98	51.5	39.39	45.5	28.29	37.35	57.19	36.60	23.38	79.80	60.32	40.98	10.23	44.67	-3.15
Employment	895	859	1161	630	1195	785	917	895	895	895	895	895	895	895	635	4029

Scenarios 4 & 5 : Heavy vs. Light Fabric

In these scenarios the product mix of heavy versus light fabric is changed. While the base scenario considers a 50:50 mix we now consider the extremes of an all heavy and an all light product mix. If the entire fabric output is to be of the light decorative type, the project cost would rise to Rs. 978 lacs, and though there is an improvement in profits, the IRR declines marginally. The other alternative of all heavy fabrics has a lower project cost of only Rs. 645 lacs, but the IRR is substantially reduced. Once again, we believe that the base scenario represents a balanced product mix which should be adopted.

Scenario 6 : Jute Cotton Blend Ratio

This scenario assumes that the average jute cotton blend will be 60:40 rather than the 70:30 assumed earlier without any change in the selling prices. Profitability obviously declines, but the project is still viable.

Scenarios 7 & 8 : Wage Rates

These scenarios explore the sensitivity of the project to changes in the wage rate. The base scenario assumed a wage rate of Rs. 30 per day. We find that an increase or decrease of Rs. 5 in this rate makes a substantial impact on the profitability. The unit would cease to be viable at wages much higher than Rs. 35 per day. Thus the location of the unit will not be very crucial for its economic viability.

Scenario 9 : Capacity Utilization

This scenario considers the possibility that the unit might achieve a peak capacity utilization of only 80%. This scenario leads to a sharp fall in profitability and IRR.

Scenario 10 and 11 : Selling Price and Sales Tax Relief

This scenario considers increase in selling price. If selling price can be increased by 10% by better marketing efforts, substantial improvements in profitability can be achieved. This assumes significance because jute products are today priced below cotton and other products of comparable quality.

Currently, jute products are subject to sales tax while cotton fabrics are not. Scenario 11 shows that substantial improvement in profitability takes place if the state government gives sales tax exemption to the unit.

Scenarios 12 & 13 : Jute Prices

The base scenario assumes a TD5 rate of Rs. 450 per qtl. Scenario 12 shows that an increase to Rs.475 does not make much of a difference. On the other hand, Scenario 13 considers a drastic increase to Rs. 600; this makes the project unviable.

Scenario 14 : Eliminate Sacking Unit

Our main reason for including a sacking unit was that it could utilize the roots and wastes from the main unit. In this scenario, we consider the possibility of selling the waste and roots in the market, and thereby eliminating the need for the sacking unit. This idea is motivated by the fact that the sacking unit would not be financially profitable. The scenario assumes that the wastes, roots etc. can be sold at an average price amounting to about 50-60% of the raw jute price. Under these conditions, the rate of returns declines by about 1 % slightly, but the unit remains viable. An additional benefit is that the project cost declines from Rs. 7.6 Crores to Rs. 5.2

Crores. The attractiveness of the option would improve if the price realization improves. The feasibility of selling waste on a regular ongoing basis and the possible price realization would depend on the local conditions including the proximity of other jute mills. An a priori decision on this matter would not be advisable.

Scenario 15 : Large Mill

As discussed earlier, large unit is not suitable for diversified products due to its organizational and operating rigidities. Here we consider the financial analysis of large mill. For comparision, we take the base scenario as the benchmark and see how a similar large unit will fare. Instead of a 5 tpd unit for diversified products, we now consider a 25 tpd unit. As earlier, there is an equally large sacking unit so that we are talking of a 50 tpd unit in all as against 10 tpd earlier.

In financial terms, however, it will not be just a question of multiplying all the previous figures by five. This is because the large unit has several economies of scale. Our analysis suggests that the per tpd project cost of the large unit will be about 20% lower because of improved line balancing. At the same time, man days per ton may be lower by about 10%. Some of the operating costs will also be lower in consequence of these changes.

On the other hand, a large unit like this will be forced to go by the industry wide wage settlements. Even if it is located in a backward district with high unemployment, it will be forced to pay the ruling wage rats of the jute industry which is about

Rs. 70 per day. By contrast, the small unit can easily obtain labour at the rate of Rs. 30 per day or less. Table 4.6 shows the result of this analysis. It is seen that the large unit is not viable at all.

4.4 Recommended Project Structure and Capacities:

Our analysis of various scenarios suggest that the base scenario represents the most reasonable project structure and that its financial prospects are quite good. The project structure and capacities of this scenario are suitable for operational flexibility. Various scenarios suggest that project is highly sensitive to large changes in some crucial variables. Thus, though the unit with this project structure is financially viable, it is not in such a rosy business that it can remain profitable even under inefficient management. The management of project implementation and post-project (or operations stage) will ultimately decide the success of the unit.

5.0 Project Implementation

The financial analysis of the project is based on estimates of various costs and product prices. To ensure that the estimated financial results ultimately materialise an enterprenuer or organisation wishing to undertake the project will have to implement project within an estimated time, cost and quality. Actual project costs, time and performance often vary with the estimated levels and this can be the major cause of making a project economically unviable eventhough the pre-project estimates show the project to be viable. In fact, the cost and time overruns or low project performance during operations stage in a project like the jute mill project can have far-reaching

financial implications. For example, in case of proposed jute mill project, if the project cost of base case (Rs.7.55 crores) is exceeded by twenty percent (20%), the pre-tax IRR drops from 15.72% to 11.44% and post tax IRR drops from 14.12 to 9.72%. Similarly time delays in the project implementation results in additional interest burden and late start of operation results in late positive cash flow. In fact, a six month delay in project start-up shall reduce the post-tax IRR to 10.67% compared to base case IRR of 14.12%. The quality of project delivered has implications on the capacity utilisation achievable compared to planned capacity. As discussed in scenario 9 (section 4), a small decrease in capacity utilisation have severe impact on the IRR. Thus, it is most important that at the project implementation stage the project is managed such that the planned time, cost and quality levels are achieved.

6.0 Management of Post Project Stage

Post-project stage is essentially the operations stage when the regular commercial production takes on. The jute mill for diversified products has to be operated at high capacity and as a highly flexible manufacturing unit. The production planning need to be dynamic and maintenance responsive. Since number of products are large the main focus in the production planning should be on: (i) small production lot sizes, and (ii) quick product change-overs. A most crucial consideration the production manager should have for this purpose shall be to keep the set-up changeover times very low. The manufacturing has to quickly respond to what market demands, else the demand may be lost to the substitute products or other competitors. This would require highly responsive and dynamic management.

For, a jute mill, the marketing strategy should be to sense the demand for different products and timing. Each jute mill for diversified product shall have its own marketing niche based on the consumer segment it is catering to. This will decide the product-mix, cost, quality etc. Eventhough, a mill may have its own niche in the market, it does not mean that it need support its own exclusive distribution channel. A diversified jute producer should have part of its marketing through exclusive channel and part through established distribution networks. Exact relationships in this context will depend on each mill's product mix and overall strategy.

The government should take necessary action to support the sales of diversified products. Market for diversified products can not exist only in mill's locality. Established marketing channels such as handloom or khadi shops should be used for ultimate retailing. Diversified products need a very good sensing of the market and also innovative products to break into new markets. A support structure should be created and coordinated by government organisations for evolving new design by expert designers and integrating the same with local skills.

The basic approach in the management should be primarily market oriented with adequate production flexibility, cost and quality controls. The actual product-mix to be produced by a unit shall depend on local conditions, market dynamics and present cost structure. A strong distribution network for retailing the diversified products will be the key to marketing success. To create consumer awareness and opening up new markets, government agencies should promote products by exhibiting them in national

and international fairs and hold exclusive exhibitions for diversified jute products. The research institutions related to jute should consider giving emphasis on product research with a strong interface with market needs. In the overall, government support for consumer awareness, opening new markets and new product development shall be crucial for successful marketing of diversified jute products. At the same time, an individual mill management will have to understand its own market niche well and should focus on this niche by coordinated marketing and manufacturing interface.

Ultimate success of a diversified jute mill will rest on dynamic enterprenueral management. Key to success would be strategic planning and its interlinkages with functional planning i.e. with functions such as operations, maintenance, marketing, personnel, finance etc. At the corporate level, manufacturing and marketing of diversified jute products is a new and unexplored area in many respects. New designs, combinations with other materials such as cotton, synthetic etc. can have considerable potential. But each such new product poses its own manufacturing problem in terms of adopting machinery and skills for such production. At the same time, every new geographic or consumer segment to be catered to poses its own marketing challanges. Thus, the management of the jute mill need to be highly dynamic and responsive to integrate product and market changes within the production set-up of the jute mill. A totally government sheltered marketing approach and a static manufacturing structure will not at all work in the long run. The diversified products hold promise due to its considerable value added component over the raw jute, however the same may prove to be a problem if the

value addition is not directed by proper strategies, controlled by suitable operations management practices and realised by correct marketing approach.

7.0 Conclusions

For more than a century, jute occupied a very important position in the national economy of India. Serious problems presently faced by jute industry points towards some major factors such as demand-supply gap, raw jute price fluctuation, emergence of substitute products and excessive dependence on sheltered demand. The demand of jute for traditional uses can be expected to stabilise at a much reduced level in the coming decades. In this context, diversified jute products offer one of the ways to rejuvenate jute industry. by widening the demand-base in domestic as well in the world market. A most important feature of diversified jute products as compared to traditional products is the large number of item variety and customer segments and hence their production and marketing is entirely different. The production is characterized by small lots and marketing by innovation and quick response to changing customer preferences. Diversified products also have entirely different value addition and cost structure.

The foregoing analysis leads to a relatively small capacity project structure of about 5 tpd to produce diversified products from the raw jute stage onwards. This unit is designed to work in close collaboration with the handloom weavers and end product converters. This is strategically advantageous since the handloom weavers and end-product converters can further diversify the product range beyond the mill stage through their inherent

manufacturing flexibility. Part of the yarn output will be sold to handloom weavers for conversion to fabric; the rest of the yarn will be processed into fabric in the mill. The finished fabric may be directly saleable to consumers or may have to be sold to converters who can fashion it into diverse products. A small sacking unit is incorporated to utilize the jute waste. Analysis of the various scenarios confirms that the project structure represented by base scenario is most reasonable in terms of operational flexibility and its financial prospects are quite good. The various scenarios do show however that the project is highly sensitive to large changes in some crucial variables such as wage rates, raw jute prices, capacity utilization and selling price of products.

The unit though is financially viable, its prospects are not rosy to afford unimaginative and inefficient management. It would be essential that at the project implementation stage, time and cost over-runs are controlled since profitability of project is highly sensitive to these parameters. The project management is thus crucial in deciding the operating viability of the jute mill.

In the post project stage, i.e. operations stage, the main concerns should be management of operations and marketing in a strategic way. Operations management practices should focus on (i) maintenance to achieve utilisation (ii) production planning and control to achieve flexibility, and (iii) materials management to minimize inventory holding. Training of workmen, induction of supervisory personnel and creating a responsive organisation should be given utmost importance by the jute mill

management. Since the products are diversified, the marketing strategy should be based on defining the appropriate market niche and corresponding product mix. Apart from its own exclusive distribution channels by the proposed jute mill, the government should facilitate sales of diversified products through established retail network, such as handloom and khadi shops.

Ultimate success of a diversified jute mill shall depend on dynamic enterprenueral management which is responsive and capable to integrate product and market changes within the production set-up. The diversified products hold promise due to their considerable value added component over the raw jute, however the same may prove to be a problem if the value addition is not directed by proper stratagies, controlled by suitable operations management practices and realised by correct marketing approach.

The product and market characteristics of diversified products - i.e. large number of products, small lot sizes, flexibility and quick response etc. - are such that the traditional large mill is not appropriate for exploiting these products. A minimum financially viable plant with technological constraints, is a 5 tpd mill for diversified products with 5 tpd sacking unit.

The mill is viable if it has to pay the wages of about Rs. 30/- per day. Thus location is a crucial factor. The viability of the unit is contingent also on reasonable and stable jute prices. The government should ensure this by the creation of a jute bank and by other market stabilization mechanisms and operations. Sales tax exemption by the state governments for these diversified products as they are more like textiles than conventional jute packaging products is justifiable and necessary.

The production and marketing of diversified products is considerably different compared to traditional jute goods. The production requires flexibility and marketing innovation and quick response to changing customer preferences. Enterprenuers with dynamic orientation and proven capabilities be attracted to the jute mill project. In case of joint sector project, private enterprenuers be given the day-to-day management responsibility. The handloom weavers should be organised as a co-operative organisation. The jute mill management should be however given responsibility for co-ordinating various functions such as maintaining warehouses, common infrastructure etc. with the weaver's co-operative.

In the long run, the success of diversified jute units will depend on the management practices. While there are several technical institutions for jute, there is no formal management oriented focus on jute industry. For diversified products, there is also a need for professional product design interface. The cause of diversified jute products would be tremendously served if the government promotes professional management and design interaction with jute industry through existing management and design institutions or by creating a separate cell for the purpose.