Competitiveness in Pineapple Canning Industry[a]

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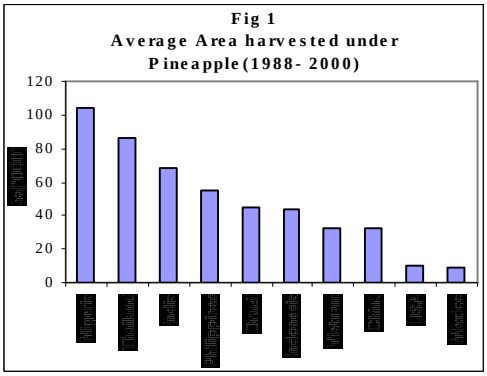
Competitive advantage in agricultural commodities is not a permanent phenomenon. It gets weakened as new and more efficient competition emerges. It has to be sustained through continuous upgradation in production, processing technology, and marketing. Protective measures by the importing countries particularly in the form of non-tariff trade barriers can deal a serious blow to the exporting industries. This is well illustrated by the case of Thai pineapple canning industry which is heavily geared towards exports with typically less than five per cent of production being consumed domestically.

Thailand, like many other tropical countries, benefited from relocation of the pineapple processing industry from the Temperate Zone developed countries where operations became prohibitively expensive and quite uneconomical mainly due to high cost of land and labour. The tropical countries had suitable agro- climates, abundant land and labour, and lax environment protection laws. The Government boosted the growth of this industry through investment incentives and liberal policies on foreign investment that enabled easy acquisition of overseas capital and access to foreign markets. The bulk of the commodity is canned and exported to temperate-zone developed countries. Overtime, Thailand has emerged as a highly competitive source for pineapple products. It had captured a large share in the US market, which is also the largest importer for these products. Despite many favourable factors, the scene has been changing with non tariff trade barriers causing a serious blow to the competitiveness of Thai pineapple canning industry. In the face of anti dumping investigation, Thailand lost significant share in the US market to Philippines and Indonesia. They had become more competitive price wise since they had similar cost advantages for labour, production and packaging. It was a major set back for the Thai Pineapple canning industry. Even though Thailand could access the EEC markets but that did not fully neutralize the adverse effects of loosing the share in US market. The exports to US started recovering after the duties were reduced from 51.6 to 21.5 per cent in 1999. Australia too imposed anti dumping duties on import of pineapple products from Thailand. The pineapple industry in Thailand faces several problems which have seriously eroded its global competitiveness.

I World Trade in Pineapple Products

Area

Area under pineapple cultivation has remained fairly stable over the period 1988 to 1999. In 1988, total area harvested under pineapple was 610,188 ha which increased marginally to 691,808 ha in 1998 (Table 1). Thailand, Philippines, India, Brazil and China together accounted for 41.7 per cent of the total area harvested under pineapple in 1988. This share marginally increased to 42.5 per cent in 1998. Nigeria always had the highest share in area (15.5 to 16.6 per cent) but it had small production (6.3 to 7.1 per cent, Table 2) reflecting low yields.



Source: Basic Data from FAO

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During the period 1988-1998, India and China showed some increase in area harvested under pineapple which declined rather significantly in Indonesia but remained fairly stable in other countries.

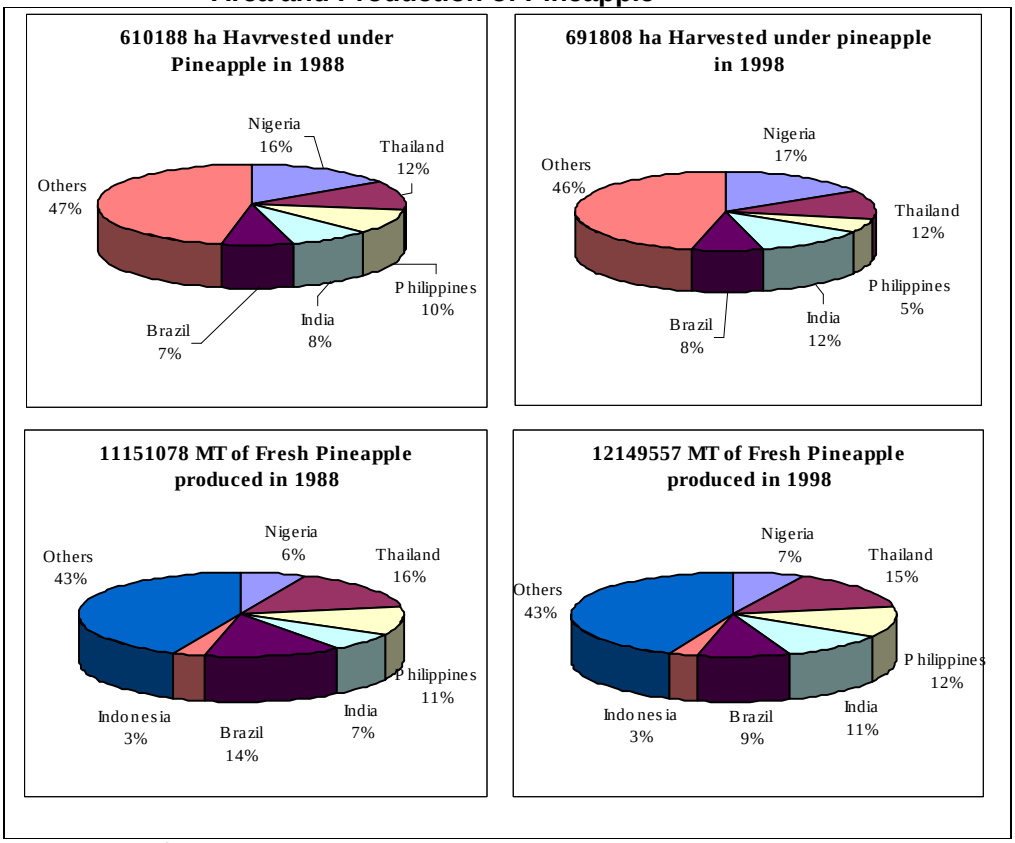
Table 1
Area Harvested under Pineapple

(% share)

	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000
Thailand	11.64	12.65	11.98	12.78	14.27	15.10	14.78	13.12	12.70	12.52	11.83	13.50	12.93
Philippines	9.92	9.91	9.58	9.26	9.64	10.12	10.22	9.95	6.86	5.98	5.45	5.20	5.77
Brazil	7.44	6.04	5.33	5.76	5.95	6.01	6.73	6.43	6.98	7.92	7.95	7.91	7.41
India	8.45	8.80	8.78	10.21	9.07	8.99	10.41	11.60	12.49	12.12	11.85	10.32	10.63
China	4.30	4.55	4.20	3.91	3.77	3.69	3.86	4.25	5.23	5.43	5.38	6.58	6.98
Nigeria	15.57	16.09	16.08	16.04	15.90	15.12	14.87	14.50	15.24	16.26	16.62	15.99	15.28
Indonesia	8.09	5.32	7.88	6.66	6.68	7.56	6.25	8.52	6.34	6.02	5.78	5.56	5.58
World(ha)	610188	615398	622006	623422	628808	661265	672336	689746	656354	676494	691808	719294	752405

Source: Basic Data from FAO

Fig 2
Area and Production of Pineapple



Source: Basic Data from FAO

Production

Over the period 1988 to 1998, there has been about nine per cent increase in production- from 11,151,078 mt to 12,149,557 mt (Table 2). During the period 1988-2000, the production increased at compounded annual growth rate of 1.59 per cent per annum[1]. The share of the five leading producers -Thailand, Philippines, Brazil, India and China- increased from 53.7 per cent in 1988 to 54.6 per cent in 1998. The share of Brazil has declined, while China has increased its share. In other cases the relative shares have either remained same or increased marginally.

Nigeria contributes only a small share to the world production despite having the largest area. In contrast Thailand had a 12 per cent share in total area harvested under pineapple in 1998 and contributed 15 per cent to world production. Philippines had a five per cent share in area harvested in 1998 and contributed 12 per cent to the world production of pineapple. (Fig 2)

Table.2
World Production of Pineapple

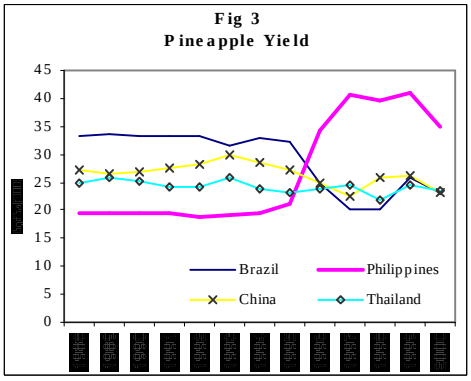
(% share)

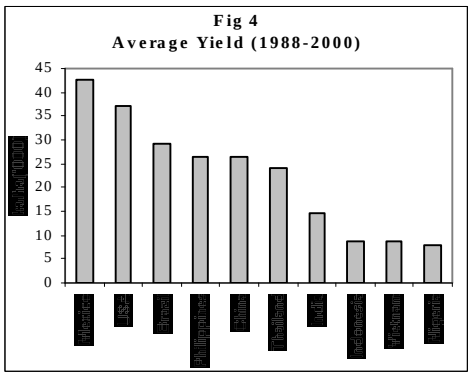
	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000
Thailand	15.88	17.81	16.52	17.39	19.10	21.29	19.42	16.73	16.25	16.74	14.70	17.43	17.01
Philippines	10.59	10.47	10.24	10.06	9.95	10.59	10.94	11.56	12.61	13.16	12.25	11.25	11.34
Brazil	13.56	11.03	9.78	10.72	10.86	10.30	12.16	11.43	9.37	8.62	9.16	10.86	9.61
India	7.31	6.99	7.80	6.92	7.53	8.22	8.28	8.50	9.81	10.04	10.54	7.39	8.18
China	6.40	6.59	6.17	6.04	5.85	6.02	6.04	6.38	6.99	6.65	7.91	9.05	9.03
Nigeria	6.28	6.58	6.76	7.20	7.01	6.58	6.55	6.41	6.54	6.67	7.05	6.48	6.55
Indonesia	3.21	1.91	3.46	3.38	3.30	3.78	2.83	5.64	4.10	3.10	2.69	2.33	2.68
World(mt)	11151078	11259434	11291972	11103417	11412547	12159545	12204574	12476653	12226506	12448093	12149557	13605492	13448930

Source: Basic Data from FAO

Productivity

There is variation in the productivity of pineapple in the major pineapple producing countries (Fig 3). In Thailand, average productivity during 1988-2000, was about 24,252 kg/hectare, whereas Brazil had a high productivity of 29,016 kg/hectare.
Although Mexico and USA have high productivity, they are also the high cost producer of pineapple. In Thailand and Philippines the yields are comparatively low but the cost of production is also lower (Fig 4).





Source: Basic Data from FAO

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World Trade

World trade in pineapple consists of three main products: preserves, forming by far the largest proportion (1,000,000 tonnes), pure or concentrated juice (170,000 tonnes) and fresh fruits (500,000 tonnes)[2].

Exports

Fresh Pineapples

Because of the perishability, pineapple in its fresh form is traded only on a limited scale and mostly in the neighbouring regions. The big trade in the fresh pineapple originates from Philippines, Côte d'Ivoire, Central America and the Caribbean countries (Table 3).

Table 3
Export of Fresh Pineapple

(% share)

	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000
ɔte d'Ivoire	26.63	22.41	23.57	19.92	21.49	18.58	17.82	17.48	20.31	19.42	17.36	19.14	18.07
ıilippines	28.58	28.16	25.49	27.48	25.76	22.77	21.47	21.02	17.16	16.06	13.65	12.11	13.04
entral Amer & Caribbean[3]	25.98	31.22	33.18	35.12	34.96	30.57	31.25	32.73	28.69	33.09	39.66	35.87	36.18
orld(mt)	541773	539979	574102	609623	589829	677742	752308	777763	839152	901585	860472	1054320	1039209

ɔurce: Basic Data from FAO

According to FAO projections[4], the world market for fresh pineapples is expected to expand over the next decade. The global imports of fresh pineapples are projected to reach 922 000 tonnes by the year 2005. The developed countries are expected to increase their global share from 89 per cent to 90 per cent and that would absorb most of the expected increase. The share of imports by developing countries is estimated to decline from 11 per cent to 10 per cent. Europe is expected to remain the largest import market with 484 000 tonnes exported to be imported by the year 2005. Imports into the EC would amount to 461 000 tonnes, or 50 per cent of global pineapple imports. France would account for a large proportion of EC imports. By 2005, the French are expected to import 133 000 tonnes, or 29 per cent of total EC imports. Côte d'Ivoire has hitherto dominated the European market taking as much as 60 per cent share. From 1986 onwards, Central America and the Caribbean countries also started exporting pineapple to Europe since ships carrying their bananas could also carry pineapple. This has posed a threat to the leading position of Côte d'Ivoire which is now building its future strategies on restructuring of import and export trade channels and the limits imposed by the European Commission on imports of Latin American bananas which has also hit pineapple supplies.

Canned Pineapple

Thailand holds the largest share in the World canned pineapple exports followed by Philippines, Indonesia and China. In 1988, world export of canned pineapple was 817,403 mt, out of which 41.8 per cent was exported from Thailand, followed by Philippines at 22.4 per cent (Table 4). Over the years (1988-2000), countries like Thailand, China and USA have registered negative growth in exports of canned pineapple, except for Indonesia where export of canned pineapple increased at annual compounded growth rate (quantity) of 8.5 per cent per annum (Table 5). The share of

Indonesia in world exports of canned pineapple increased from 3.4 per cent in 1988 to 12.3 per cent in 2000. However, 1997 and 1998 were the bad years.

Table 4
Export of Canned Pineapple

(% share)

	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000
Thailand	41.82	39.42	43.33	43.42	48.17	47.93	46.16	39.07	34.84	35.77	30.15	45.83	41.73
Philippines	22.36	22.05	19.44	20.04	19.21	18.28	19.40	19.29	24.72	23.17	26.97	17.29	23.50
Indonesia	3.36	5.52	5.29	6.61	6.96	9.42	8.93	9.15	12.45	8.58	4.90	12.83	12.31
China	4.77	3.68	3.37	2.91	1.46	0.98	1.08	0.88	1.03	2.46	6.85	3.24	2.09
USA	1.73	1.18	1.12	1.20	1.01	0.51	0.38	0.46	0.39	0.57	0.76	0.41	0.29
World(mt)	817403	877538	921238	969443	1028096	1059017	1109687	993573	1011428	799876	771744	1060982	1069735

Source: Basic Data from FAO

In 1988, nearly 72.3 per cent of world exports of canned pineapple had come from Asia. This share further increased to 79.9 per cent in 2000. Thailand's share in world exports of canned pineapple dropped during the period 1995 to 1998 presumably because of low harvests and anti-dumping margins imposed by the US. Initially, the anti dumping margins were as high as 51.6 per cent of the value of shipment[5]. In 2000, World canned pineapple exports increased to 1,069,735 mt from 1,011,428 mt in 1996 (Table 4). Thailand recovered its share in world exports of canned pineapple to 41.7 per cent. Indonesia took as much as 12 per cent share in the world exports.

Table 5
Export of Canned Pineapple-Analysis

(1988-2000)

	Min (mt)	Max (mt)	Average (mt)	COV	G Rate
Thailand	232703	512266	401158	21.94	-0.53
Philippines	179131	251423	202001	11.79	1.42
Indonesia	27482	136115	80807	44.84	8.47
China	8728	52871	24347	54.93	-1.57
USA	3147	14145	7152	51.32	-10.70

Source: Calculated on the basis of data from FAO

Single Strength (SS) Juice

The volume of SS juice exports increased to 369,477 mt in 2000 from 151,378 mt in 1988 (Table 6). From just 19 per cent in 1988, Philippines share in the world exports of ss juice increased to 34 per cent by 2000. Thailand's share has been fluctuating over the period (1988-2000), it peaked to 43.6 per cent in 1993 but currently it is around 31 per cent. Other countries like Netherlands and Kenya accounted for eight and six per cent share respectively. The Dutch exports are of course value added re-exports.

Table 6
Export of Pineapple Juice(sing str)

(% share)

	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000
Thailand	26.53	32.10	39.75	39.67	43.25	43.61	37.46	35.98	31.06	27.69	25.73	34.97	31.12
Philippines	18.73	18.74	17.44	18.44	17.35	17.23	16.12	18.65	24.52	19.62	23.22	18.12	33.90
Netherlands	10.21	10.15	7.58	7.73	6.68	7.62	10.14	11.45	13.61	12.85	12.21	12.25	7.96
Belgium-Luxembourg	6.20	6.14	0.04	0.01	0.01	4.40	3.62	3.59	3.46	3.58	2.35	1.26	0.00
Kenya	6.86	4.46	4.66	4.50	5.43	5.05	5.46	2.70	0.01	7.24	6.64	7.21	5.57
World(mt)	151378	182674	185338	201545	183323	195343	276406	284489	270173	224539	266968	290375	369477

Source: Basic Data from FAO

Pineapple Juice Concentrate

Philippines is the largest exporter of pineapple juice concentrate (pjc) accounting on an average for almost 61.6 per cent of the world exports during 1988-2000. However, during this period the share of Philippines has been declining. In 1993, Indonesia also started exporting pjc and took an average of almost 27 per cent share in the world exports during 1993-2000 (Table 7).

Table 7
Export of Pineapple Juice (conc) [b]

(% share)

	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000
Indonesia	0	0	0	0	0	4.86	12.17	22.67	31.98	24.73	8.36	38.25	74.59
Philippines	90.93	77.04	64.46	63.36	64.97	76.16	67.96	59.23	58.17	60.92	72.72	45.39	0.00
USA	5.14	21.37	18.68	21.65	19.24	15.55	14.59	15.34	7.08	9.70	13.77	12.38	18.59
World(mt)	32002	42202	63517	68513	58043	48340	56288	67772	75853	59982	56632	69079	26877

Source: Basic Data from FAO

Imports

Fresh Pineapple

Global Imports of Fresh Pineapple have increased reasonably during 1988-2000 (Table 8).

Table 8
Import of Fresh Pineapple

(% share)

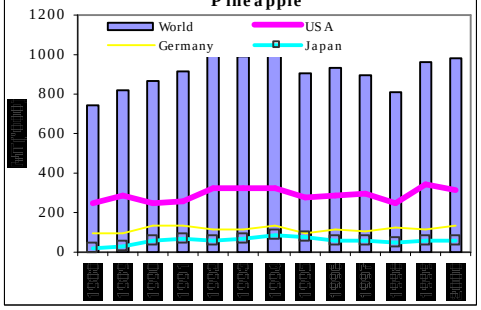
	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000
USA	15.16	18.24	19.12	18.45	19.57	19.17	18.76	17.90	17.41	23.49	29.39	27.43	30.51
UK	4.15	3.71	3.48	3.37	3.28	3.00	3.26	2.93	3.25	3.60	3.55	2.99	2.80
Germany	7.04	6.33	6.80	6.76	7.14	7.24	5.58	5.99	5.96	4.66	4.46	5.90	5.49
France	14.30	12.77	13.46	13.79	12.02	15.67	16.84	16.11	18.31	16.45	15.33	16.30	14.18
Italy	8.03	6.69	6.80	6.70	8.01	6.38	6.08	5.64	6.16	5.85	5.51	7.21	6.48
Japan	25.63	25.09	21.53	22.07	20.17	18.24	16.24	15.51	12.44	11.07	9.84	8.71	9.58
World(mt)	539134	539637	595753	624228	631969	663213	699058	695978	776873	868272	860459	1031889	1045092

Source: Basic Data from FAO

Canned Pineapple

During 1988-1998, the world import of canned pineapple averaged at 905,101 mt. The major importing countries were USA, Germany and Japan. United States was the largest importer in 1988 and continues to occupy same position even now. Japan has increased its share significantly, Germany has almost maintained the same share but the share of UK has declined. In all cases, the shares have been fluctuating from year to year.

Fig 5
Major Importing Countries of Canned Pineapple



Source: Basic Data from FAO

[b] It is reported that Thailand also exports pjc, but data on that is not available.

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Table 9
Import of Canned Pineapple

(% share)

	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000
USA	33.87	35.09	28.90	28.68	32.36	33.13	29.84	30.01	30.10	33.19	30.39	35.56	32.23
Germany	12.86	11.76	15.34	14.94	11.55	11.13	12.41	10.60	12.61	11.88	14.79	11.54	13.43
Japan	2.92	3.05	6.15	7.40	6.07	7.06	7.85	8.31	6.33	6.17	5.86	5.95	5.82
UK	7.27	8.04	6.25	5.04	6.08	5.48	4.72	5.15	5.51	5.46	6.09	5.42	5.50
World(mt)	740082	817195	866582	910042	1012084	990323	1070652	905591	936849	897357	809351	961104	983014

Source: Basic Data from FAO

Single Strength Juice

A few major markets account for the bulk of imports of pineapple juice i.e. single strength and concentrates. The five largest markets - comprising the United States, Netherlands, Spain, France and Italy- together imported 66.4 per cent of world imports of pineapple juice (single strength) in 1998. The Dutch and German exports are of course value added re-exports.

Table 10
Import of Pineapple Juice(sing str)

(% share)

	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000
USA	22.20	24.33	19.46	20.14	19.32	19.78	22.67	27.06	22.42	23.56	22.57	22.48	21.53
Netherlands	15.36	14.15	15.26	14.11	15.63	15.06	17.25	19.34	20.37	16.38	17.34	20.77	21.07
Spain	9.12	9.85	11.61	15.00	15.43	11.61	11.25	7.87	9.08	9.06	8.82	7.56	7.61
France	9.75	10.48	10.92	9.57	10.20	10.10	8.83	8.34	8.12	8.95	8.55	7.91	7.38
Italy	9.78	7.89	6.87	7.63	7.04	9.27	9.98	8.38	7.20	7.70	9.09	9.55	9.95
World(mt)	125100	151477	164602	188453	162505	173282	246246	274243	251156	244511	245909	271418	281006

Source: Basic Data from FAO

Pineapple Juice Concentrate

USA has been the major importing country for pineapple juice concentrate. In 1988, USA had almost 95 per cent share in the world imports of pineapple juice concentrate. Although this share declined to about 88 per cent in 1998, USA is still the largest importer of pjc.

Table 11
Import of Pineapple Juice (conc)

(% share)

	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000
Canada	2.43	1.63	1.55	1.51	1.37	1.27	1.99	1.67	1.61	1.74	2.27	1.89	2.42
Israel	1.84	0.76	0.66	0.81	0.79	0.52	0.55	1.14	1.94	1.39	2.58	0.69	0.95
Russian Federation	0.00	0.00	0.00	0.00	7.86	6.52	6.76	5.38	4.64	3.63	3.36	1.17	2.50
Spain	0.05	0.04	0.08	0.08	0.21	0.11	0.14	0.45	0.71	0.11	0.77	0.11	0.09
UK	0.13	0.09	0.26	0.16	0.06	0.07	0.09	0.10	0.08	0.15	0.11	0.03	0.02
USA	94.63	96.84	95.84	95.72	88.14	90.41	87.72	88.71	88.52	90.41	88.30	92.89	88.81
World(mt)	243455	293466	347004	369856	381726	383633	286210	316099	339654	302055	238722	303753	265488

Source: Basic Data from FAO

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II Pineapple Industry in Thailand

Pineapples have been grown and consumed mainly as a fresh fruit in Thailand for many years but the canning industry is barely four decades old. The industrial processing took off during the early seventies and overtime Thailand has become one of the major producers and exporters of canned pineapple in the world. While the canned pineapple is a significant earner of foreign exchange for Thailand, it is not very significant to it's over all foreign trade (less than one per cent[6]). However, the pineapple processing industry is a major constituent of the Thai food processing industry (Box 1).

Box 1

Thai Food Processing Industry

Thais are great consumers of the processed foods that they imported liberally until the World War II. After that the imports became much dearer and could not be sustained from the drastically reduced export earnings. The situation was such that the prices of import products kept on rising while export earnings mainly from agriculture based commodities were continuously on the downslide. In a bid to substitute imports while simultaneously meeting the growing domestic demand, the Thai entrepreneurs started to manufacture the processed foods from locally grown raw materials. However, the industry did not properly organize itself until 1961 when the first National Economic and Social Development Plan was launched. Even then the growth of the processed food industry was quite slow until the Thai Food Processor's Association was established in 1970. After that a world competitive Thai food processing industry started evolving in a phased manner.

Food products take a 61 per cent share in the Thai food processed industry while the remaining 39 per cent share goes to beverages. By 1997, the industry had reached a market value of $6.2 billion although that declined to 5 billion by 1999. To reach this level, the industry had gone through several stages of growth adding value at each stage through technological up gradation, safe and superior product development, cost efficient production, and market savvy.

Until 1960, the technologies available to preserve foods were traditional and limited to drying, pickling and sugar glazing. The processing was mainly for fruits and vegetable which had large surplus production.

During the decade of the Sixties, government introduced industrial promotion privileges offering several incentives for the domestic manufacturers to promote import substitution. Towards this goal, the technologies for sweetened condensed milk processing, fruit or vegetable canning, and production of vegetable oil were either upgraded or newly acquired from Taiwan and Japan

During the period 1970-72, the Thai Food Processor's Association collected data, rules and regulations, food standards, production processes from all over the world. Knowing the standards in terms of quality demanded and food safety required in markets abroad was a first important step on the learning curve. The Seventies saw accelerated development of the processed food industry and beginning of the processed food exports that generated surplus income. Still the focus was on the local consumption and the exports were seen as means for discharging surpluses in production. However, the development of the industry during this period was considerably constrained by the lack of experience in bulk production, resulting poor quality and disorganized marketing. These constraints were somewhat alleviated during the period 1974-1979 when better production processes were developed and quality standards improved. During this period, the canning industry started developing, exports were seriously pursued and the product base diversified to include canned sea foods such as tuna, crab, prawn and shells. The sea food exports were directed towards France, England, Germany and United States of America.

The Eighties were devoted to rapid industrial growth through acquisition and development of technologies, production expansion and marketing. New markets were accessed and consolidated. The demand originating from these markets set the tone for the technology upgradation mainly through imports from America and Europe. During this period, the growth in exports of processed foods averaged around 26 per cent per annum due mainly to surge in exports of frozen and chilled commodities.

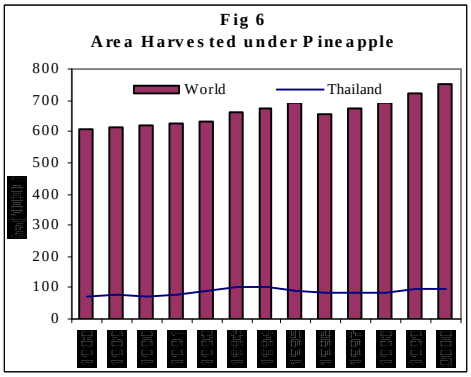
During 1980-1985, the Thai processed food industry grew at a rapid pace. On average, 10 new processing plants were established every year thereby significantly expanding installed processing capacities. Production and exports expanded steadily. New markets in Europe, Canada, Australia and Japan were reached. As export volume and market share increased, the importers started rigorously enforcing product quality and safety standards particularly in case of sea foods. Thai processors wisely chose to work with the importing countries by inviting their inspectors to regularly visit the Thai processing facilities and advice on production processes and quality control. As a result, the Thai food processing industry underwent a major change during the later half of the Eighties. The government organizations dealing with food processing, food safety and exports were directly involved in these efforts and offered advice and other services for production standards and product quality, training and research. The representatives from the Thai food processing industries both public and private visited processing sites abroad to study inspection processes in those countries. The quality inspectors from those countries regularly visited Thailand advising the Thai processors on food quality control and inspection. On the whole, the Thai processing industry during this period was in a learning mode.

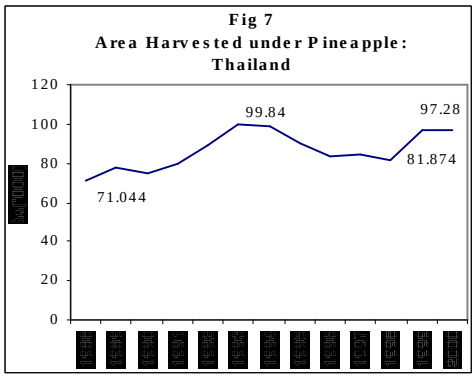
The Nineties saw a more fierce competition in the markets. The dilemma was that while on one hand the processors had to pay higher prices for the raw material that were short in supply particularly those of the good quality, they could not proportionately raise the selling prices in the face of stiff competition. Thailand then lost share in some important markets for canned bamboo shoots, tubers, pineapples and other few products. So the mission then was to be most efficient in production thereby producing highest quality food products at the lowest cost so as to be able to compete in markets abroad in terms of product quality

standards and cost. This forced the Thai food processing industry to reorganize and restructure itself keeping in focus key parameters such as sanitation, hygiene and food safety during production, lower production cost, value-addition, strict conformity with environmental regulations, and quality of the foods processed. By then the Thai processors knew well that quality and safety were essential and had to be created. Accordingly, quality considerations dominated all efforts in the industrial reorganization. They aimed at producing products that the consumers abroad demanded.
Source: Based on a note from Thai Food Processors Association

Area

The area harvested under pineapple in Thailand increased from 71,044 ha in 1988 to 97,280 ha in 2000, at an annual compounded growth rate of 1.8 per cent (Table 12). The production of fresh pineapple increased from 17,70,931 mt in 1988 to 22,87,000 mt in 2000, at an annual compounded growth rate of 1.1 per cent.





Source: Basic Data from FAO

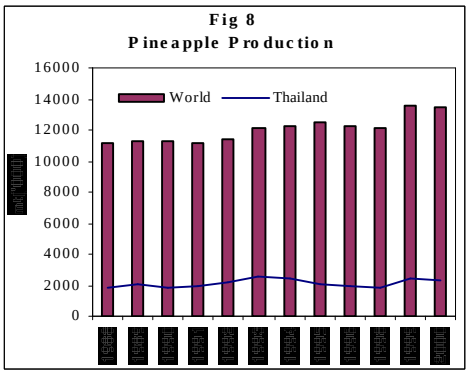
Table 12
Analysis of Area Harvested under Pineapple

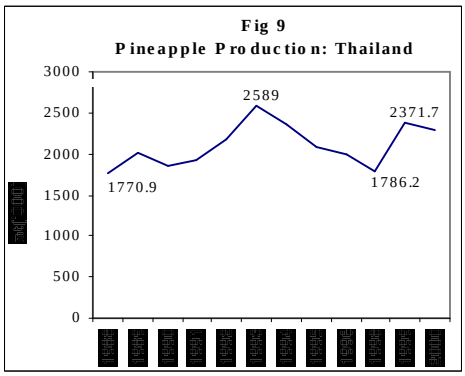
	Area in Thailand					% Share in World Area				
	Min (ha)	Max (ha)	Average (ha)	COV	G Rate	Min (%)	Max (%)	Average (%)	COV	G Rate
1988-2000	71044	99840	86679	11.23	1.83	11.64	15.10	13.06	8.31	0.26
1998-2000	81874	97280	92085	9.60	9.00	11.83	13.50	12.75	6.63	4.52

Table 13 Analysis of Region wise area harvested					(1994-98)
	Min (ha)	Max (ha)	Average (ha)	COV	G Rate
Whole kingdom	51360	90560	79616	20.11	10.36
Prachuap Khiri Khan	40800	49280	43936	7.76	-3.52
Rayong	8000	8640	8352	3.15	1.74
Chon buri	4320	4800	4448	4.69	2.13
Phetchaburi	5280	6400	5696	7.59	-2.38
Uthai Thani	2080	3200	2720	16.11	1.18
Kanchanaburi	3680	4480	4000	8.00	4.01
Ratchaburi	3840	4000	3872	1.85	-0.41
Chumphon	2720	7200	4832	40.38	-22.66
Chachoengsao	960	1440	1152	18.11	6.79
Nong Khai	2080	3360	2400	23.09	-10.44
Trat	1440	2560	2048	21.68	-7.22
Lampang	1440	2080	1696	14.31	-4.30
Others	2400	5280	4160	25.80	-3.97
Source: Center for Agricultural Statistics, Office of Agricultural Economics, Ministry of Agricultural & Co-Operatives					

Production & Farm Prices

During 1995-2000, the average annual production amounted to two million tonnes from approximately 89,131 ha spread over thirteen provinces with concentration along the East and the West Coasts of the Gulf of Thailand. About 55 per cent of area under Pineapple is in Prachuap Khiri Khan Province. More than 95 per cent of the pineapple producers are small-holders. For some years now their production is on contract basis. The production peaked during 1997-98 in response to market demand and high prices (Table 14). However, 1999 saw the prices crash to 2.4 from 5.2 Baht/kg in 1998 (Table 15). This resulted in lowering of the production in the following year.





Source: Basic data from FAO

Table 14 Analysis of Pineapple Production Data										
Production in Thailand						% Share in World Production				
	Min (mt)	Max (mt)	Average (mt)	COV	G Rate	Min (%)	Max (%)	Average (%)	COV	G Rate
1988-2000	1770931	2589000	2101086	11.82	1.12	14.70	21.29	17.41	9.81	-0.46
1998-2000	1786234	2371791	2148342	14.73	13.15	14.70	17.43	16.38	8.97	7.55

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Table 15 Analysis(1991-2000)					
	Min	Max	Average	COV	G Rate
Farm Price (Bahts per Kg)	1.18	5.24	2.49	46.34	5.94
Farm Value (Million bahts)	3055.00	9359.00	5199.80	35.64	5.83

Productivity

During 1988-2000, the yields averaged around 24,252 kg/ha. Over the years, there has been wide variation in productivity mainly attributed to weather conditions and the level of management given to pineapple crop usually in direct response to the prices that prevailed during the previous season. 1998 was a bad year when lowest productivity at 21817 kg/ha was recorded (Table 16). Even though Thailand is the largest producer of fresh pineapple in the world, its yields are lower than the other producers such as Mexico, USA, Philippines and Brazil.

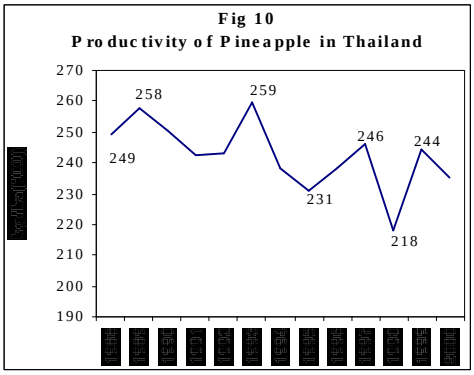


Table 16 Pineapple Yield													(kg/ha)
	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000
Thailand	24927	25765	25033	24227	24287	25931	23853	23070	23838	24598	21817	24426	23509
World	18275	18296	18154	17810	18149	18388	18152	18089	18628	18401	17562	18915	17875
Source: Calculated n the basis of data from FAO													

Industrial Processing

The industrial processing began in 1964 with Malee Foods[7] establishing a small factory at Sampran, Nakornpathom. However, an organised large-scale export industry for the processed fruit began to emerge only from 1967 when the first modern processing facility was established by Thai Pineapple Canning Industry Company Ltd.(TPC) at Pranburi, Prachuab Kirikhan Province, around 250 km South of Bangkok near the old resort area of Hua Hin. With an installed capacity of 2.5 million cases per year, it processed pineapples purchased mainly from small producers in the region around the factory. Now Thailand has many factories canning pineapple. In addition to some 30 small factories, many more spring up during the glut season. But these factories have a minor impact on total capacity as well as the foreign trade. The key players are large companies receiving the Board of Investment (BOI) privileges. Some of them have foreign equity participation in terms of equipment and marketing, while others are wholly Thai owned.

Exports

Fresh Pineapples

Pineapple is consumed mainly in two forms: fresh and processed. The share of Thailand in world export of fresh pineapple has been very small; less than one per cent of the production. Therefore Thailand takes an insignificant share in the world trade in pineapple (Table 17). But according to FAO projections the world market for fresh pineapples is expected to expand to 922 000 tonnes by the year 2005. Given a strong capacity to build the required infrastructure for cost efficient logistics, Thailand might venture into export of fresh pineapple through joint ventures that could take care of marketing.

Table 17
Export of Fresh Pineapple

(% share)

	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000
Thailand	0.22	0.09	0.17	0.08	0.14	0.07	0.09	0.15	0.26	0.33	0.17	0.19	0.48
World(mt)	541773	539979	574102	609623	589829	677742	752308	777763	839152	901585	860472	1054320	1039209

Source: Basic Data from FAO

Canned Pineapple

Thailand is the biggest exporter of canned pineapple in the world. The Thai canned pineapple industry made spectacular progress in exports from 1,000 mt in 1967 to a record 5,12,266 mt in 1994 valued at US $ 26.6 million. Thereafter the exports dropped both in volume and value terms. The declining exports reflected a weakening competitive position for the Thai pineapple canning industry largely due to the anti dumping duties that were imposed first in the United States and then in Australia. Yet in the year 2000, Thai exports of the canned pineapple stood at 4,46,355 mt valued at US $ 21.3 million. Quantity-wise, even then Thailand took a 41.7 per cent share in the world exports.

The countries which traditionally imported canned pineapple from Thailand are USA, Germany, Netherlands, Japan, United Kingdom, France and Canada. USA is the largest importer of canned pineapple from Thailand while the Netherlands is essentially a re-export market (Table 18).

Table 18
Thai export of Canned Pineapple to USA

	Volume(tons)	Value(Million Baht)
1996	66323	1161
1997	40903	822
1998	24856	735
1999	108822	2669

Source: Department of Business Economics, Thailand

Exports depend upon production, the market situation, economy of the importing countries, and trade barriers. In 1999, the production of pineapple increased significantly leading to an increase in exports over the previous year by 109 per cent. Excess supply caused prices to slump and in a typical cob-web pattern output of pineapple in the following year declined by 3.6 per cent. With less produce available for canning, canned pineapple output in 2000 fell by 11 per cent. Exports of Thai canned pineapple too declined both in volume and value in 2000.

Fig 11
Exports of Canned Pineapple

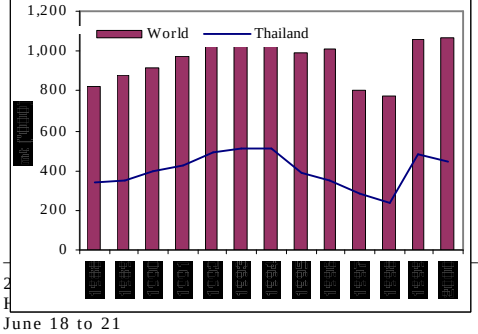
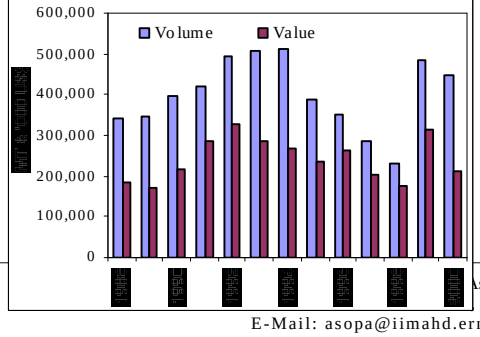


Fig 12
Export of Canned Pineapple: Thailand



Source: Basic Data from FAO

Thailand lost some of its share in the US market to Philippines and Indonesia who had become more competitive price wise. Thailand has been facing stiff competition from Philippines and Indonesia which had the same advantages for production- suitable climate, cheap labour and availability of raw material. Besides, in the US market the Philippines pineapples were perceived to be of better quality. It was a major set back for the Thai Pineapple canning industry. Even though Thailand could access the EEC markets, it did not fully neutralize the adverse effects of loosing the share in US market. The exports to US started recovering after the duties were reduced from 51.6 to 21.5 per cent in 1999.

Table 19
Analysis of Export of Canned Pineapple

	Export of Canned Pineapple from Thailand					% Share in World Canned Pineapple Export				
	Min (mt)	Max (mt)	Average (mt)	COV	G Rate	Min (%)	Max (%)	Average (%)	COV	G Rate
1988-2000	232703	512266	401158	21.94	-0.53	30.15	48.17	41.36	13.05	-1.17
1998-2000	232703	486260	388439	35.10	38.50	30.15	45.83	39.24	20.72	17.64

The production was expected to continue to decline during 2002 too due to EL NINO and other effects. The production cost was rising because of the clamour for paying more to the farmers for the raw material supplied by them and the cost incurred in installing HACCP system and the related machinery. On the brighter side, a significant lowering of the import duty on packaging material offered some respite to the pineapple processors.

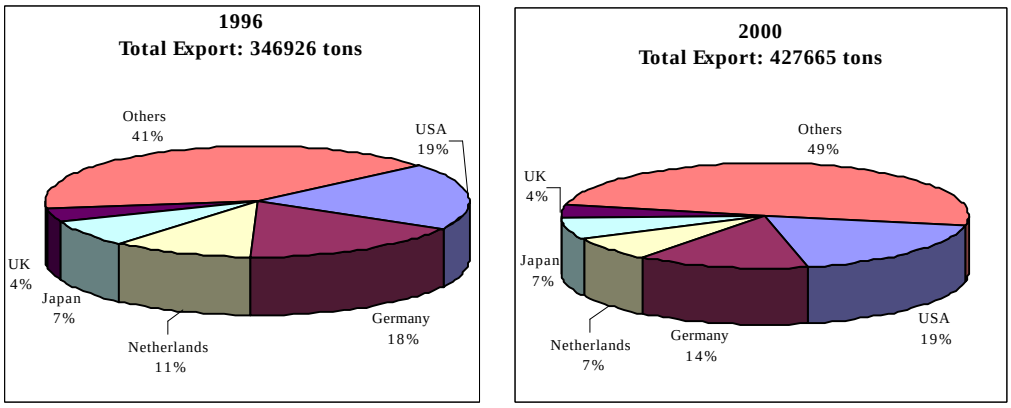
Twenty per cent of the total canned production is consumed domestically and that will continue to be static since the Thais prefer consuming more fresh fruits than their canned products. Eighty percent of the canned produce is exported and that share is unlikely to grow in the face of anti-dumping duties from the US and Australia. The Thai pineapple canning Industry will continue to yield more and more share in these markets to Philippines and Indonesia whose products are not subject to anti-dumping measures and still receive GSP. Products from China also enjoy lower production costs but their method of computing the cost defy understanding. To overcome these adverse market situations, the Thai processors are aggressively pursuing market diversification and sales through super markets and retailers. The goal is to distribute risk over a larger number of export destinations.

Fig 13
Thai Canned Pineapple Export: Destination Wise

(1 996-2000)

Destination	Min (ton)	Max (ton)	Average (ton)	COV	G Rate
USA	24856	108822	64373	51.33	14.77
Germany	38454	66935	54038	21.30	4.64
Netherlands	18075	37399	29767	27.64	0.16
Japan	17069	29644.3	24245	21.08	5.48
UK	14253	21777	16995	16.62	6.29
Spain	5903	18966	10391	50.83	26.85
Canada	10860	18776.6	15487	22.26	5.07
France	11389	16854.1	13145	18.24	9.90
Taiwan	4858	9550	8015	23.63	-3.80
Belgium	5317	28092	10689	91.43	26.30

SOURCE : DEPARTMENT OF BUSINESS ECONOMICS, THAILAND.



SOURCE : DEPARTMENT OF BUSINESS ECONOMICS, THAILAND

Unit Value Realisation (UVR)

On the whole Thailand has a better per unit value realisation for canned pineapple products as compared to Philippines and Indonesia. Indonesia has been improving its per unit value realisation but in Philippines there has been a noticeable decline (Fig 14).

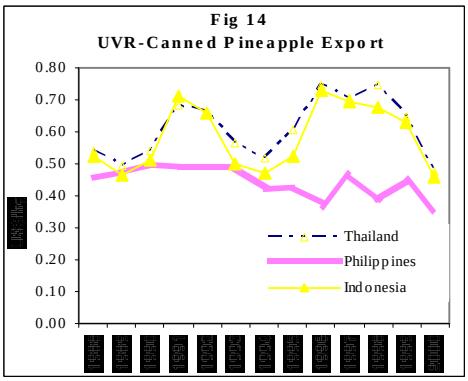


Table 21
UVR of Export Canned Pineapple

(US$/kg)

	Min	Max	Average	COV	G Rate
Thailand	0.48	0.75	0.61	15.50	1.23
Philippines	0.36	0.50	0.44	10.67	-1.92
Indonesia	0.46	0.73	0.58	17.69	1.10

Source: Calculated on the Basis of Data from FAO

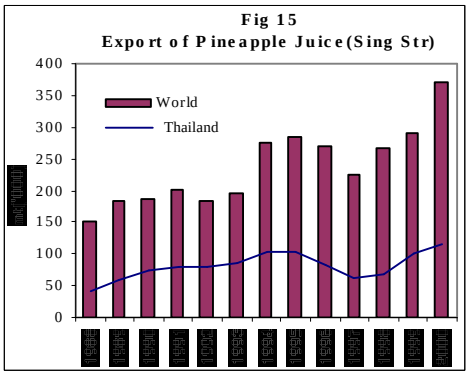
Per unit Values realised from Thai exports of canned pineapple have fluctuated from year to year and also from destination to destination. During the period 1996-2000, the range has been 28.58 (Germany) to 37.26 Baht/kg (Taiwan) (Table 22). Highest per unit values were realised in 1998. Considering average values during this period, Taiwan has always given highest unit value but exports to this destination have been small in quantities. United States which is the largest importer of canned pineapple in volume terms from Thailand, gives a relatively low value of 22.66 Baht/kg.

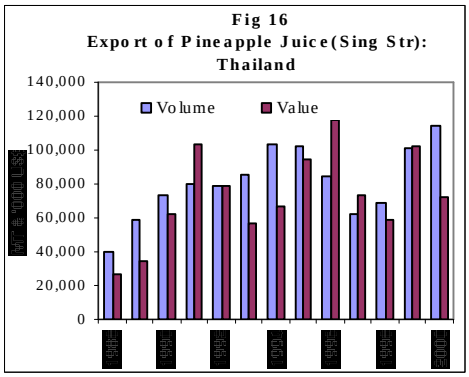
Table 22
Analysis of UVR Thailand Export of Canned Pineapple
(1996-2000)

Destination	Min (Baht/kg)	Max (Baht/kg)	Average (Baht/kg)
USA	17.51	29.58	22.66
Germany	16.25	28.58	21.09
Netherlands	18.80	31.44	23.80
Japan	20.52	34.46	27.07
UK	19.07	32.42	25.53
Spain	19.28	30.37	23.51
Canada	17.88	30.02	22.33
France	18.85	30.55	23.23
Taiwan	24.05	38.45	30.87
Belgium	9.94	31.69	20.98

Source: Calculated on the basis of data from Department of business economics with cooperation of the customs department, Thailand.

Single Strength Pineapple Juice





Source: Basic Data from FAO

The export of pineapple juice from Thailand increased considerably during 1988-1994 but the volumes started declining after 1995. Some revival was witnessed after 1999. The key destinations for Thai pineapple juice have been the Netherlands, USA, Spain, Germany, Japan and Israel. In 1996, the Netherlands alone took 38.3 per cent share in the Thai exports of pineapple juice. This share then further increased to 56.7 per cent in 2000, recording an annual compounded growth rate of 13.7 per cent. On the other hand, US imports have fluctuated during 1996-2000.

Table 23

Analysis of Export of Pineapple Juice from Thailand (1996-2000)					
Destination	Min(tons)	Max(tons)	Average(tons)	COV	G Rate
Netherlands	19414	40629	26032	32.45	13.73
USA	7935	24356	12929	55.41	-11.17
Spain	4606	8416	6165	23.93	7.89
Japan	1515	3566	2374	38.63	-12.92
Israel	731	2509	1770	43.43	-8.89
Source: Department of Business Economics, Thailand					

Table 24
Analysis Export of Pineapple Juice SS

	Export of Pineapple juice SS from Thailand					% Share in World Export of Pineapple Juice SS				
	Min (mt)	Max (mt)	Average mt)	COV	G Rate	Min (%)	Max (%)	Average (%)	COV	G Rate
1988-2000	40167	114964	81085	25.91	4.68	25.73	43.61	34.53	17.55	-1.25
1998-2000	68678	114964	95057	25.05	29.38	25.73	34.97	30.60	15.17	9.98

Growth Factors

Production Advantage

The tropical countries benefited from relocation of the pineapple processing industry from the temperate zone developed countries where operations were becoming prohibitively expensive and quite uneconomical mainly due to high cost of land and labour. In the United States, the output of pineapple was contracting in Hawaii, the main pineapple growing area. The tropical countries particularly Philippines and Thailand had suitable agro climates, abundant land and labour, and lax environment protection laws. The Government on its part boosted the growth of this industry through the Board of Investment (BOI) privileges and liberal policies on foreign investment that enabled easy acquisition of overseas capital and access to foreign markets.

Role of the TNCs

The Trans National Corporations (TNCS) played a key role in developing pineapple canning industry in Thailand. They provided the critically needed capital by transferring the canning technologies to the joint ventures and wholly locally owned firms. TNC influence in the pineapple canning industry of Thailand is significant. Of the seven major pineapple-processing TNC companies, two have substantial direct TNC equity participation. Together they account for 42 per cent of the installed capacity. On a weighted basis, foreign equity accounts for 23 per cent of their productive capacity. In addition, the TNCs exert indirect influence on the wholly Thai-owned companies through the marketing operations.

Infrastructure Facilities[8]

Infrastructure plays a key role in creating and sustaining a world competitive industry. The availability of infrastructure and related services affect the cost of logistics and the speed at which the raw materials and products move. For a small country- area about half a million sq.km and population of 61 million people- Thailand has a remarkable combination of different modes of transportation commercially run quite efficiently[9].

Despite many favourable factors, the scene has been changing with non tariff trade barriers causing a serious blow to the competitiveness of Thai pineapple canning industry.

Trade Barriers

In many countries of the world import duties on pineapple products have been increasing although within the upper bounds committed in the Uruguay Round. For example, at the end of 2000, Mexico was preparing to raise its tariffs on pineapple imports from 23 to 45 per cent which could seriously affect Thailand's US$ 100-million pineapple trade with Mexico. The higher duties were directed at imports from all sources and not specifically to Thai canned pineapple. Of course, NAFTA partners were exempt from these duties but that meant only the Hawaiian producers since pineapple is not grown in rest of the North America. Raising duties to protect domestic producers is a still a routine fiscal exercise in many countries.

Anti Dumping Investigations

USA

Following a spurt in world prices for pineapple during 1992 and 93, Thai producers increased their production accumulating a huge surplus. This severally depressed price by the end of 1993 but most of the surplus were exported in 1994. The canned pineapple worth 79.2 million Baht was exported to US alone during 1994. Thais had successfully captured 46 per cent of the US. This was also the beginning of the trouble for the Thai canned-pineapple industry.

In 1994, a Hawaii based manufacturer, Maui Pineapple Co, filed an antidumping petition with the U.S. Department of Commerce (DOC) against the Thai producers alleging that it was suffering a serious damage from indiscriminate imports of the canned pineapple from Thailand at much lower prices. The Hawaiian pineapple industry was seriously crippled by high cost of production and low price realization. In 1993 Maui had recorded a net loss of 11 million dollars that reduced to 3.9 million U.S. dollars in 1994. Maui was struggling to survive in the face of the depressed world pineapple prices, caused by the flood of Thai pineapple in the US.

To begin with, the Thais protested that Maui's plaint was not so much to protect its US interests but to serve the interests of its Indonesian joint venture partner, PT Great Giant Pineapple Co. The JV, named Premium Tropicals International LLC, marketed and sold Indonesian canned pineapple to the U.S. However, the two companies did not actually merge until 1998. Even though Indonesia was a major low cost producer of pineapple and PT Great Giant Pineapple Co, was the largest and lowest-cost grower and canner of pineapple in the world, surprisingly this did not find any mention in Maui's original antidumping petition[10].

Initiating an anti-dumping investigation, the US DOC imposed preliminary duties that were as high as 51.6 per cent. Later during the annual review these duties were reduced to a level ranging from 3.26 to 24.64 per cent of the CIF value (Table 25).

Table 25
Anti Dumping Duties on Pineapple Product Imports from Thailand

Company	1995	1997	1999	2001
Siam Food Products Company Ltd (SFP)	24.64	13.25	12.85	0.18
The Thai Pineapple Public Company, Ltd (TIPCO)	38.68	33.06	27.85	4.73
Thai Pineapple Canning Industry (TPC)	24.64	06.54	21.54	2.33
Siam Agro Industry Pineapple Co.	51.60	16.48	16.48	
Malee Sampran Public Co., Ltd	43.43	16.48	16.48	10.45
Dole	01.73	01.73	01.73	1.02
Kuiburi Fruit Canning Co. Ltd(KFC)	.	.	.	1.66
Siam Fruit Canning(1988) Co. Ltd (SIFCO)	.	.	.	1.41
Vita Food Factory(1988) Co. Ltd(VITA)	.	.	.	4.57
Source:www.foodmarketexchange.com				

Dispute on Methodology[11]

The methodology to be used for constructing cost of production (COP) and cost value (CV) became a matter of dispute at the very beginning of the anti dumping investigation. The Thai companies routinely maintained two sets of accounts. One set contained actual information and reflected the true cost of production or what the Thais called actual raw material or non-output price-based weighted cost allocation. The second set of the accounting information was based on finished price-based accounting cost allocations and it contained higher values. This method was used officially for “certain managerial and tax goals” but did not reflect the actual production cost. Stated simply, this method enabled Thai companies to get larger tax benefits but this accounting information also showed a higher cost of production making the Thai canned-pineapple industry vulnerable to the dumping charge. However, if the DOC applied a weight-based allocation, a lower material cost would be realized, which would explain the lower selling price. Using this method, Thailand's canned pineapple “would not have appeared to be sold at less than fair value”.

According to the Thais, their processing of pineapple differed greatly from that of Maui's and that explained the cost differences between the two companies. Thais manufactured canned pineapple fruit, pineapple juice and pineapple juice concentrate. Maui, however, processed only the solid fruit for canning and discharged the juice as a waste. As a result, the cost of raw material in the final product varied. Thais used separate parts of the fruit including the peel and distributed the raw material costs among the final products by weight. However, until the DOC investigated, Thai pineapple producers continued to apply price-based accounting to achieve what they called “tax and managerial goals”. The Thais claimed that the price-based method had been audited and found in conformity with the generally accepted accounting principles (GAAP) in Thailand.

Being unfamiliar with the weight-based allocation method, the DOC rejected the Thai contention in May 1995. It then based the dumping margins on the price-based accounting cost allocations. Using this accounting method, the DOC found that a large part of the Thai canned pineapple products were below the COP. For certain types of canned fruit sales, as much as 90 per cent of the volume was below the fair cost of production. However, the Thais could successfully challenge this determination in the U.S. Court of International Trade (USCIT). In November 1996, USCIT ordered the DOC to accept the weight-based, and not price-based, methodology. The DOC appealed this ruling and could obtain a reversal from the U.S. Court of Appeals in July 1999. At the end, the methodology followed used price-based accounting information which gave a higher cost of production for Thai pineapple products. So the dumping charge prevailed.

Annual Reviews

As is the practice, the antidumping duties are subject to annual reviews either at the request of a single company or a group of producers. If the cost of production had changed relative to the selling price of the product in the U.S., the anti-dumping duties would then be appropriately adjusted and a new cash deposit rate for future entries established.

Until 1994, when the antidumping duties were imposed, imports from Thailand were growing as a result of there aggressive marketing. Their low pricing and intense promotional activities had adversely affected Maui sales volume and average prices. But, Maui was able to generate profits after the anti dumping duties were imposed on its major overseas competitors. Therefore, Maui kept on successfully arguing at every annual review that if the antidumping duties were not renewed, it was likely that Thailand will continue to dump canned pineapple on the U.S. market. In fact in its annual report Maui cited the looming threat of anti dumping duties on Thai canned-pineapple being reversed as one of the factors that could significantly affect the future business of the Company. Maui was the only company canning pineapple in Hawaii after the others had changed their line of business to the fresh fruit. Through these annual reviews, some of the Thai pineapple companies were successful in significantly reducing their antidumping duties but they were not totally removed (Table 25).

Sunset Review[12]

As per the established procedure, a sun set review was also undertaken by the ITC five years after an anti- dumping determination had been made. The objective was to determine "whether revocation of the antidumping duty order was likely to lead to a continuation or recurrence of dumping and of material injury within a reasonably foreseeable time". In the case of Thai pineapple, such review was done by June 30, 2001 and a decision made on keeping the antidumping duties in place for another five years. But for the anti-dumping duties, Maui could not have competed with the Asian producers who had the cost advantage for labour, production and packaging[13].

Australia

In the same vein, in August 2000, the Australian pineapple industry could also obtain an anti dumping ruling from their Government against Thai pineapple products (canned pineapple and pineapple concentrate) which were used by Australian businesses for retail sales and for use as an ingredient in other food products. Following a six month investigation on complaint from the country's major pineapple processor, Golden Circle, the Australian Customs Service placed an interim dumping duty that ranged between 63 and 247 per cent. There is no quota for import of pineapple products in Australia and the normal import duty is five per cent of the CIF value. Golden Circle, owned by 700 Queensland farmers, processed 80 per cent of all domestic production of pineapple into solid pack, juice and concentrate products. It was aggrieved by a dramatic increase in imports from Thailand in the critical segments of the Australian market.

Reeling under the effects of anti dumping duties, the industry faced a much more stiff competition.

III Competition and Competitiveness

Philippines is the second largest producer of pineapples next to Thailand. Both of them have strong industries around pineapple. Brazil and India are next in importance but their production is largely home oriented with small processing. China and Nigeria have significant production but most of that is also consumed domestically. Indonesia, USA, and Mexico are other key producers with sizeable processing industries or business in pineapple. For canned pineapples, Thailand competes with Philippines and Indonesia in the export market.

Philippines

Producing 11.4 per cent of the world production of fresh pineapple in 2000, Philippines is a major exporter of fresh and canned pineapple. Pineapple industry contributes about 1.4 per cent to the agricultural production in Philippines valued at P 2.6 billion annually. Ranked number 11 among the top dollar earners, pineapple and its products contribute significantly in the total dollar earnings to Philippines economy.

The area under pineapple in Philippines decreased from 68,708 ha in 1994 to 37,714 ha in 1998 but the production increased from 1,334,960 mt in 1994 to 1,638,000 mt in 1997. However, the El Niño phenomenon brought down production to 1,488,700 mt in 1998 (Table 26). The leading regions by area as well as production of pineapple in 1998 were Northern Mindanao and Southern Mindanao.

Table 26
Area & Production of pineapple in the Philippines

% share(Area)						% share Production				
	1994	1995	1996	1997	1998	1994	1995	1996	1997	1998
Northern Mindanao	39.21	39.33	35.71	39.79	39.48	58.79	59.13	58.02	52.99	48.98
Southern Mindanao	34.42	34.93	35.07	27.85	27.74	31.05	31.56	31.12	36.87	40.30
Southern Tagalog	13.53	12.79	12.90	13.76	13.88	4.61	4.08	4.19	3.79	4.04
Bicol Region	6.90	7.00	7.60	8.04	8.08	3.37	3.12	3.94	3.74	3.90
Others(Eastern Visayas , CARGA, Central Visayas, Western Mindanao, CAR, ARMM, Ilocos Region, Central Mindanao,Western Visayas)	5.93	5.95	8.72	10.55	10.82	2.18	2.12	2.74	2.61	2.78
TOTAL	68708	68600	45046	40441	37714	1334960	1442820	1542240	1638000	1488700
Source: Total Figures are from FAO Statistics. Region wise (% share) data is from BAS.										

In the domestic market in Philippines, pineapple is mostly consumed as a fresh fruit. However, a large portion of production is exported in both fresh and processed form. The volume of pineapple exported in all forms decreased from 459,546 mt in 1994 to 428,760 mt in 1998. During this period, the export of pineapple from Thailand also decreased substantially due to Anti Dumping Duties imposed by USA.

The pineapple industry in Philippines faces several problems which may ultimately affect its competitiveness. Low level of production technologies, inadequate transfer of improved technologies and inadequate pre and post- harvest facilities are important constraints. The small scale producers are also vulnerable to fluctuations in prices due to seasonality of production.

In pineapple production, there is one significant difference between Thailand and Philippines. In Thailand, nearly 85 per cent of the production is from the small holders and the processing facilities have mixed ownership of both the MNCs as well as the Thai entrepreneurs. In contrast, 85 per cent of the pineapple farms in Philippines are managed by multinational companies. Dole dominates the pineapple trade in Philippines.

Dole Pineapple

With over 20,000 hectares of pineapples under cultivation in the Philippines, Dominican Republic, Honduras and Thailand, Dole is the world's leading supplier of fresh pineapples. It has long experience in growing, processing and marketing of fresh pineapples through its world-wide distribution network. For Asian markets, Dole Fresh Pineapples are grown primarily in the Philippines. The variety grown is F-200, notable for their green color even when ripe. The F-200 fruits are extremely juicy, have a sugar content of 10-20 per cent, are considerably sweeter than other types of pineapples, and have a well-balanced sweet-tart flavor, low acidity and tender flesh. Dole Fresh Pineapples are harvested, packed and shipped within 7 hours. The Pineapples are shipped either in refrigerated containers or reefer vessels that maintain temperatures of 6-7° Celsius. Stringent inventory management ensures a stable, year-round supply of market-ready pineapples to the retailers.

Non Tariff Trade Dispute[14]

Bio security Australia in its report in 2001 ruled that Philippines, Sri Lanka and Thailand should use methyl bromide as fumigant for pineapples and also required the de-crowning of the fruits before they were shipped to Australian ports. The Australians were concerned about weed seeds possibly found in crowns. The Bureau of Plant and Industry (BPI), Philippines temporarily agreed to de-crown the fruits before they were shipped. They also agreed to fumigate the fruits prior to shipments but they would rather use hydrocyanic acid (HCN) as an alternative fumigant. Philippine exporters feared that methyl bromide could cause discoloration, reduce the shelf life of the fruit, and even destroy the reputation of Philippine pineapples. Besides methyl bromide was also known to be environmentally destructive because it depleted the ozone layer.

The Philippines decided to take up its trade dispute with Australia over pineapples to the World Trade Organization. As a first step, formal consultations were initiated during which Philippines conveyed to Australians their concern about what they viewed as an improper treatment of their case. Philippines deplored Australian protectionist actions despite the fact that it was chairing the CAIRNS group and proudly advocating free trade. Philippines felt that Australians in the guise of quarantine measures against pineapple were trying to find excuses to settle the dispute that arose two years ago regarding import of cattle from Australia.

Indonesia[15]

Although of recent origin, pineapple canning is now an important fruit-processing activity in Indonesia. It began as a private activity and continues to be a privately owned plantation based industry. The processing industry has little linkage with the small scale pineapple producers who are mainly oriented towards the domestic market for the fresh fruit. The *queen* is the common variety. Area under pineapple has been consistently increasing; from 13,000 ha in 1970 to 42,000 ha in 2000 (Source: FAO).

Established in 1977 at Lampung, *PT Umas Jaya* was mainly in cassava grown on 10,000 ha. In 1979, it devoted 5,000 ha from cassava cultivation to pineapple plantation and built a pineapple processing plant. Overtime the Company's business in pineapple grew so much so that it has now shed cassava business altogether. The pineapple plantation was first expanded to 11,500 ha in the late 1991 and more recently to 30,000 ha. Accordingly, the processing capacities have also increased; from 1,200 t to 2,400 t. in 1995 and more recently to 3,130 t of fresh fruit per day. A subsidiary company, *Great Giant Pineapple Coy* (GGPC), was established to exclusively look after the pineapple business. This company is now the largest producer and exporter of canned-pineapple in Indonesia.

Taifung Group from Taiwan, which had large experience of pineapple cultivation and processing in several countries, established another processing factory in 1988 in Lampung province. Beginning with a 300 ha plantation, the company now has 8,000 ha, plantation and a processing capacity of 700 ton of fresh pineapple per day. The company leased part of the land that the Javanese migrants had been given in the Lampung province under the Government's Transmigration Project. When the lease

expired, the Javanese migrants took their land back causing a serious blow to the Taifung's pineapple business since it had no land of its own. As a result, Taifung stopped canning activities from 2000.

In Indonesia, only *Cayenne Liese* is grown. The Indonesians have been doing plant breeding work to produce a variety best suited for processing. The pineapple seeds were used from Subang, West Java and through cross breeding they developed new Cayenne pineapple variety. The fruit so produced is optimal in taste, size and recovery rate. It has a size that best fits the processing machinery, because of shallow fruit stigmata it gives much higher recovery on processing, and it is just sweet and sour in taste giving the required brix and well meeting the consumer taste.

The two pineapple-canning companies produce canned slices (the premium quality *choice*, standard and the low quality *chang)* and *titbits.* The crush, juice and jam are not canned. The waste product, pineapple pulp, is used as feed for cattle.

Horizontal Link

Great Giant Pineapple *Coy* (GGPC) has established a dynamic horizontal link between pineapple cultivation and beef production. Its subsidiary, Great Giant Livestock Company (GGLC) established in 1990, is in the business of fattening the feeder steers imported from Australia to produce better quality beef meat. It uses pineapple pulp that is abundantly available from the GGPC processing plants, to feed these cattle reportedly 4,000 heads. The manure produced by these cattle is used to fertilize the pineapple plantations. GGLC has also involved some 100 small farmers in its cattle fattening programme. Each farmer is given five heads of imported cattle, provided the required technical assistance for a standardized management of cattle, and supplied pineapple waste for feeding the cattle. At the end of 90 day, normal fattening period, the live weight of the cattle increases from 300 to 425 kg. The farmer then sells the fattened cattle to the GGLC. From the payment due to him is deducted the initial value of feeder steers and the cost of feed i.e., pineapple pulp.

Growth in Exports

Although Indonesia exports some pineapple juice and a bit of dried pineapple slices, canned pineapple in syrup is the main product exported. The exports have been fluctuating. During the first half of the eighties the total export of canned pineapple was a mere 4316 mt, during 85 to 93 the exports increased significantly both in quantity and value but they declined during 93-95, again increased in 96 but steeply declined during 97-98, and of late the exports have again picked up. Indonesia has a diverse portfolio of markets for processed pineapple, the key markets being US, Singapore, Germany, Netherlands and Japan.

Government Policies and Services

The Government of Indonesia has promoted pineapple industry through various policy measures and incentives. It allowed establishment of large plantations with long lease for 30 years, leasing of land from the beneficiaries of the transmigration

project, tax holidays during the initial stage until the plants start fruiting, and tax exemption for the imported canning machineries. The Government also supplies power at concessional rates for the processing factories.

USA[16]

The entire United States production of pineapple is concentrated in Hawaii. However, closure of the Del Monte cannery in 1985 signalled the beginning of the fall of the Hawaiian pineapple canning industry. Subsequently, several pineapple companies closed down in the face of rising cost of production, increasing competition from Hawaii-based corporations with operations in low-cost countries such as Philippines and Thailand, and an oversupply of canned pineapple products. In 1994, it was reported that 15 farms in Hawaii used a total of 22,300 acres to produce 365,000 tons of pineapple. The Hawaiian pineapple industry both fresh and processed was then valued at approximately US$ 135 million.

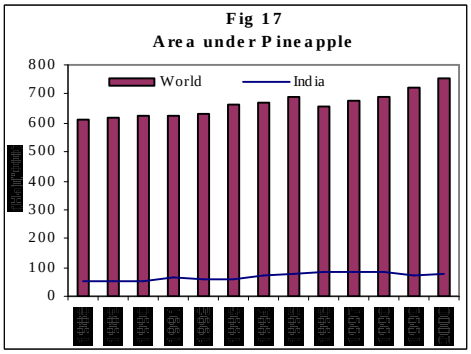
The small scale producers in Hawaii, although many in number, mainly cater to the local market for fresh fruit. Dole Company, PPI Del Monte Fresh Produce, Inc. (formerly the California Packing Corporation), and the Maui Land and Pineapple Company are the key large scale producers. Dole and Del Monte have operations in several countries while Maui Land and Pineapple Company is in a joint venture relationship in Indonesia. Presently, Maui is the only large scale canning company in Hawaii, others having shifted to the more lucrative fresh fruit markets.

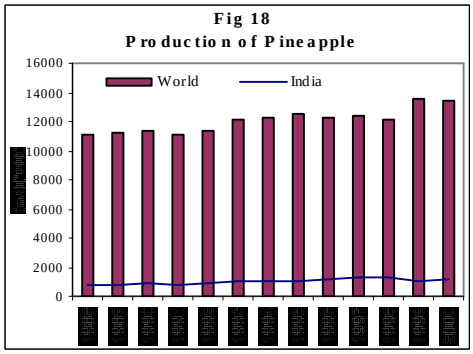
India

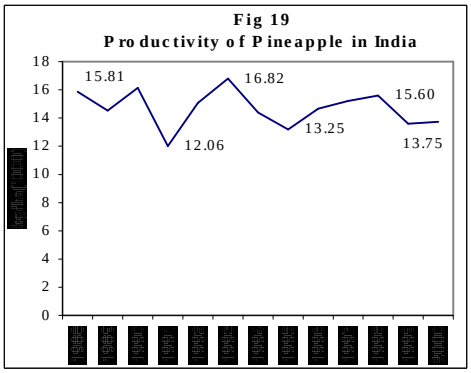
India is the fourth largest producer of pineapple in the world, contributing almost 9 percent to the world production of fresh pineapple. During 1988-2000, the average production of pineapple in India was 1,001,261 mt harvested from an average area of 68509 ha. In 1999, the world production of pineapple had increased but production in India remained almost the same. As a result, India's share in world production of pineapple declined by almost 30 per cent (Table 28).

In India, pineapple is mainly grown in eleven states. In some cases it is grown as a catch crop among coconuts and rubber. The North Eastern states, West Bengal and Kerala are the key producers of pineapple. Assam has the largest area under pineapple and it is also the largest producer. Nagaland, West Bengal and Bihar are the three states reporting high productivity. Though Bihar has a small area under pineapple, it has a very high productivity at 24.9 mt/ha. Overall, Indian productivity at an average of 14686 kg /ha compares well with the world average of 18207 kg/ha. In the producing states, the area under pineapple has generally remained same overtime.

The export of pineapple products from India have been almost negligible. This is attributed to the poor infrastructure facilities available in India.







Source: Basic Data from FAO

Table 27
Area Harvested under Pineapple

(% share)

	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000
India	8.45	8.80	8.78	10.21	9.07	8.99	10.41	11.60	12.49	12.12	11.85	10.32	10.63
World(ha)	610188	615398	622006	623422	628808	661265	672336	689746	656354	676494	691808	719294	752405

Source :Basic Data from FAO

Table 28
Pineapple Production

(% share)

	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000
India's	7.31	6.99	7.80	6.92	7.53	8.22	8.28	8.50	9.81	10.04	10.54	7.39	8.18
World(mt)	11151078	11259434	11291972	11103417	11412547	12159545	12204574	12476653	12226506	12448093	12149557	13605492	13448930

Source: Basic Data from FAO

Logistics

Presently India has insignificant export of fresh or processed pineapple due to difficulties that arise during the post harvest care and subsequent movement to the processing factories and then to the markets at home and abroad. Several areas in the NorthEastern States are well suited for growing of pineapple and can provide reasonably high yields during the two harvests in a year. But these areas are far removed from the markets. It could take anywhere from 36 to 60 hours and in some

cases even more to transport fresh fruits to Guwahati which is the gateway to the plains. Experience has shown that during this long journey, through torturous roads which were constructed very badly and virtually not maintained at all, as much as 30 per cent of the fruit could be damaged. This damage could be even more. Besides the accessibility problem, transport availability and cost are important constraints even after the transport subsidies given to the NorthEastern states. For example, from Guwahatti to Agartala covering a distance of about 600 kilometers, to carry a truckload of material would cost around Rs.15,000 whereas the cost to cover the same distance elsewhere in the country would be Rs.5000 only. Various insurgent groups impose taxes at various places on goods being transported making the operation a losing venture in many cases. These groups routinely impose economic road blockades severely affecting the movement of goods. The best way is to access West Bengal through Bangladesh but that is not possible at the moment because of the political difficulties and rising tensions between the two neighbours. In absence of this most economical access, a great deal of NorthEast's perishable produce is wasted.

In all the NorthEastern states, pineapple and many other kinds of fruits are grown but the local demand being limited the surplus production gets wasted although some of that is processed too. Every state in the NorthEast has a fruit processing factory mainly the canning type. The processing is simple using the time tested 'Hot and Fill' method and packing is in cans. The products are slices, titbits and fruit cocktails. Since these plants use the elementary technology, they produce products of different qualities and the volumes produced are small.

A state of the art pineapple juice concentrate plant was set up in 1988 by the Government of India at Nalkata, Tripura. Costing Rs.3.62 crore, it was supposed to be a state of the art fruit juice processing plant with aroma recovery and aseptic packaging facility. However, it could never be fully operationalized on account of many difficulties. The very location of the plant in the quite interior of the state adjoining the Bangladesh posed great logistics problems. Accessibility to the plant and general safety in the area are problems. This area is known to be dominated by insurgents. As a result, staff is reluctant to go there. The plant never had technically qualified staff for any reasonable period. Due to the insurgency problem, people from outside are reluctant to come to the region even for repairing the sophisticated machines. NERAMAC had paid to a consultant at Bombay to repair the aseptic filling machine that is lying damaged. The consultant refused to come to Nalkata fearing personal safety. Same is the case with other machines like pumps, generator, etc. They are all in a state of slumber. The decision to locate the plant at Nalkata was mainly political but a strong reason cited then was that the area produced abundant quantity of pineapple and processing that would provide higher returns to the producers in Tripura and Barak valley i.e., the southern districts of Assam. At that time the farmers were getting about Rs. 0.50 per kg. This was also expected to generate employment for the locals.

A whole lot of other problems ensued as a result of which the Nalkata plant was never fully operated. However in anticipation of demand and prices for fresh pineapples rising, the State Government undertook extensive extension efforts to expand the

cultivation of pineapple in the region. Plans are now afoot to transfer technologies for staggering cultivation.

Nalkata area is extremely well suited for growing pineapple under natural conditions – without fertilizers, irrigation and pesticides. By default, the product could be even labelled as organically grown. However, the cost of logistics of moving this to consumers is exorbitantly high, given that the required infrastructure is just not there. The plant at Nalkata was expected to procure the produce for processing but the plant had its own problems. Under pressure from the Government and without regard to the economics of fruit processing, the plant has been offering quite high procurement prices at Rs. 2 per kg. but that too was not attractive for the farmers. They had the alternative of selling their produce at a higher price to the clandestine trade to nearby Bangladesh. Consequently the plant was starved of the basic raw material in the peak processing season. On the whole the Nalkata plant operated barely for three months in a year. This state of affairs continues unabated even now.

Under the Kerala Horticulture Development Programme, a modern fruit processing factory for the commercial processing of pineapple, mango and other fruits has been established in the heart of Kerala's Pineapple growing area Nadukkara, Avoly panchayat near Muvattupuzha. The Company, Nadukkara Agro Processing Company (NAPC), that operates the plant was established as a public limited company with target farmers holding 70 per cent share and the Government of Kerala 30 per cent share. The plant has a state of the art technology and the latest equipment because of the support from the EU during the initial period. The factory has aseptic packaging as well as canning units. In contrast, NERAMAC does not have a canning unit and its aseptic filling machine was *de facto* never commissioned. In absence of a running aseptic line, NERAMAC is producing concentrate and supplying that by reefer vans at -18° Celsius to Dabur Nepal for their REAL brand of tetrapack for retail marketing.

The NAPC factory in Kerala can process 3.5 tonnes/hour input of pineapple and concentrate to normally 60° Brix using a single stage scrapped surface vacuum concentrator. The finished product is aseptically packed in bags-in-drums of different sizes. Mango is processed at the rate of 2-tonnes/ hour input and concentrated to 28°Brix. The factory is in the process of getting ISO 9002 accreditation and HACCP certification.

Pineapple is harvested in the winter season as well as during July-August. During the intervening period, mangoes from Kerala as well as the neighbouring states are processed. As a result, the plant has a longer working season and higher capacity utilization. On the other hand, the NERAMAC plant at Nalkota solely depends on processing the pineapple. It could process the locally grown oranges between the two pineapple seasons but the juice so produced is bitter because of the simultaneous crushing of the seeds during the juice making process. The turn key project supplier has argued that the plant is *de facto* capable of producing orange juice fulfilling the condition stipulated in the original contract. That the juice so produced is not commercially saleable is altogether a different matter which has nothing to do with the equipment supplier. NERAMAC has been disputing this contention all along. Even if this dispute is resolved, the Nalkata plant would be still not able to produce

juice of international quality. The technologies for processing oranges are now far more sophisticated. A seperate orange processing line will have to be installed.

NAPC has a Ready to Serve (RTS) line which employs a Tetra Pak TBA/9 machine capable of giving an output of 6,000 cartons/hour of 250-ml size. Cartons are automatically packed 27 to a tray shrink-wrapped. Using this RTS line, the Company had launched 250-ml. pineapple juice 'JIVE' in the domestic market. Like the *PINEAP*, which was launched by NERAMAC in 1989, JIVE too had a short product life cycle. In both the cases, marketing has been the key problem and now they are reported to be selling their concentrates to prominent manufacturers of RTS drinks such as Godrej Foods and Dabur Nepal.

On the whole, India may find it difficult to compete in the world trade in pineapple products because it is a high cost producer of relatively poor quality concentrate which fetches the lowest prices. The raw material and processing costs are high comparing the international norms (Table 29 & 30).

Table 29

Cost of Processing Pineapple

	India	**International**
For 1 kg Concentrate	13 Fruits	9 – 10 Fruits
Yield	40% - 50%	65% - 70%
Size	0.7 - 1.5 kg	2 - 3 kg
Cost / kg of Fruit	Rs. 2.0 - 2.5 / kg	Rs. 0.8 - 1.0 / kg

Cost of manufacturing pjc

For 1 kg of Concentrate	**India (Rs.)**	**International (Rs.)**
Fruits	26.00	10.00
Processing	06.00	04.00
Packaging	13.00	13.00
Transportation	03.00	10.00
Total	**48.00**	**37.00** **(Import Duty: 65%)**

Comparative Price Realization of pjc

India	Rs. 50 / kg
Thailand	Rs. 55 / kg
Philippines	Rs. 58 / kg
Malaysia	Rs. 60 / kg
Europe	Rs. 65 / kg

Source: NERAMAC, Guwahatti

India continues to use canning technology that involves addition of preservatives. In contrast, Thailand, Malaysia and Europe that dominate world trade in pineapple use

aseptic packaging and frozen technologies where the nutritional and other quality parameters are much superior.

Can India be competitive? India has the right agro-climate, pineapple producing clusters of areas, access to the state of the art technologies, and not too bad a cost economics in production and processing with potential for substantial improvements. The key bottleneck is infrastructure, product and market development and marketing. Well thought out commercial strategies linking production, processing and marketing have to be evolved keeping in mind that world markets for pineapple products are already quite crowded.

Brazil[17]

Until 1989, Brazil was the second largest producer of pineapple but then its production declined. A strong research and technology transfer by Brazilian Corporation for Agricultural Research (EMBRAPA) and other research institutes had played a significant role in extending area under pineapple cultivation and enhancing the yields. Nearly three-fourth of the production came from the Northeast and Southeast regions particularly Paraiba and Minas Gerais States. But, the pineapple cultivation has been increasing in the North particularly in South of Pará and North of Tocantins States, which contributed about 19 per cent of the country's production during the Nineties. *Pérola* cultivar is commonly grown mostly for consumption as fresh fruit. The processing variety, *Smooth Cayenne* is grown in about 20 per cent of the area most of which is in Minas Gerais and São Paulo States. 98.6 per cent of pineapple production in Brazil is for home consumption at 11 kg per capita/year. Most of the home consumption is for fresh fruit juice and the processed products take a mere one-third share. The exports in processed form are negligible. About one per cent of the fruit volume produced is exported as fresh and a mere 0.4 per cent as processed juice. Because of the perishability of the fruit, the exports of the fresh fruit are mainly to neighbouring countries.

Malaysia

Malaysia is no more a significant producer of pineapple although in the Sixties and early Seventies it ranked as one of the top three producers. Currently, the area is between 7–8 thousand ha of which 5,000 ha are managed by three prominent estates (Table 31). Their produce is mainly canned and exported to the USA, Japan and the Middle East. The export of canned pineapple has been declining- from 2.5 to 1.6 million standard cases (1990–1997).

Pineapple production in Malaysia has two distinct features. One, nearly 90 per cent of the crop is planted on peat soil that are considered marginal lands with little use in other agriculture. Two, small-holders dominate production of fresh pineapple (area 1,200 ha.) that is mainly consumed domestically. The exports are destined to the neighbouring Singapore, the volume being less than 30000 tones a year. After the new hybrid *Josapine* was introduced in 1996, there has been sudden upsurge in exports to Singapore, volume having reached 40000 tonnes worth RM 10 million in 1997.

Table 31
Area Harvested and Production

(% share)

	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000
Area													
Malaysia	1.28	1.30	1.46	1.46	1.42	1.27	1.15	1.14	1.07	1.02	1.10	0.97	0.93
World(ha)	610188	615398	622006	623422	628808	661265	672336	689746	656354	676494	691808	719294	752405
Production													
Malaysia	1.74	2.02	1.89	2.18	2.08	1.67	1.64	1.47	1.33	1.29	1.18	0.98	0.97
World(mt)	11151078	11259434	11291972	11103417	11412547	12159545	12204574	12476653	12226506	12448093	12149557	13605492	13448930

Source: Basic Data from FAO

Overtime, the production in many Asian countries, particularly those on the industrial upswing, started declining because of strong competition and the uncertainty about future labour market. The manufacturing industries offered round the year employment and much higher wages to the labour than the agriculture could. In addition to these general conditions, the Malaysian pineapple canning industry became uncompetitive for two other main reasons. First, it lost tariff preference through GSP in the United Kingdom which was a key export destination. Second, the smooth *Cayenne* variety could not be grown economically in Malaysia. The land and climate were unsuitable. The *Cayenne* is well suited to commercial canning because of its cylindrical shape, shallow eyes and relatively small core. On processing *Cayenne* gave a much higher recovery rate.

The overall effect of competition getting stiff was soon reflected at home in Thailand.

IV Changing Scenario

Declining Competitiveness

At one time the Thai pineapple canning industry ranked tenth most important foreign exchange earner for the country but now it faces an uncertain future

The prices paid to the growers are declining and that makes pineapple growing uneconomical. The processors are also complaining about the quality and size of the fruit available which do not meet the manufacturing standards. At times, the difficult weather conditions not only reduce the productivity but also affect the quality. Given the importance of contract producers, the processing industry can not continue to squeeze them for ever. If the processors have to pay higher prices to the growers then they become cost uncompetitive in the face of stiff price competition from Philippines and Indonesia.

The industry sources speak of many woes. The Government regulations, processes and procedures adversely affect the cash flow of the processing companies. Taxes are high, customs procedures complicated, value-added tax refunds time consuming, and regulation of the industry strict. High duties are levied on the imported processing equipment and raw material such as tin plates from Japan and glass bottles from Europe which raises the production cost. European markets require bottled products

but the volume required does not justify establishing a bottle manufacturing plant in Thailand due to unfavourable economies of scale.

The food safety has become a key non-tariff trade barrier and that has made it essential to strictly meet the product quality and standards required by the importers. There is a cost of creating and maintaining the quality and ensuring food safety. The shipping costs have been also rising.

The Thai canned pineapple was earlier enjoying GSP privilege like many other least developed countries but that has been withdrawn given the robust economic growth and development of the country. Thus the lower import duties in the EU for countries of the Lome Convention and others have reduced cost competitiveness of the Thai canned pineapple.

Proposal for a Cartel[18]

In July 2001, the Thai Industry Ministry proposed formation of a cartel of the major canners. The intended objective was to clear surpluses, support prices in the short run and stabilize the Thai canned pineapple industry in future. Under the plan proposed, the exporters would be required to work under a single holding company, with each member firm holding shares based upon their share of the export market. The objective was to build cooperation between exporters and reduce competition in favour of the local industry. The Ministry offered to take a 25-per cent stake in the cartel, the canners a 50-per cent stake between them, while growers would hold the remaining 25 per cent share. Although twelve of the 55 important canners expressed interest in participating in the plan, some others expressed apprehensions. They felt that the proposal was unworkable because pineapple was used in a variety of products making it difficult to control production and trade. Besides, they did not think that foreign entities, such as Dole or Del Monte, the world's biggest producers of canned pineapple with production facilities in Thailand, would be willing to participate in such a plan. Above all, they feared that the cartel might be viewed by major trading partners, such as the U.S., Europe and Australia, as a mechanism for subsidizing the local pineapple industry, and that could bring about countervailing measures. They were already suffering the consequences of anti-dumping margins in USA and Australia.

Conclusion

The Thai pineapple canning industry is primarily export oriented and it accounts for 70 percent of total Thailand's pineapple exports. In the past, shipments of canned pineapple grossed 10 billion Baht annually. However, exports have been declining since 1994, especially after the US initiated anti dumping investigation. The canning industry now has a daunting task to reverse the trend of continuingly declining exports in the face of production, marketing and export problems, trade barriers and fierce competition from Philippines and Indonesia. The industry is working hard to upgrade product quality, develop new product lines and strengthen the marketing channels. The overall effort is to produce highest quality safe products at lowest cost. It is obviously an uphill task. Given its importance to the Thai agrarian economy, the Government is bound to protect its interests lest it relocates itself in Vietnam which has

all the favourable conditions but lacks technology, investments and industry experience. (Bangkok Post, 15 June 1993).

End Notes

[1] The growth rates have been computed as regression coefficients using the following formula:

$Y_t = Y_0 (1+r)^t$,
where
t = 1,2,3... (number of years)
Y_t = data range for which growth rate has to be calculated
Y_0 = data in the initial year
r = compounded growth rate.

Growth rate based on regression captures variability in all the data point and at the same time retains characteristics of a compound growth rate. Usually simple or compound growth rates are calculated based on the initial and final year data. Such methods do not take into account what happens between these two years.

[2] D. Loeillet , The World Pineapple Market: The Importance of Europe ISHS Acta Horticulturae 425: II International Pineapple Symposium

[3] Central America and Caribbean Countries includes Costa Rica, Honduras, Mexico, Dominican Republic.

[4] FAO, Tropical Fruits: *Commodity Projections*, Commodities and Trade Division, Rome, December 2002.

[5] Source: www.foodmarketexchange.com

[6] Government of Thailand, Basic Statistics, 2000.
[7] www.malee.co.th

[8] Thailand Business & Investment Guide-www.modernthailand.com

[9] These include six international airports, 29 domestic airports, eight international deep-sea ports in operation, 4,000 km of the rail network of which 90 km are double-track, a solid 170,000 km long network of roads, 50,000 km of highways, and over 10 million telephone lines of which nearly half are in Bangkok alone. Large capital investments are on the anvil to significantly expand these facilities speedily so as to meet the future requirements of trade and commerce efficiently.

[10] Bangkok Post, August 12, 1998.

[11] www.foodmarketexchange.com

[12] See the order of ITA(Import Administration)-June 2001-web.ita.doc.gov

[13] Maui used the tin-coated steel imported from Japan to manufacture the cans for packaging pineapple. Its profits were affected by a ruling from the DOC in April 2000 imposing preliminary antidumping duty margins against Japanese producers of tin mill. DOC rulings were of course aimed at protecting the domestic industries.

[14]Department of Agriculture, Bureau of Agricultural Statistics, Philippines.

[15] This write up is based on Hadi, Prayogo U. , The Case Study of Canned Pineapple in Indonesia, Paper presented at the UNCTAD Workshop on "Commodity Export Diversification and Poverty".

[16] Hawaii's Agricultural Statistics Service

[17]Pineapple industry and research in Brazil, ISHS Acta Horticulturae 529: III International Pineapple Symposium

[18] www.foodmarketexchange.com