



RP1968/5

A brief review of the Thai  
kenaf mill industry

CULTURE, MINISTRY OF AGRICULTURE  
DEPARTMENT OF COMMUNITY DEVELOPMENT, MINISTRY OF INTERIOR  
OFFICE OF ACCELERATED RURAL DEVELOPMENT, OFFICE OF THE PRIME MINISTER  
DEPARTMENT OF FOREIGN TRADE, MINISTRY OF ECONOMIC AFFAIRS  
DEPARTMENT OF LAND DEVELOPMENT, MINISTRY OF NATIONAL DEVELOPMENT  
KASETSART UNIVERSITY, OFFICE OF THE PRIME MINISTER  
DEPARTMENT OF VOCATIONAL EDUCATION, MINISTRY OF EDUCATION  
ROYAL FOREST DEPARTMENT, MINISTRY OF AGRICULTURE  
ASIAN INSTITUTE FOR ECONOMIC DEVELOPMENT AND PLANNING, UNITED NATIONS  
ECONOMIC COMMISSION FOR ASIA AND THE FAR EAST  
UNITED STATES OPERATIONS MISSION TO THAILAND  
CHECCHI AND COMPANY  
THAI JUTE ASSOCIATION  
APPLIED SCIENTIFIC RESEARCH CORPORATION OF THAILAND

COOPERATIVE RESEARCH PROGRAMME NO. 1  
PRODUCTION, PROCESSING, AND UTILIZATION OF  
KENAF AND ALLIED FIBRES

RESEARCH PROJECT NO. 1/8  
SPINNING AND WEAVING OF KENAF FIBRE

REPORT NO. 1  
A BRIEF REVIEW OF THE THAI KENAF MILL INDUSTRY

BY  
CHIEN CHU  
AMPIKA KRAIRIT  
NORMAN L. WAKE  
NIPON KAMOLRATANAGUL

ASRCT, BANGKOK 1968

not for publication

DEPARTMENT OF AGRICULTURE, MINISTRY OF AGRICULTURE  
DEPARTMENT OF COMMUNITY DEVELOPMENT, MINISTRY OF INTERIOR  
OFFICE OF ACCELERATED RURAL DEVELOPMENT, OFFICE OF THE PRIME MINISTER  
DEPARTMENT OF FOREIGN TRADE, MINISTRY OF ECONOMIC AFFAIRS  
DEPARTMENT OF LAND DEVELOPMENT, MINISTRY OF NATIONAL DEVELOPMENT  
KASETSART UNIVERSITY, OFFICE OF THE PRIME MINISTER  
DEPARTMENT OF VOCATIONAL EDUCATION, MINISTRY OF EDUCATION  
ROYAL FOREST DEPARTMENT, MINISTRY OF AGRICULTURE  
ASIAN INSTITUTE FOR ECONOMIC DEVELOPMENT AND PLANNING, UNITED NATIONS  
ECONOMIC COMMISSION FOR ASIA AND THE FAR EAST  
UNITED STATES OPERATIONS MISSION TO THAILAND  
CHECCHI AND COMPANY  
THAI JUTE ASSOCIATION  
APPLIED SCIENTIFIC RESEARCH CORPORATION OF THAILAND

COOPERATIVE RESEARCH PROGRAMME NO. 1  
PRODUCTION, PROCESSING, AND UTILIZATION OF  
KENAF AND ALLIED FIBRES

RESEARCH PROJECT NO. 1/8  
SPINNING AND WEAVING OF KENAF FIBRE

REPORT NO. 1  
A BRIEF REVIEW OF THE THAI KENAF MILL INDUSTRY

BY  
CHIEN CHU  
AMPIKA KRAIRIT  
NORMAN L. WAKE  
NIPON KAMOLRATANAGUL

ASRCT, BANGKOK 1968

not for publication

## F O R E W O R D

This is one of a series of Brief Reviews which ASRCT is producing. The aim of each Review is briefly to examine an industrial sector from both economic and technological points of view as an indication of the capability of the sector and the problems which exist within it.

Brief Reviews do not purport to be a detailed and comprehensive study of each industrial sector. They are based on statistical and other data of a non-confidential character which are available from government departments and other fact-collecting agencies as well as from discussions with various persons associated with the industry.

The Brief Reviews will assist the Board and management of ASRCT in formulating research programmes regarding each sector.

All Reviews in the series will conform to a more-or-less standardized format so as, finally, to present a synoptic view of industry in Thailand, in which each sector can be compared, point to point, with all other sectors. This again will assist the Board and management of ASRCT in allocating research resources more effectively between the various sectors.

Each Brief Review also has a secondary function in that it indicates the need, and forms a "launching pad" for more intensive examinations of particular aspects within each sector.

In the present instance, ASRCT gratefully acknowledges the advice and assistance of members of the kenaf-mill industry and other sources of information, particularly statistics made available by the National Statistics Office and the Department of Customs.

## A BRIEF REVIEW OF THE THAI KENAF MILL INDUSTRY

By Chien Chu,\* Ampika Krairit,<sup>+</sup> Norman L. Wake<sup>‡</sup> and Nipon Kamolratanagul<sup>‡</sup>

### SUMMARY

(1) The Kenaf Mill Industry in Thailand has developed rapidly in recent years, currently providing a market for about 100,000 tonnes of home-grown kenaf and saving over 400 million required for import of gunny-sacks. Indeed, the industry is now earning foreign exchange by the export of an increasing number of gunny-sacks - almost 50 million baht worth in 1967. The industry is, moreover, a major employer of labour, our recent survey showing almost 12,000 were engaged. The industry, too, is heavily decentralized, the ten mills being located from Bangkok into the far north-east of Thailand.

(2) Of the ten mills, four are government-owned and operated and the remaining six, which have been established subsequently are privately-owned. Establishment of additional mills and expansion of existing mills have recently been forbidden, capacity being considered ample for foreseeable needs.

(3) The industry is virtually a mono-product industry, gunny-sacks being by far the major product.

(4) Our survey indicated total current capacity at 73 million gunny-sacks p.a. of which 80 per cent was in use. Not all mills, however, work a 3-shift, 6-day week: if they did, output could increase by almost 40 per cent. Stocks of sacks held by mills at the end of May, 1968, were equivalent to only one month's production.

(5) There is evidence of recent "cut-throat" competition in the industry, prices for rice-sacks having been lowered drastically early in 1968. To stabilize the market, all ten mills have joined together in the Siam Gunny Sack Co. which will set prices for local sales as well as act as export agent.

---

\* Chemical Technology Group, Technological Research Institute, ASRCT.

+ Physics and Engineering Group, Technological Research Institute, ASRCT.

‡ Economic Evaluation Group, ASRCT.

(6) Exports of new empty sacks accounted for 13.6 per cent of industry sales in 1967 while in the first five months of 1968, this proportion rose to 27.6 per cent, and is expected to increase further as government mills also commit an increased proportion of their output to export. Indonesia received about 80 per cent of Thailand's gunny-sack export in 1966 and 1967. Customers further afield are expected to buy larger quantities.

(7) The bagging of rice accounts for some 80 per cent of local sales of sacks, many of which are eventually exported. In fact, export as filled sacks accounts for the greater part of total production: 53 per cent in 1967.

(8) Our survey showed that kenaf was accounting for 38 per cent of total costs of sack production but this was at a time of low kenaf prices. A more normal proportion for materials cost would be almost 60 per cent with a conversion cost of 18 per cent and a fixed cost of 24 per cent. From consideration of a "model" mill, profit could be of the order of 30 per cent on invested capital.

(9) Compared with a mill in Taiwan using only jute, cost of production in Thailand is only about one-half. Compared with large Indian jute mills, however, labour productivity in Thailand may be much lower.

(10) The survey showed considerable variation in costs as between individual mills and private mills appeared significantly more efficient; Total costs, labour productivity, ability to use lower grades of fibre and export performance all showing up more favourably than in the government sector. However, one of the government mills, at least, is quite efficient. Age of equipment is probably a major underlying cause.

(11) The main problems of the industry arise chiefly as a consequence of poor retting and unreliable grading coupled with the inherently harder nature of kenaf fibre. Difficulties also occur because equipment is often not up to date or otherwise inefficient; moreover, there is a high rate of labour turnover and absenteeism in some mills.

## I. INTRODUCTION

The Thai Kenaf Milling Industry absorbed about 69,000 tonnes of local kenaf in 1966 and almost 90,000 tonnes in 1967, representing about 12.5 per cent and 25 per cent respectively of total kenaf production. Whilst relatively small, this outlet is nevertheless important in that it affords a stable, dependable, "doorstep" market which, to a small but growing extent, affords a buffer against the vagaries of the precarious external market, so very largely controlled by the fortunes of the jute crops in India and Pakistan.

Kenaf has rapidly become one of Thailand's major crops. In 1966, with a production of 550,000 tonnes and an export of 473,000 tonnes it was the Kingdom's third largest earner of foreign exchange, and though production and particularly exports declined to 360,000 tonnes and 313,000 tonnes respectively in 1967, production of kenaf is an activity well suited to the agricultural economy of Thailand's north-east. The plant has a weed-like propensity for growing on land marginal to rice-cropping, thriving well even without fertilizer or pesticide and is looked upon by many farmers in the north-east as a crop from which surplus family labour can reap a welcome cash return.

Not only do the kenaf mills help to support the production of kenaf in Thailand's impoverished north-east, the industry in its own right provides employment for over 10,000 people who work in the 10 operative mills making gunny-sacks, hessian and twine. The kenaf-mill industry, moreover, exports an increasing proportion of its production as well as saving foreign exchange for the import of gunny-sacks. In 1967, for example, gunny-sacks worth some 48 million baht were exported while import of sacks for local consumption would probably have cost over 400 million baht, but for the existence of the local industry.

The question naturally arises as to whether the kenaf-converting industry could not be further expanded. Kenaf fibre is a good deal cheaper than jute<sup>\*</sup> and it would obviously be in Thailand's interest to undertake much more conversion of her raw fibre than at present, thereby freeing herself to a greater extent from the dictates of the international raw jute market.

---

\* See section IV, Tables 10, 11

Recent reports\* indicate that rising costs are losing India her export market, particularly in sacking and hessian due both to rising labour costs and to a 30 per cent rise in the price of jute which itself accounts for over 60 per cent of finished product costs. While Pakistan may well be able to capture the markets thus lost by India, some locally-established mills in Thailand are having no difficulty in finding an export outlet for much of their gunny-sack production.

The industry has, in fact, grown and changed rapidly in the past few years so that earlier published descriptions and critiques are now completely out-of-date. This Brief Review, then, is an attempt to present a picture of the current activities of the industry as a basis for further enquiry and research, both economic and technical. The Review complements work already carried out and in progress by ASRCT and numerous cooperating agencies in other aspects of kenaf-research. In particular, it constitutes in part, a sequel to the report "An economic study of the production and marketing of Thai kenaf" by Chaoyong Chuchart, N.L. Wake, and Satchee Suthisathien,+ and should form a useful source of background data for a worldwide study on the future world demand and supply of jute, kenaf and similar fibres which will shortly be put in train under UNIDO auspices.

It should be noted that this Brief Review is largely confined to the results of our recent visits to kenaf mills: it principally deals with the operations of those mills and, though it has regard to the supply of kenaf and to the markets for finished products, it does so mainly through the eyes of kenaf-mill managers. Purposely restricted in this way, it aims to focus attention on the capability of the kenaf-converting industry to expand and/or ameliorate its internal operations given adequate supplies of the factors of production, a firm market for its output, and a favourable climate, generally, for its operations.

In particular, this Review looks at recent stock-holdings of gunny-sacks and their immediate implications but it has deliberately avoided attempting to examine the complex questions of who holds stocks of raw materials and of finished products, and when - an involved matrix of seasonal demand, supply, price and entrepreneurship. Such questions, it is felt, should be examined in depth or not at all.

---

\* The Bangkok Post. 31 July 1968.

+ Report No. 1 on Research Project 1/10. ASRCT unpublished report.

The periods chosen for study have been the entire calendar year of 1967, and the first five months of 1968.

Normally, it is usual to compare operations in one period of the current year with those of the corresponding periods of preceding years, especially in seasonally-affected industries.

The history of the kenaf industry, however, is characterized by violent fluctuations in demand, supply and price, such fluctuations being due only partly to local conditions. The year 1966, for example, was a boom year for this industry and this carried over into the early part of 1967. The remainder of 1967 was, however, a depressed period which carried over into the first half of 1968.

The kenaf mill industry, as distinct from the industry producing kenaf fibre, has, of course, its own parameters of well-being but these are largely determined by the supply and price of raw-material.

It has, therefore, been thought better to present the year 1967 as a whole, and the year 1968 so far as data was available, rather than to compare the first five-month operations of each year which would give no real basis for trend projection, nor any really significant comparison of simple seasonality. Emphasis has been, rather, on comparison of the government and private sectors in the two periods, a much more cogent basis for practical purposes.

## II. METHODS

The procedure adopted in the collection of data and preparation of this report followed the normal practice of, first, reviewing available data on the industry, formulating questionnaires, visiting each of the mills in turn (in some cases a visit to both mill and head office was necessary), then assembling, tabulating and analysing results and finally preparing the report. A list of the mills visited appears as Appendix I.

The survey is a joint effort between members of the Technological Research Institute and the Economic Evaluation Group, both units of the Applied Scientific Research Corporation of Thailand.

In presenting the data, every care has been taken to avoid disclosure of the activities of individual firms except where such data has already been published elsewhere. Thus, it has been found convenient to aggregate



data from the four government mills and to compare this with aggregated data from the private mills. There is a great deal of difference between the performances of individual mills and while the aggregated results obscure this, the presentation nevertheless brings into sharp contrast a number of points, as will be seen in the succeeding pages.

### III. HISTORY OF DEVELOPMENT OF THE INDUSTRY

Figure 1 shows the dates of establishment of Thailand's kenaf mills and indicates how, initially, the industry was founded on government-owned mills but the entrance of private mills dominates the latter part of the industry's history. It shows, too, the recent accelerating growth of the industry.

Figure 2 shows the growth of capacity of the industry for gunny-sack production.

Increasing production capacity has lessened the need for import of gunny-sacks and Thailand has, for the last few years, been a net exporter. Tables 1 and 2 show the trends in this regard. Some of the sacks imported in earlier years were made in Japan and Taiwan from Thai kenaf.

Ten mills are now operating with a current production capacity of 73.4 million gunny-sacks as well as other products, and an employment of 11,600 workers, kenaf-conversion has been one of the largest and most rapidly growing industries in Thailand in recent years.

### IV. NATURE OF THE INDUSTRY

#### (a) Structure of the industry

The kenaf-mill industry in Thailand is composed of ten operative mills, of which four are government-owned and six are privately-owned (Figures 1 and 2). Only one of the privately-owned mills was financed from other than Thai sources, i.e. capital of the Industrial Development Co.Ltd. was derived wholly from Taiwan.

Each mill is integrated to the extent that it has within it facilities for preparing raw kenaf for spinning through to the stage of producing the printed gunny-sacks. All the mills also make kenaf-twine which they require for sewing and binding their own products, but five of the mills sold twine as such. One government mill makes hessian. Generally, production of twine

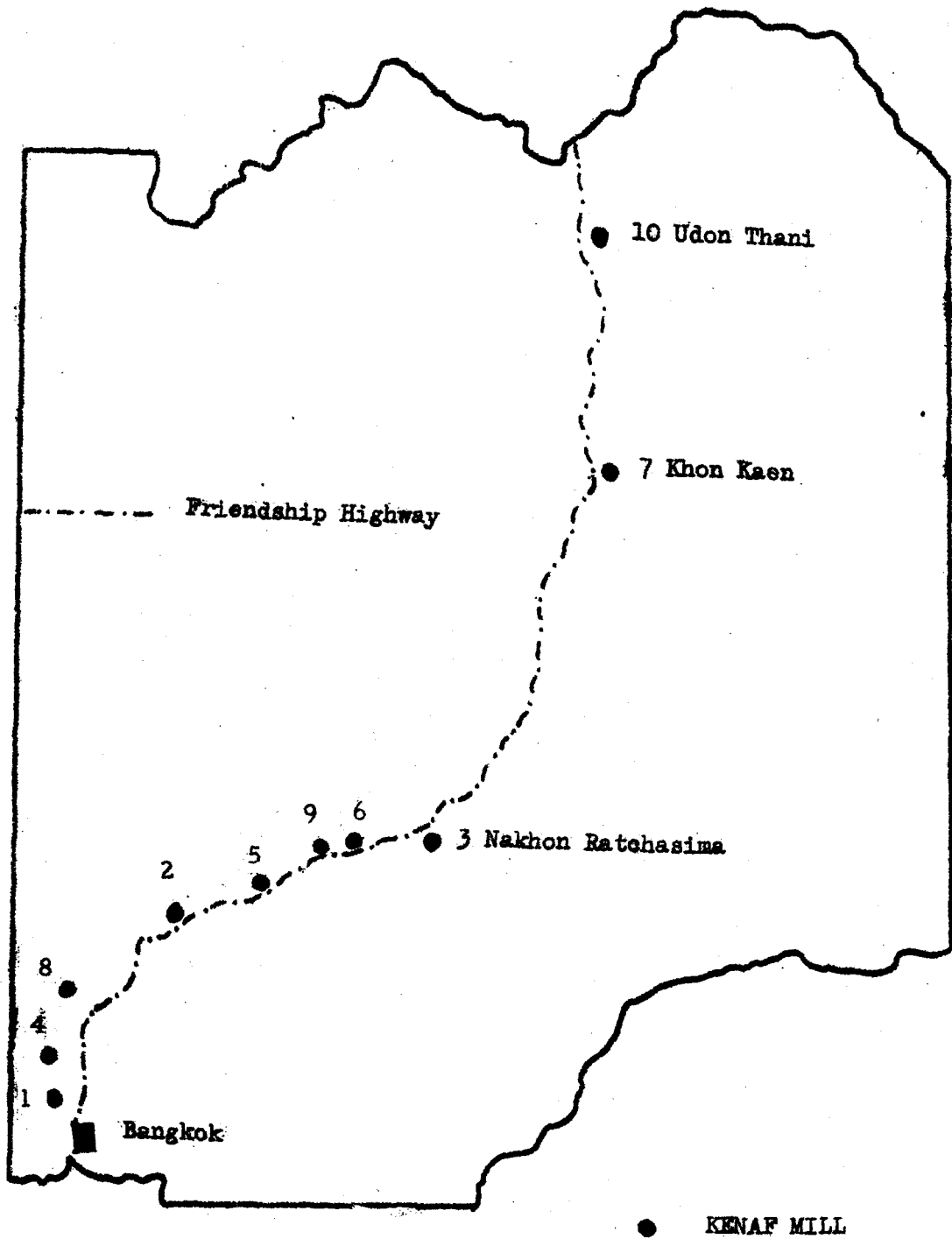


Figure 1. Date of establishment of kenaf-mills in Thailand.

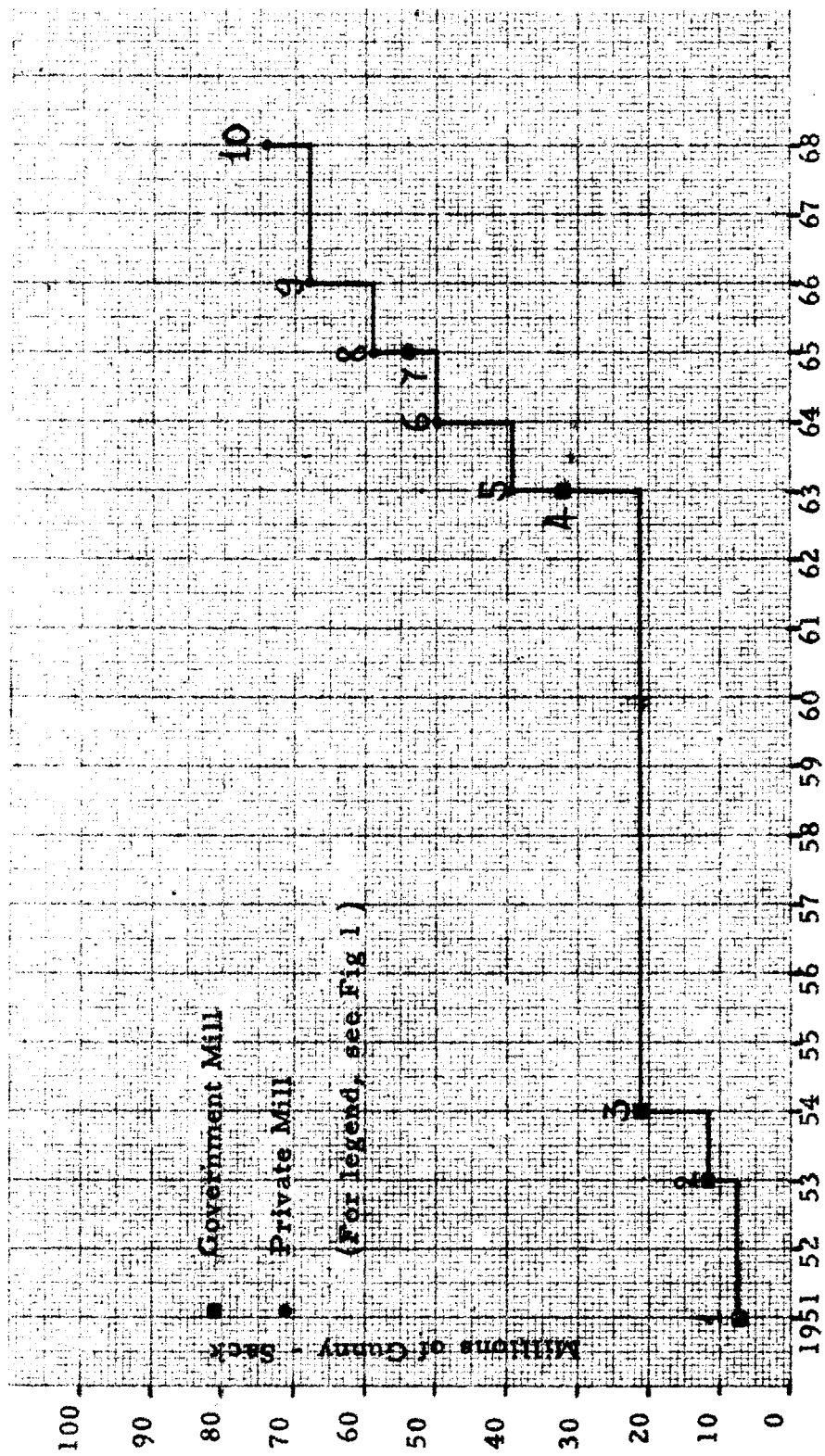


Figure 2. Growth in total capacity of Thai kenaf-mills in 1951-1968.

TABLE 1  
SIZE OF MILL ACCORDING TO ANNUAL CAPACITY

<u>Capacity</u>	<u>Number of mills</u>
<u>Millions of gunny-sacks p.a.</u>	
Under 5	2
5 to 6.9	2
7 to 9.9	3
10 and over	3

TABLE 2  
GUNNY-SACKS; SUPPLY AND AVAILABILITY

Year	Production	Import	Total supply	Export	Export, full sacks (containing principle crops)	Apparent -domestic consumption
	(1)	(2)	(3)=(2)+(1)	(4)	(5)	(6)
	'000 units	'000 units	'000 units	'000 units	'000 units	'000 units
1958	4,553.3	17,677.9	22,231.2	109.3	14,057.5	8,064.4
1959	5,060.0	19,722.3	24,782.3	28.4	15,007.7	9,746.3
1960	6,877.8	21,145.0	28,022.8	0.8	19,721.6	8,300.4
1961	8,842.1	25,258.9	34,101.0	95.4	26,089.5	7,916.1
1962	10,815.9	30,826.9	41,642.8	54.0	24,105.0	17,483.8
1963	23,129.0	0.3	23,129.0	134.9	28,837.0	-5,843.4
1964	33,511.2	12,354.3	45,866.0	34.4	41,453.4	4,378.2
1965	40,022.5	641.0	40,663.5	154.5	38,648.5	1,860.5
1966	45,297.2	2.7	45,299.9	5,972.0	40,018.4	-690.6
1967	54,661.0	1.3	54,662.3	6,449.0	29,052.0	19,161.3

Source: Production: from Economics Division, National Economic Development Board, Bangkok.

Import & Export: from Department of Customs, Bangkok.

hessian and bags other than gunny-sacks are relatively minor activities.

Geographically, the mills are distributed from Bangkok through Udon in the far north-east of Thailand and generally follow the course of the main trunk road, the Friendship Highway. Figure 1 illustrates this distribution as well as the historical trend away from Bangkok successively further into the kenaf growing areas.

The industry is composed of mills with annual output capacities of between 3.6 and 10.5 million gunny-sacks, average capacity being 7.4 million sacks per annum.

The size distribution by capacity of mills in the industry is shown in Table 2.

The industry is a major employer of labour, especially female labour, and in May, 1968, a total of some 11,600 persons were employed. This is comparable with numbers employed with other large long-established industries in Thailand such as rice-milling, sugar-milling and the saw-mill and plywood industry.

As indicated in Figure 1, the kenaf-mill industry is highly decentralized and undoubtedly provides the largest permanent employment opportunities in those changwats of the north-east in which mills have been established, average employment per mill being 1,200. Female labour predominates, ranging from 60 to 90 per cent of total staff, with an average of 75 per cent for the industry.

In the private sector there is no linkage of ownership between the six operative mills and all capital is claimed to be drawn from Thai sources.\* Of the four government mills, two are owned by the Ministry of Finance, and one each by the Ministries of Industry and Defense.

There are no present links with balers or exporters. The government mills, however, sell direct, except in the case of the Nonthaburi Jute Mill Ltd. which sells through the Ministry of Economic Affairs.

The Ministry of Industry has recently announced that no additional mills will be permitted to begin operations and that no expansion will be allowed of existing kenaf-mill capacity, current capacity being considered more than ample for foreseeable needs.†

---

\* Except in the case of the Industrial Development Co., Ltd. (see (a))

† Monthly Review, Bangkok Bank Ltd. June 1968

(b) Mode of operation of the industry

(i) Technical operations-processes and equipment

General

All Thai kenaf mills follow essentially the same process for the manufacture of kenaf sacks and the machinery used is the same type as that usually employed in the jute industry.

It should be stated at the outset, however, that whatever the rights and wrongs of current Thai kenaf-mill technology, the whole undertaking is handicapped initially by the poor quality of kenaf available.

In the first place, the fibre is often poorly retted, secondly it is unreliably graded and thirdly the local kenaf mills, from force of economic and commercial circumstances, tend to get the "left-overs" of each season's crop i.e. the export market takes precedence so far as quality is concerned.

Thus, in Thailand at least, the full potential of kenaf fibre can seldom be realized. Mather (1963), has stated that, given good retting and strict grading, fine kenaf yarns of 8 lb/sp can be produced on standard jute machinery. Good kenaf yarn is, in fact, comparable in quality to yarn made from jute of Pakistani Export Hearts Grade. But Thai kenaf-mills must use a fibre which is coarser than jute and which therefore requires a more careful batching operation with the use of more batching emulsion, usually 30 to 40 per cent more, and a longer time in the aging bins.

Batching

Batching is the first step in kenaf processing. All mills use machine batching emulsion with a formula of 20-30 per cent mineral batching oil and 70-80 per cent water mixed with 2-3 per cent emulsifier. Each mill consumes about 1-2  $\frac{1}{2}$  tonnes of mineral batching oil per day. The price is about 2.5 baht per litre of batching oil and 10-15 baht per kg of emulsifier. Since each sack contains about 1.2 kg of fibre and 0.1 kg of batching oil, about 6,000 tonnes of batching oil are consumed annually for production of sixty million sacks in Thailand.

The emulsion is prepared in a mixer with a motor driven agitator. It is sprayed on bundles of kenaf fibre in a softener which usually consists of 63 pairs of rollers. These rollers are deeply fluted spirally. The emulsion

which overflows from the fibre bundles at the point of application is allowed to drain from the softener and recycled to the spray system after straining.

The fibre bundles after batching on the softeners are taken to storage bins for aging. The aging period varies with fibre grades. High grade fibre needs only two days. Grades B and C take one week and cuttings require up to ten days. During the batching process in maturing bins, temperature in the centre of fibre piles rises to about 35°C from fermentation. The batching is considered complete when the fibres become pliable and the butt ends are loosened. Over-batching would weaken the fibre and cause excessive waste in carding. Some mills add about 0.15 per cent urea to their batching emulsion to promote bacteriological growth and claim thereby a shortening of batching time for low grades to the extent of two days. It certainly benefits the batching process as a shorter batching time maintains better moisture regain in the subsequent carding operation.

In the case of well-retted fibre, batching serves mainly for lubrication of the fibre, and a very short batching time is sufficient to get an even distribution of the emulsion over the fibre.

Only one mill uses a spreader batching system. Here, strips of fibre are fed root-end first to the spreader and stretched by heavy pinned traveling lattices with an overhead dust extractor, which consists of a hood over the lattices and a suction-fan with pipe connection to a dust cyclone outside the factory building. Thus dust nuisance is much reduced in this practice. Batching emulsion is sprayed onto the spread fibres on a conductor plate before roll forming. This spreader system provides better contact between the emulsion spray and the thinly spread fibre which is also freed of some dust on its way to form a ribbon roll, and then conveyed to the storage area for conditioning or aging for a period of 3 days. The batched rolls, after aging are taken to the breaker card where six rolls are uniformly fed so as to produce one carded roll in lieu of the hand feeding of batched fibre strips from softeners in the softener batching system.

### Carding

All mills followed the same process of two-stage carding with breaker followed by finisher cards. The breaker cards, as used in the jute industry, are usually semi-circular with back delivery and they strike downwards, having two or three pairs of worker-strippers and a doffer. Hopper-fed teaser cards

are used to salvage mainly card wastes and rejected kenaf selected from baled kenaf. The rejects are treated in a softener, batched for a week, then opened in the teaser card to deliver loose fibre fleeces, which are used to feed the breaker card for sacking weft. The teaser card has a more drastic action than does the breaker card. It consists of a pinned cylinder, two worker-stripper pairs and a doffer.

Except for the spreader system with roll feed as above-mentioned, the breaker cards are fed with batched fibres strips root-ends first to the shell feed. The operation of feeding in such cases is entirely manual requiring intermittent weighing with a Dollop scale. It was apparent that the carding action at the strip feed had great irregularities. For weft yarn, the waste fibre fleeces from the teaser card are added to the breaker card to make low grade rolls for blending in the finisher card. The breaker cards serve the purposes of opening the fibrous strips and forming a fibre ribbon roll which feeds the finisher card.

The finisher cards are usually  $4 \frac{1}{2}$  pair or  $5 \frac{1}{2}$  pair full circular type with front delivery. The finisher cards combine ten fibre rolls from breaker cards to form one ribbon roll of more uniformity for feeding to the first drawing frame.

Except in the case of the selvedge rolls for which B grade fibre is used exclusively, most mills blend B grade fibre with C grade or with fleeces from the teaser cards. This blending is done by alternating, in the central rolls, rolls of B grade with rolls of lower grade fibre.

One striking feature of the kenaf mill economy is the availability of large quantities of kenaf cuttings in the market. This ever-present surplus tends to deter mills from separating cuttings and hard-wastes. An alternative outlet for such cuttings would, no doubt, help to improve the carding operation since it would lead to greater use of proportionately more long fibre. The disadvantage of the present system is that there are irregularities in feeding the breaker card.

### Drawing

For heavy yarn, all mills have two-stage drawing, i.e. first drawing and finisher drawing. For light yarn, three-stage drawing is the usual practice i.e. first drawing, second drawing, and finisher drawing. In the first drawing, two slivers are fed to the drawing frame, usually of push-bar type, and drafted



to make one sliver of greater evenness. In the second drawing, three slivers from the first drawing are fed to the second drawing frame of double-thread spiral type and these also emerge as a single sliver of greater uniformity. The finisher drawing, also of double-thread spiral type, combines four slivers from the second drawing into one fine sliver with more crimps. The crimped slivers coiled in cans serve to feed the spinning frame.

Automatic stop motions are provided on all drawing frames for missing slivers. Trained operators tending the drawing frames have to remove lapped slivers and piece up sliver ends properly. Also the wear-and-tear of high speed pinned fallers in all drawing frames requires good maintenance by repairing crews.

All mills use fixed draft drawing frames. Variable draft drawing frame of the Raper Autoleveller type as adopted in jute drawing in recent years is not yet found in kenaf drawing, due to the large variations in weight which are present in kenaf slivers for sacking and hessian. The variable draft responds to variations of sliver weights, increasing the draft for thick slivers and decreasing it for thin sections.

Several mills have humidifiers but many mills ignore humidification, with the result that the batching emulsion gradually loses its lubricating effect upon loss of moisture.

### Spinning

All mills have dry sliver spinning with double wing-flyer spinning-frames provided with automatic doffing. Single crimped slivers from finisher drawing frames are fed from cans to the spinning frame which usually has a breast plate and a pair of intermediate rollers between two pairs of drafting rollers for draft control. Several mills have humidifiers in their spinning rooms.

The heavy yarn for warp on Onemack looms usually has a weight of 34 lb per 14,400 yards. One mill using sized warp has a lighter weight of 30 lb per 14,400 yards. This fixed length of 14,400 yards of yarn is called "one Spyndle". In other words, the warp yarn has a count of 30 lb per Spyndle. Likewise, the light weft yarn for Onemack looms usually has a weight of 13 lb per 14,400 yards or 13 lb per Spyndle.

As far as quality control of yarn is concerned, some mills occasionally checked their yarn counts to correct any irregularities. Moisture testing

with electronic meters at the yarn stage, as practiced in the jute industry, is not done by any of the Thai kenaf mills.

#### Winding, twisting and reeling

Many mills have spool winding for warp and cone winding for weft. Kenaf twines are used in hemming and sewing bags. The twines are made by twisting two plies of single light yarn on flyer twisting frames. The bobbins of yarn are placed on separate creels opposite to the flyer twisting frame. The amount of twine for mill uses is small. Each mill has two or three twisting frames followed by one reeling machine.

#### Beaming, sizing and weaving

Most mills using Onemack looms usually do not size their warp, but some mills with automatic co-change shuttle-looms do so. Separate beaming and sizing machines are usual. One mill has integrated beaming and sizing machines.

All new mills have Onemack looms but some mills have both types, i.e. Onemack looms and automatic shuttle looms. Onemack looms use heavy warp yarn and high speed operation to produce 33 yards per loom per hour. Also the cost of maintenance is lower for Onemack looms than for the conventional shuttle looms. No circular looms are used.

#### Waste disposal

Most of the waste is produced during the carding, drawing and spinning processes and is then returned to teaser cards to recover the cleaned fibre as loose fleeces for feeding to breaker cards. Hard wastes, such as yarn wastes, twines and coarse ropes from kenaf bales, are collected and chopped by manual labour into short lengths for feeding to the hard waste machine, which has strong pins to open the hard wastes into loose fibre fleeces to feed breaker cards. Floor wastes, being dusty, are processed in a dust shaker to recover some useful fibres for the teaser card, which has a hopper feed. The unrecovered fibres in each mill amount to about five per cent.

Many mills organize their hard wastes collection and reclaiming work in their main factory. Several mills have separate sheds for waste disposal to clear the main processing area from waste nuisance and the fire hazard arising from accumulated wastes loaded with batching oil.

### Finishing and converting

The kenaf mills all have practically the same type of finishing and converting equipment. This department is the most labour intensive, as hemming, sewing, inspection and packing involve a large labour force. All mills have this department integrated with the weaving and spinning departments, rather than located in a separate building.

#### (ii) Commercial operations

Kenaf-mills buy their requirements of fibre from balers and merchants rather than direct from farmers. Thus the kenaf purchased by mills has gone through an intermediate stage of sorting and grading-often a re-grading following the initial grading by the farmer-and possibly some beneficiation at the baling house.

Kenaf, of course, is a seasonal crop while kenaf-mills work throughout the year. Thus, kenaf-mill owners must choose whether to buy large stocks following the harvest, thereby tying up working capital, or to buy more or less according to current needs, paying a premium to the dealers who have held stocks. Buying practice varies from year to year and is largely determined by what mill-owners believe will be the price-trend of the fibre throughout the year. In the period under study i.e. from January 1967 to May 1968, kenaf prices fell drastically (see (d)) and mills therefore tended to stock up well ahead of needs. As mentioned in the Introduction, the holding of stocks of raw materials is a complex question which this Brief Review does not explore.

Kenaf mills withdraw fibre from stock and process it. Again, the holding of finished products (i.e. mainly gunny-sacks) involves a complex of factors and some of these are dealt with in later sections.

Marketing is generally done by the individual mills themselves although in April, 1968, the ten member mills formed a joint selling organization, at least for export (Appendix II).

#### (c) Market situation

##### (i) Supply of gunny-sacks

Table 2 shows how production of gunny-sacks has steadily risen since

1958 while Thailand has changed from a net importer to a net exporter of sacks in the past few years. Fluctuations are generally explicable through intermittent clearance of accumulated stocks.

Capacities in use in 1967 and 1968 are shown below:

	<u>1967</u>	<u>1968</u>
Government mills	82 per cent	84 per cent
Private mills	82 per cent	75 per cent
Average	82 per cent	79 per cent

Capacities in use varied from about 50 per cent to full capacity in both periods. As "capacity" is a somewhat imprecise concept, data in the Table have been rounded. Even so, it is probable that government mills place a lower maximum on their production potential than do private mills.

"Capacity" in all cases is based on a 3-shift, 6-day working week. In May 1968, only 3 mills, were working to this schedule, the position being:-

2 shifts, 5 days	one mill
2 shifts, 6 days	five mills
2 shifts, 6 $\frac{1}{2}$ days	one mill
3 shifts, 6 days	three mills

Had all mills been working a 3-shift, 6-day schedule then total production would have risen from 24, 333, 667 gunny-sacks to about 33.6 million sacks for the period January-May, 1968, an increase of 38 per cent. This, of course, assumes availability of extra labour, markets, maintenance, etc.

(ii) Demand for kenaf mill products

Demand for gunny-sacks is a composite of local and export demand but the greater part of local demand is for sacks which are filled mainly with primary products and eventually exported (see Table 2). Indeed, as the import of gunny-sacks is controlled, the only sales avenue for gunny-sacks which is capable of being expanded independently, is the export of gunny-sacks in the unfilled condition.

Our survey shows that sales of gunny-sacks in 1967 amounted to almost 50 million while in the period January-May, 1968, it totalled over 25 million, or an annual equivalent of 60 million. Admittedly, seasonal factors tend to

make sales early in the year greater than subsequent sales, but the fact that stocks had fallen from about 7 million in 1967 to 2.4 million in May 1968, coupled with rising production (see (i)) suggests that a good deal of the industry's surplus production was being cleared.

Table 3 summarizes the position regarding production, sales and mill stocks for the two periods. The Table indicates that, overall, there was a consequent decrease in stocks of gunny-sacks held, the decrease being greater in the government than in the private sector, a fact undoubtedly coupled with the substantial price reduction by the government mills (Table 6). Stock-holding by the industry at 31 May 1968, was equivalent to about one month's production.

There is a comparatively small discrepancy between opening stocks plus production for January-May, 1968, on the one hand, and sales and closing stocks on the other, due largely to stocks in transit.

As Table 2 shows, there has been a rising trend in exports of gunny-sacks and in the first five months of 1968, our enquiries indicated a marked increase in exports from 13.6 per cent of total sales in 1967 to 27.6 per cent as at the end of May 1968. This proportionate expansion of exports has taken place wholly within the private sector, the government mills exporting only a few per cent of their output which, in fact, declined as between the two periods. (Table 4).

It is likely that this disparity will change in the near future, as all ten mills have recently formed the Siam Gunny-Sack Co. which will act as a joint export sales office for the group. Each member mill must contribute up to 35 per cent of its production to the company. Local sales will be made directly by individual mills as in the past, but even here, the Siam Gunny-Sack Co. hopes to prevent price-cutting between local mills (see Appendix II)

Destinations of new, unfilled gunny-sacks exported in 1966 and for the first 11 months of 1967 are shown in Table 5 from which it is evident that Indonesia has been, recently at least, by far the major customer, having absorbed about 80 per cent of Thailand's total export in 1966 and 1967. Reports from the kenaf-mills indicate that the trends apparent in Table 5 are continuing and that sales are also extending to Eastern Europe.

TABLE 3  
PRODUCTION, SALES AND MILL STOCKS OF GUNNY-SACKS

	Government mills	Private mills	Total
Production 1967	25,841,889	29,560,166	55,402,055
Sales 1967	22,765,821	26,905,237	49,671,058
(a) Stocks at 31 Dec. 1967	3,580,014	3,733,415	7,313,429
(b) Production, Jan.-May 1968	11,031,192	13,302,475	24,333,667
Total of (a) & (b)	14,611,206	17,035,890	31,647,096
(c) Sales, Jan.-May 1968	13,458,770	13,511,014	26,969,784
(d) Stock at 31 May 1968	1,215,860	3,455,389	4,671,249
Total of (c) & (d)	14,674,630	16,966,403	31,641,033

TABLE 4  
EXPORT OF GUNNY-SACKS

	1967			Jan.-May 1968		
	Government mills	Private mills	Total	Government mills	Private mills	Total
Exports (units)	480,000	5,510,500	5,990,500	200,000	6,829,481	7,029,481
Total sales	17,059,821	26,905,237	43,965,058	11,958,770	13,511,014	25,469,784
Exports as a percentage of Total sales	28.13 %	20.47 %	13.62 %	1.67 %	50.54 %	27.59 %

Note: These are new, empty gunny-sacks only - see Table 2 re-export of full sacks

TABLE 5  
EXPORTS OF GUNNY-SACKS, NEW, UNFILLED FROM THAILAND

Country	1966		1967(port of Bangkok only)	
	Quantity unit	Value fob baht	Quantity unit	Value fob baht
Hong Kong	80,400	654,614	110,000	868,140
Malaysia	513,444	4,155,536	11,000	90,288
Singapore	242,000	1,926,266	520,000	3,135,493
Indonesia	4,791,134	38,550,942	4,630,695	35,010,921
North Germany	*	*	10,200	57,215
Italy	*	*	500,000	2,152,800
Netherland	*	*	150,300	759,849
Union of South Africa	300,000	2,269,012	117,500	679,486
Australia	30,000	188,581	399,000	3,007,308
United Kingdom	15,100	99,381	*	*
Total	5,972,078	47,844,332	6,448,695	45,761,500

Source: Department of Customs, Bangkok.

Gunny-sacks are used almost entirely as containers for primary products and, for 1964, the Department of Internal Trade estimated domestic usage as follows:-

Rice	19.0	million	48	per cent
Maize	12.0	"	31	" "
Tapioca	7.0	"	18	" "
Beans	0.8	"	2	" "
Castor seed	0.4	"	1	" "
Sugar	0.3	"	1	" "
	<u>39.5</u>			

In our survey, four of the mills did not supply information on usage of the sacks they produced, but for the remaining six mills, the disposition of sales was:-

Sacks for Rice:	78	per cent
Maize:	4	" "
Sugar:	5	" "
Fertilizer:	10	" "
Other purposes:	3	" "

Some of the government mills have captive markets and this, of course, tends to constrain the pattern of sales.

Sales of twine were 1086 tonnes in 1967 and 589 for the first five months of 1968, which is equivalent to 1416 tonnes for 12 months. As the weight of the gunny-bags produced in 1967 would have totalled almost 60,000 tonnes, production of twine for sale is a relatively minor item.

The price of sacks varies as between mills and also with the end use of the sack, specifications differing according to the commodities to be contained. However, taking a rice-sack as the basis for comparison, it will be seen from Table 6 that there has been a substantial reduction in price since 1967, the average prices again being split on a government/private mill basis.

Government mill prices which were well above prices charged by private mills at the end of 1967, declined by over two baht per sack, so that at the end of May, 1968, the two prices were approximately equal. The result of this large price reduction is reflected in the recent stock quittance evident in Table 3.



TABLE 6  
 AVERAGE EX-MILL PRICES OF RICE-SACKS  
 (in baht/unit)

	1967	1968 (Jan.-May)
Government mills	6.75	4.69
Private mills	6.12	4.71
Average overall	6.31	4.70

Members of the industry have spoken of a "price-war" and "cut-throat competition", a situation to which the recent heavy price reductions testify. The formation of the Siam Gunny-Sack Co. is an attempt to stabilize prices at a higher level.

(d) Raw materials and services

The major cost components of gunny-sack production are indicated in Table 7, which shows that kenaf fibre is the major item of expense.

(i) Kenaf

The kenaf consumed is, of course, wholly of Thai origin, and it is used without admixture with any other fibre. Kenaf fibre is bought either from merchants or from balers, some mills buying partly from both sources (Table 8). The most popular grade is obviously Grade B which accounted for some 70 per cent of total purchases. Nevertheless, there appears to be a significant difference between the ability of private mills to use grade C when compared with their government counterparts (Table 9), an ability probably linked with the newer equipment in the more-recently established private mills.

Figure 3 shows that in March and April of 1968, the wholesale price of high-grade kenaf had dropped to about 40 per cent of what it was early in 1967. This, in part, no doubt accounts for the large variation in absolute and proportionate costs of kenaf throughout the industry (Table 7) since mills tend to buy stocks at what they believe to be the lowest price of the season. High interest rates on capital tied-up in stocks, however, also influence

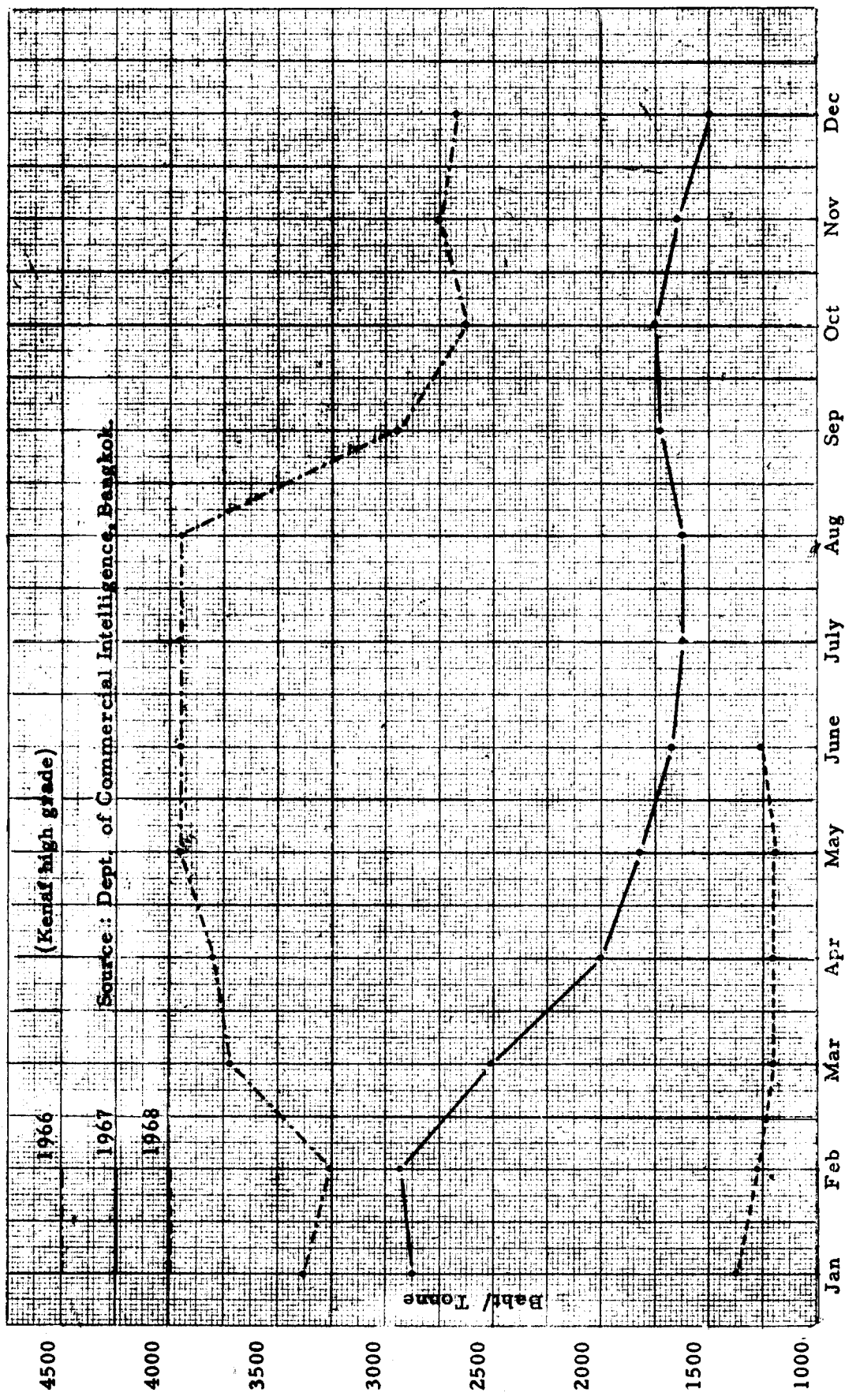


Figure 3. Bangkok average wholesale prices of kenaf.

TABLE 7  
COMPONENT COSTS OF GUNNY-SACK PRODUCTION

Cost item	Government mills			Private mills			Industry total					
	Average		Highest lowest	Average		Highest lowest	Average		Highest lowest			
	Baht	Per cent	Baht	Baht	Per cent	Baht	Baht	Per cent	Baht			
Kenaf	2.05	36	2.69	1.20	2.05 (a)	41	2.89	1.50	2.05	38	2.89	1.20
Other raw materials	0.40	7	0.90	0.16	0.86 (b)	17	1.40	0.32	0.55	10	1.40	0.16
Labour	0.88	16	1.20	0.37	0.78 (c)	16	1.00	0.65	0.84	16	1.20	0.65
Electricity	0.16	3	0.30	0.06	0.13 (d)	3	-	-	0.15	3	0.30	0.06
Depreciation	0.65	11	0.90	0.45	0.79 (e)	16	-	-	0.68	13	0.90	0.45
Other costs	1.54	27	-	-	0.41	8	-	-	1.07	20	-	-
Total	5.68		6.00 (f)	5.32 (f)	5.02		5.77 (f)	4.37 (f)	5.34		6.00 (f)	4.37 (f)

5

- (a) One of the 6 private firms included "other raw materials" as well as kenaf (it was not the highest result).
- (b) Only 2 private mills quoted "Other raw materials" as a separate item.
- (c) Only 3 of the private mills quoted "Labour" as a separate item.
- (d) Only 3 government and one private mill quoted "Electricity" as a separate item.
- (e) Only 3 government and one private mill quoted "Depreciation" as a separate item.
- (f) These totals are not totals of the figures shown in the table, but are the highest and lowest totals given by the various mills.

TABLE 8  
SOURCES OF KENAF USED BY MILLS

	Number of mills					
	1967			1968		
	Government mills	Private mills	Total	Government mills	Private mills	Total
(a) Bought wholly from provincial merchants	1	2	3	1	3	4
(b) Bought wholly from Bangkok merchants	0	0	0	0	0	0
(c) Bought wholly from balers	2	2	4	3	2	5
(d) Bought partly from (a) & (b)	0	1	1	0	1	1
(e) Bought partly from (a) & (c)	1	0	1	0	0	0

TABLE 9  
GRADES OF KENAF USED BY MILLS

	1967			1968		
	Government mills quantity, (%)	Private mills quantity, (%)	Total quantity, (%)	Government mills quantity, (%)	Private mills quantity, (%)	Total quantity, (%)
Grade A	9.98	6.68	8.33	8.42	9.89	9.16
Grade B	75.66	57.01	66.34	82.55	60.75	71.65
Grade C	14.36	36.31	25.33	9.03	29.36	19.19

stock-holding policy as mentioned earlier. Some mills, moreover, can use lower grades of kenaf than others (Table 9).

For the industry as a whole, the cost of kenaf averaged 2.05 baht per sack and was the same in government and private sectors although there was considerable variation from mill to mill in both sectors as above-mentioned. Kenaf used per gunny-sack is 1.215 kg, so that price pertaining was 1.68 baht per kg. This is a somewhat lower price than has been usual for some years as Figure 3 indicates.

Kenaf, the major cost component, is also the item in which Thai kenaf-mills have such a marked advantage over jute (Tables 10, 11)

(ii) Raw materials other than kenaf

Raw materials, other than kenaf, used by the mills, were shown to absorb 10 per cent of the total input. These materials comprise mainly batching oil, emulsifier, lubricants and dyes.

The cost of these per tonne of sacks can be put at:-

Batching oil	146	baht
Emulsifier	5	"
Lubricants	29	"
Dyes	<u>7</u>	"
	187	=====

As there are some 900 sacks to the tonne, total cost should be about 0.2 baht per sack. Some mills reported a much higher figure, presumably including other materials, e.g. diesel oil.

(iii) Labour

As shown in Table 7, labour is the second most expensive input in Thai gunny-sack production. For the industry as a whole, labour represented 16 per cent of total cost and comprised the same proportion (16 %) in both sectors. In absolute terms, labour represented a rather higher cost in government mills (0.88 baht) compared with private mills (0.78 baht).

As mentioned previously, the kenaf mill industry is a major provider of jobs especially in the north-east. Total employment was 11,600 persons in

TABLE 10  
 THAI KENAF PRICES AT LONDON MARKET  
 (c.i.f. prices in £/tonne)

	1967			1968		
	A	B	C	A	B	C
January	83.00	76.00	67.00	66.54	52.25	41.88
February	80.50	73.50	65.50	61.47	49.00	39.00
March	76.65	71.22	62.70	59.17	47.00	37.00
April	71.25	64.25	54.50	62.52	50.19	40.19
May	68.91	61.89	50.57	62.14	51.76	41.86
June	67.40	59.40	48.40	64.30	53.50	45.65
July	66.67	58.52	47.81	75.04	65.04	55.44
August	64.39	58.91	48.23	78.68	68.84	60.00
September	64.54	59.54	49.91			
October	62.34	56.39	46.41			
November	65.81	54.14	46.72			
December	71.87	59.53	49.05			

Source: Reuter.

TABLE 11  
 PAKISTAN JUPE PRICES AT LONDON MARKET  
 (c.i.f. prices in £/tonne)

	1967		1968	
	Lightning	Hearts	Lightning	Hearts
January	139.48	131.45	128.00	121.00
February	138.90	131.45	126.00	120.00
March	135.83	128.83	123.50	117.50
April	133.85	126.85	123.50	117.50
May	131.70	125.13	125.00	120.00
June	123.45	116.41	127.50	122.00
July	118.24	110.38	130.00	123.00
August	117.41	110.36	138.50	132.00
September	114.49	108.26		
October	115.09	108.73		
November	119.97	113.44		
December	130.00	122.00		

Source: Reuter.



May, 1968, of which 75 per cent were females. Moreover, the industry is characterized by large assemblages of labour, average employment for the ten mills being about 1,200 persons per mill.

The industry has its labour problems which are in part bound up with the concentration of such large labour forces, and the decentralization of the industry. Decentralization, of course, implies that much of the labour force is composed of employees who are not used to the constancy and discipline of factory work. There is a high rate of labour turnover and absenteeism in some mills 10 to 30 per cent daily, especially in harvest periods. It is probable that the easier rural life in Thailand makes the task of factory management more difficult than in India and Pakistan where the struggle for existence is harsher.

Several mills have sought with considerable success to overcome the problems inherent in the labour situation. Provision of free meals, dormitories and free medical services appears to have proved effective measures.

Wages paid to women workers range from 8 to 20 baht per day of 8 hours, while to men they may be higher, but the position is complicated by whether the factory provides free meals-- perhaps only to women, or meals and/or housing, etc, at reduced cost.

Productivity of labour varies considerably from mill to mill and is rather higher in private than in government mills. (Table 12). Similarly, the ratios of office to factory staffs is somewhat higher in government than in private mills. (Table 13)

There is no training-course in textile-mill management in Thailand and all the private mills and one of the government mills employ foreign experts on short-term contracts. Another of the government mills had a Scottish jute-mill expert until quite recently. Many of the technical personnel otherwise have been trained in the industry, technicians from the long-established government mills having often been recruited by the private mills.

#### (iv) Electricity

Electricity represented only three per cent of total cost in both government and private mills but, in actuality, its role as a cost factor is somewhat more important. Most mills have their own diesel-electric generators and five mills used these exclusively. The remaining five used the public

TABLE 12  
 GUNNY-SACKS PRODUCED PER MONTH PER EMPLOYEE

	1967			1968 (January-May)		
	Government	Private	Total	Government	Private	Total
Production	25,841,889	29,560,166	55,402,055	11,031,192	13,302,475	24,333,667
Production per month	2,153,490	2,463,347	4,616,838	2,206,238	2,660,495	4,866,733
Number of employees	5,746	6,300	12,046	5,746	6,300	12,046
Monthly production per employee	374.7	391.0	383.2	383.9	422.3	404.0

TABLE 13  
OFFICE AND FACTORY EMPLOYMENT IN GUNNY-SACK MILLS

	Government*	Private	Total
Office	38	68	106
Factory	4,346	6,300	10,646
Ratio	1/87	1/108	1/99

\* 3 mills only.

power supply, on the score of cheapness, in preference to generating their own current, keeping their generator-sets in stand-by.

While the cost of electricity is given as the cost of power used, there is, in fact, an added, unmeasured, cost, for either the mill invests in a generator set and keeps it in stand-by as an insurance against public power-supply failure or it relies solely on the cheaper public power supply and has the added cost of lost production time when power-failure occur.

(v) Indirect costs

As to indirect costs, it was difficult to arrive at strict comparisons because different mills use different methods of cost dissection. A figure for "depreciation" was supplied by four mills and is shown as averaging 13 per cent of total costs. In Thailand, it is permissible to amortize buildings at a maximum rate of 5 per cent annually and machinery, plant and equipment at 20 per cent annually, but companies do not necessarily choose to follow these maximum rates.

(vi) Illustrative profit schedule for a "model" factory

Based on the data as set out in Appendix III an illustrative profit schedule can be derived. In brief, the major suppositions made are:

Total fixed capital	42,260,000	baht
Depreciation	4,776,000	baht p.a.
Annual production (and sales) of sacks	6,554,512	
Price of kenaf	2.00	baht per kg.

Direct labour: 240 employees per shift, 3 shifts per day, 6 days per week. Wage per employee: 540 baht per month.

Interest on working capital		
(assumed capital is from abroad)	6	%
Selling price per sack	6.40	baht
Annual profit	=	Total sales
		less total costs
	=	41,950,000
		less 29,372,000
	=	12,578,000

Profit on fixed capital investment

=	<u>12,578,000</u>
	42,260,000
=	30 per cent.

(vii) Comparison of costs with overseas mills

By modifying some of the data obtained in our survey so as to bring it within normative limits, it is possible to construct a model for mill operation in Thailand. Thus, in the model, kenaf, for example, has been priced at 2.00 baht per kg while the cost of batching solution has been modified downwards. Fixed costs have been arrived at after confidential discussions with several mills. Full details of construction of the model will be found in Appendix III, but Table 14 compares it with the direct result of our survey enquiries.

TABLE 14  
COMPONENT COSTS OF THAI GUNNY-SACK PRODUCTION  
COMPARISON OF SURVEY DATA WITH "MODEL" DATA

	<u>Survey data</u>		<u>Model data</u>	
	<u>Baht</u>	<u>Per cent</u>	<u>Baht</u>	<u>Per cent</u>
Raw material (i.e. kenaf)	2.05	38	2.43	54
Other raw materials	0.55	10	0.17	4
Labour	0.84	16	0.71	16
Electricity	0.15	3	0.10	3
Depreciation	0.68	13	0.72	16
Maintenance (lubricating oil and parts)			0.11	3
Overhead	<u>1.07</u>	<u>20</u>	0.20	6
Interest	—	—	<u>0.04</u>	<u>1</u>
Total	5.34	100	4.48	100

Comparative data are available for a Taiwan jute mill making sugar-sacks and these are contrasted with the Thai model in Table 15.

TABLE 15  
COMPARISON OF COSTS; TAIWAN AND THAI MILLS

	<u>Taiwan jute mill</u>		<u>Thai kenaf-mill (model)</u>	
	<u>Baht</u>	<u>Per cent</u>	<u>Baht</u>	<u>Per cent</u>
Raw material (fibre)	6.25	70	2.43	54
Other raw materials	0.11	1	0.17	4
Direct labour	1.00	11	0.71	16
Electricity	0.10	1	0.10	3
Depreciation	0.38	4	0.72	16
Maintenance	0.38	4	0.11	3
Overhead	0.62	7	0.20	6
Interest	<u>0.20</u>	<u>2</u>	<u>0.04</u>	<u>1</u>
Total	9.04	100	4.48	100

A further analysis of Table 15 shows the following:-

	<u>Taiwan jute mill</u>		<u>Thai kenaf-mill (model)</u>	
	<u>Baht</u>	<u>Per cent</u>	<u>Baht</u>	<u>Per cent</u>
Materials	6.36	70	2.60	58
Conversion cost	1.10	12	0.81	18
Fixed cost	<u>1.58</u>	<u>18</u>	<u>1.07</u>	<u>24</u>
Total	9.04	100	4.48	100

Thus, Thai costs are about one half of those in Taiwan on these figures, a difference contributed to by lower materials conversion and fixed costs. The higher conversion cost for the Taiwan mill is said to be due to its having been only partly re-equipped with modern machinery, hence giving rise to higher labour costs. In order to reduce costs, Taiwan has been importing some 10,000 tonnes of Thai kenaf annually to supplement jute for sacking weft.

Conversion costs in large Indian jute mills are said to be lower - some mills requiring only about 0.09 man-hours to produce a sack compared with 0.20 to 0.30 man-hours per sack in Thailand, but recent overall performance data on Indian and Pakistani mills are not available.

## V. IMPACT OF GOVERNMENT POLICIES ON THE THAI KENAF MILL INDUSTRY

The activities and development of the industry are, of course, influenced greatly by the institutional framework of the country. This framework, itself, has shown a fundamental change within the history of the industry i.e. from a policy of government participation to a policy of assisting private industrial development. The evidence of this change is quite clear: first, the establishment of four government-owned mills followed by the establishment of six privately-owned mills, resulting in a total of ten operative mills.

Of the ten mills, three received Promotion Certificates under the Promotion of Industrial Investment Act, 1962, namely:-

Thai Jute Mill Co., Ltd.

Jute Industry 1961 Co., Ltd.

Of the three, two are now government-owned, although originally the Bangkok Jute Mill was set up as a private mill and taken over by the Thai government as part of the Sarit estate. The Thai Jute Mill Co., Ltd. is privately-owned.

Other government policies which have a major impact on the industry are regulative in character e.g. import of gunny-sacks and cloth for making gunny-sacks are both subject to licensing, thus giving protection to the local industry. Grades of kenaf are standardized by law and specifications exist for the various types of sack.

The Ministry of Industry has recently forbidden the establishment of additional kenaf mills or the expansion of present mills.

There is, of course, the usual framework of general statutes concerning factories, labour, taxation, etc.

## VI. REFERENCES

- ANON. (1953).--Jute mill modernization. Jute Gunny Rev. 4th Annual number: 97-101.
- MATHER, J. N. (1963).--Siam jute: its properties and processing. British Jute Trade Research Association Bulletin No. 60.

APPENDIX I  
LIST OF KENAF MILLS

No.	Name	Head office	Factory	Capacity sacks/year sacks/day
1	Thai Jute Mill Co., Ltd.	The War Veterans Organization, Phaya Thai Road, Tel. 819795	Mve. No. 7, Kaeng Khoi District, Saraburi Province	3,600,000 (10,000)
2	Northeast Jute Mill Co., Ltd.	National Economic Development, 43 Soi Ratchakru, Phahonyothin Road, Bangkok, Tel. 71091-5	Mu Ban Cho Ho, Km 256, Friendship Highway, Khorat, Tel. 2101	10,000,000 (27,500)
3	Nonthaburi Jute Mill Ltd.	Department of Industrial Works, Ministry of Industry.	Bang Kraso, Nonthaburi, Tel. 47747	7,800,000 (26,000)
4	Bangkok Jute Mill, Ministry of Finance	95 Mansion 10, Ratchadamoen Avenue, Bangkok, Tel. 816562, 70767	Km 34 Phahonyothin Highway, Khlong-Luang, Pathum Thani	10,000,000 (30,000)
5	Khon Kaen Jute Mill Co., Ltd.	297 Surawong Road, Bangkok, Tel. 37761	Km 400, Friendship Highway, Khon Kaen province	5,000,000 (14,000)
6	Sikhui Jute Mill Co., Ltd.	258 Phahonyothin Road, Bangkok, Tel. 71277	Mve. No. 7 Sikhui District, Khorat	9,000,000 (30,000)
7	Laem-Thong Industries Co., Ltd.	1068 Songwat Road, Bangkok, Tel. 29811-3	Km 223, Friendship Highway, Khorat	10,500,000 (35,000)



APPENDIX I (continued)

No.	Name	Head office	Factory	Capacity sacks/year sacks/day
8	Industrial Development Co., Ltd.	296 Surawong Road, Bangkok Tel. 35689	Km 176 Friendship Highway, Pak Chong, Khorat	8,000,000 (22,000)
9	Jute Industries Co., Ltd.	76, Chalermkhet 1st. 39 Street, Bangkok, Tel. 81620, 818272	Km 48 Phahonyothin Highway, Bang Pa-in, Ayutthaya	4,000,000 (10,000)
10	The Jute Kapok Industry Co., Ltd.	65-8 Rong-Muang Road, Bangkok, Tel. 53271	Mve. No. 4 Tambol Nong Bua, Udon Thani, Sakonnakhon Road, Udon Thani	6,000,000 (20,000)

APPENDIX II  
 DETAILS OF SIAM GUNNY-SACK CO., LTD.

In an endeavour to rationalize the operations of the Thai kenaf mill industry so as to avoid over-production and consequent price-cutting, the Board of Export Promotion proposed that the ten mills become co-shareholders in a company to be formed and known as "The Siam Gunny-Sack Co., Ltd."

The aims of the company are to:-

- (1) promulgate a policy of production so as to avoid over-production by the ten mills
- (2) fix prices for kenaf mill products
- (3) arrange sales of kenaf mill products at home and abroad.

Each mill, according to the agreement, must send up to 35 per cent of its output to the Siam Gunny-Sack Co.

The company will periodically fix selling prices, the price at any one time depending on the price of kenaf fibre and other factors. For the month of July, 1968, for example, prices were fixed as follows:-

1. Gunny-sack 29" x 43" x 2½ lbs	6.15	baht/unit
2. Twine, grade super	7.00	baht/kg
3. Twine, grade A	6.00	baht/kg
4. Castor seed sack	7.00	baht/unit
5. Hessian, grade A	2.60	baht/m
6. Hessian, grade B	2.45	baht/m

In July, 1968, the committee of the company, was holding orders from abroad for 590,000 gunny-sacks and decided to allocate the orders as follows:-

1. North-east Jute Mill Co.	100,000	units
2. Laem-Thong Industry Co.	200,000	"
3. Khon Kaen Jute Mill Co.	100,000	"
4. Jute Industry (1961) co.	100,000	"
5. The Jute and Kapok Industry	50,000	"
6. Bangkok Jute Mill Co.	<u>40,000</u>	"
Total	<u>590,000</u>	"

APPENDIX III  
DETAILED COST SCHEDULE FOR A MODEL KENAF MILL IN THAILAND

As mentioned in section (vii) of the report, it is possible to modify some of the data obtained during the survey to bring it more within normative limits. Confidential data obtained from several mill-managers have also been used as the basis of costing for a model mill.

The mill postulated is a private one with 76 Onemack looms producing 913 rice-sacks per hour with a total weight of 1.021 tonnes. With a 3-shift operation, averaging 23 hours effective production per day, the annual production would be 6, 554, 512 sacks weighing 7, 340, 953 tonnes.

Detailed costs are:

Cost of kenaf:

Kenaf at 2.00 baht per kg. Each sack requires 1.215 kg kenaf, cost 2.43 baht or 2,187 baht per tonne of sacks.

Batching oil:

Current price: 2.15 baht per litre

Oil require: @ 68 litres (about 65 kg) per tonne of sacks  
 $68 \times 2.15 = 146.20$  baht per tonne of sacks

Emulsifying agent:

Taking normal figure of 5,00 baht per tonne of sacks

Diesel fuel oil:

Current price of diesel fuel oil: 0.78 baht per litre

Requirement to cover power, lights. etc. = 400 kW

$400 \times 1.3411 = 540$  bhp

Consumption = 0.182 litre of oil per bhp/h

$0.182 \times 540 \times 1.11 \times 0.78 = 85.09$  baht per hour

Production: 1.021 tonnes per hour

85.09 = 83.34 baht per tonne of sacks

1.021 tonnes

Profit before depreciation:

41,948,876.80 - 24,595,670 = 17,353,207 baht

Profit after depreciation:

Annual depreciation: 4,776,000 baht

17,353,207 - 4,776,000 = 12,577,207 baht

Break-even price of sacks:

Annual production cost 24,595,670

Annual depreciation 4,776,000

Total 29,371,670

Annual production: 6,554,512 sacks

$\frac{29,371,670}{6,554,512} = 4.48$  baht per sack

The following indicates cost of production per sack from the above cost estimation:

<u>Items</u>	<u>Quantity</u>	<u>Unit cost</u> (baht)	<u>Total cost</u> (baht)
Raw material	1.215 kg	2.0	2.43
Batching oil and emulsifier	0.076 litre	2.15	0.17
Direct labour			0.71
Electricity			0.10
Maintenance (lubricating oil and parts)			0.11
Overhead (staff, indirect labour, insurance, etc)			0.20
Interest			0.04
Depreciation			<u>0.72</u>
Total			<u><u>4.48</u></u>

(One private mill reported in September 1968 the ex-factory price of 4.4 baht per sack for export by the Siam Gunny-Sack Co.)

The above cost analysis indicates low labour productivity but small overhead cost. When compared with jute sacks in Taiwan, kenaf sacks cost less. Jute costs about 5.00 baht per kg. The price of jute is rising and may reach 5.45 baht/kg.

The cost breakdown for jute sacks from a Taiwan jute mill is as follows:  
Product: Sugar sack, A twill, 27" x 44", 1.22 kg per sack.

Jute 1.35 kg @ 5.00 baht	6.25	baht
Direct labour	1.00	"
Manufacturing costs	1.79	"
Staff salary	0.125	
Indirect labour	0.030	
Batching oil 0.062 kg @ 1.75	0.110	
Supplies	0.300	
Power 0.38 kWh @ 0.25	0.095	
Repairs	0.075	
Office expenses	0.070	
Insurance	0.080	
Taxes	0.025	
Depreciation	0.38	
Administration	0.30	
Interest	0.20	
		<hr/>
Total	9.04	

The above cost for jute sacks indicates that the cost of jute accounts for about 70 per cent, whereas kenaf sacks have a lower material cost of about 54 per cent of the production cost. Taiwan has been importing Thai kenaf at about 10,000 tonnes per year to supplement jute for sacking weft. The rising cost of jute resulting from competitive food crops for arable land will increase the demand of kenaf and products. The above jute mill in Taiwan has higher labour cost due to older machinery being only partly re-equipped. Thus more labour is required as compared with Thai kenaf mills with more modern machinery.

In India, the conversion costs of jute mills are lower. An average Calcutta mill has about 700 looms. They require only about 0.09 manhour to produce one sack in some mills as compared with 0.20-0.30 manhour per sack in Thailand (Anon. 1953).