TROPICAL DEVELOPMENT AND RESEARCH INSTITUTE

TDRI MARKET NOTE

THE MARKET FOR CASHEW NUTS AND CASHEW NUT SHELL LIQUID

by Jonathan Coulter

June 1982

Tropical Development and Research Institute
127 Clerkenwell Road
London EC1R 5DB

Overseas Development Administration

CONTENTS

GLOSSARY OF TERMS AND ABBREVIATIONS

TDRI	Tropical Development and Research Institute
straight pack	retail or catering sized packages which contain only one kind of nut
mixed pack	packages containing a mixture of nuts
EC	European Community
ACP countries	Countries in the African, Caribbean and Pacific areas associated with the European Community through the Lome Convention. This term is used in tariff schedules to indicate preferential rates of duty granted to these countries by the EC.
GSP	Generalised System of Preferences under which individual developed countries have granted preferential treatment for the importing of goods from developing nations.
-	nil (used in tables)
...	not available (used in tables)

SUMMARY

The Supply Situation

The cashew tree is grown in coastal areas of tropical countries. It has in the past been considered that the crop is only viable when grown in soils unsuitable for other more profitable permanent crops like coconut, rubber and sugar cane. However research in India suggests that high yielding selections and hybrids may prove viable on better soils.

The main products are the raw nuts, from which kernels and cashew-nut shell liquid (CNSL) are obtained, and cashew apples. Of these products the kernels have by far the highest value, and CNSL normaily represents less than 5% of the total revenue earned by processors. Cashew apples are mainly wasted though there is some local consumption in most production areas. Moreover, in Brazil and the Indian State of Goa, a large proportion of the apples is now being processed, and it is believed that apples contribute as much as 35% of farmers' revenue from the growing of the trees.

Almost the entire world cashew crop is produced in India, Mozambique, Tanzania, Kenya and Brazil. Overall output has fallen significantly between 1972 and 1980. Production averaged 484,000 tonnes between 1972/73 and 1975/76, falling to an average of 363,000 tonnes between 1976/77 to 1979/80. After a slight increase in output in 1980/81, production fell back to 358,000 tonnes in 1981/82 and there are no prospects for immediate recovery to the levels of the early 1970s.

The fall in output was due to both political events and to poor weather conditions in Mozambique and Tanzania. Only in Brazil has a major increase in production been achieved and this has been insufficient to compensate for falling output in East Africa.

Trade in Raw Nuts and Processing

Formerly, most East African cashews were exported as raw nuts to India, for further processing by manual methods, and subsequently re-exported as kernels. Between 1963 and 1974 this trade accounted for between 141,000 tonnes and 204,000 tonnes per annum. From 1975 onwards quantities traded in this way declined rapidly owing to the fall in East African production, increased local processing capacity, and Chinese purchases of raw nuts from Tanzania. Now

trade in raw nuts is only 20,000 to 30,000 tonnes per annum.

For the processing of raw cashew nuts, mechanised plant has been used in East Africa in contrast to manual systems in India. The workforce engaged in cashew processing in India numbers some 150,000 and the fall in the flow of raw nuts from East Africa has had the effect of reducing the days worked by these people to 90-100 per year.

Despite the advent of mechanical processing, prices paid to farmers in certain East African countries have been low, only 30-40% of prices that Indian farmers receive. Low producer prices in East Africa have undoubtedly contributed to the low level level of collection in recent years.

Market for Cashew Kernels

International trade in cashew kernels fell from about 100,000 tonnes per year between 1973 and 1976, to around 70,000 tonnes per year from 1977 to 1980. The major markets have been North America (including Canada) and the USSR, which together have taken between 69% and 80% of supplies between 1973 and 1980. Other markets were Western Europe and Japan. Consumption per head in North America is at least three times that in all Western European countries (except the Netherlands) and Japan. In most markets whole grades are almost entirely used for snack purposes, as cocktail nuts, while broken grades are mainly used in confectionery and baked goods. Cashews have outstanding qualities as snack nuts, especially when used in mixed nut packs. Although in competition with other tree nuts, whole grades of cashew kernels are only partially substitutable by other nut kernels. Prices are largely determined by the state of supply of raw cashew-nuts. On the other hand, broken grades are close substitutes for other kernels used in confectionery and bakery products, and their prices follow those of hazelnuts quite closely.

In the USSR both broken and whole grades are used for confectionery purposes. The level of purchases is based on a bi-lateral agreement between the USSR and India in which sales of cashews are set against Aid and services supplied. The USSR is likely to buy on average more than 20,000 tonnes per annum for the remainder of the 1980s. The USSR's purchasing pattern is one of large purchases from India once or twice a year, but the timing is unpredictable. This creates considerable, short-term instability in the market. It also has an adverse effect on demand in western countries, since roasters sometimes substitute cashews with other tree-nuts whose level of availability and price are easier to foresee.

During the period 1970-1976 average annual kernel prices for "white wholes" (450 per lb) ranged from constant 1980 US$ 4,000 to US$ 5,300 per tonne C & F London. As a consequence of the relative scarcity of cashews, annual average prices since then have generally been higher, but not exceeding about constant US$ 7,000 per tonne.

Variable discounts are applicable to broken grades of cashews. For one of the main broken grades, large white pieces, average c & f prices were 61% of prices for white wholes (count 450 per lb), during the 1970s, and this differential has tended to grow over the past two decades. There is now greater incentive for processors to seek a high out-turn in whole grades.

Markets for CNSL Approaching 90% of CNSL exported is used in the friction materials industry in making brake-linings and clutch facings.

World production of CNSL is estimated at around 35,000 tonnes, over 70% of which is exported to the USA, the EC (mainly to the UK), Japan and South Korea. Demand appears to have been growing by an estimated 3-4% per year from 1973 to 1980 but supplies stagnated from 1974 to 1978 owing to diminishing availability in East Africa and as a consequence there was a worldwide shortage which caused a price explosion. Prices rose from normal levels around constant 1980 US$350-$550 per tonne c & f New York from 1973 to 1977 to a peak of around $1,800 (in current terms) in 1979. The high prices brought forth massive increases in output in India, where production is highly dependent on price levels, and in Brazil,and as a consequence prices fell during 1980 and 1981. In September 1981, CNSL was quoted at around $400 c & f London (current prices).

CNSL is imported almost entirely in bulk and is shipped in dry cargo ships with deep tanks. There is a small market in Europe, Japan and other areas for CNSL in 200 kg drums. Shipping is a major cost consideration as it typically accounts for 15% to 35% of gross revenue on a c & f basis. Certain shipping problems, above all concerning the availability of ships, were noted in relation to supplies from East Africa and India.

Prospects

(a) Kernels Given that there is considerable unfulfilled potential in a number of Western countries, especially in Western Europe and Japan, supplying countries will have no difficulty in finding buyers for well graded produce. Supplies of whole grades are expected to be scarce for most

of the 1980's and historical trends suggest that prices may be around constant 1980 US$5,500 per tonne up to 1985 for count 320 white wholes, beyond which they may fall somewhat due to increased competition from other tree-nuts, and a recovery in world cashew output. It is probable that prices for 1990 will be in the range of constant 1980 US$4,000-4,500.

Prices of broken grades are expected to be similar to those for hazelnut kernels, and the large white pieces grade is therefore forecast at around 1980 US$2,500 per tonne.

(b) Raw Nuts There will continue to be a good market in India and China for raw nuts, and given the experience of some countries which have set up their own processing industries, new supplying countries should consider the possibility of exporting the raw nuts without further processing. Historically raw nut prices c & f India have averaged 11-12% of prices for 320 count white whole kernels cif London.

(c) CNSL Output is expected to grow faster than demand, putting a downward pressure on prices, which are expected to be in the range constant 1980 US$300-450 per tonne c & f New York for bulk supplies.

1. BACKGROUND INFORMATION, CULTIVATION AND PRIMARY PROCESSING

1.1 Background Information

The cashew tree, Anacardium occidentale L., belongs to the Anacardiaceae family of plants, which includes the pistachio, the mango and the poison ivy. It is a native of Brazil, but was introduced into Asia and Africa to check soil erosion by Portuguese traders and colonizers in the 1600's. With the subsequent spread in later years cashews are now widely grown in the tropics. However, there are only five main producers and exporters: India, Brazil and the three East African countries: Mozambique, Tanzania and Kenya. Minor producers include: Benin, Ivory Coast, Togoland, Nigeria and Senegal in West Africa; Madagascar off the East African coast; China, Indonesia, Malaysia, Thailand, Philippines, Sri Lanka in Asia; and El Salvador, Guatemala and Colombia in Latin America.

The tree, which is an evergreen, grows up to 12 metres high and has a spread of 25 metres. It flowers for 2 or 3 months and the fruit matures about 2 months after the bloom. The cashew-nut forms first at the end of the stem. Subsequently, the stem swells to form the 'apple' with the nut attached externally. Once picked, the apple will keep for only 24 hours, but the nuts should keep for 12 months or more, providing that they are dried to reduce the moisture content to 8 per cent or below, packed in gunny bags and stored in proper conditions.

The cashew-nut is 2.5 - 4.0 cm (1 to 1½ inches) long and kidney shaped. Its shell is about ⅛ thick, having a soft, leathery outer skin and a thin hard inner skin. Between these skins is a honeycomb structure, which contains a phenolic material known as cashew-nut shell liquid (CNSL). Inside the shell is the kernel, wrapped in a thin brown skin, the testa. The testa is known to contain tannin, but this has not been exploited commercially. The constituent parts of a sound raw nut make up the following proportions by weight: the kernel is 20-25%, the shell liquid about 20 to 25%, the testa about 2% and the shell the balance. These figures vary considerably from year to year and region to region. The Indian nut is normally considered to have a higher content of both kernel and shell liquid than the African nut. The percentage of void and unusable nuts is likely to be minimum of 2 or 3% and may be considerably higher.

The main commercial product is the nut. Nevertheless, the yield in cashew apples is 8 to 10 times the weight of the raw nuts produced, and in parts of Latin America and West Africa the apple is regarded as the primary product. Raw nuts are pro-

cessed mainly with the objective of extracting kernels, but CNSL is a by-product which can make a significant contribution to revenue.

1.2 Growing Conditions

The cashew tree has an extensive root system which helps it to tolerate a wide range of moisture levels and soil types, but commercial production is advisable only in well drained, sandy loam or red soils. Annual rainfall needs to be at least 850 mm and not more than 3,000 mm. Cashew trees are susceptible to frost damage, especially when young, and they are most frequently found in coastal areas.

1.3 Harvesting and Yields

Ripe fruits, including the raw nut and the apple to which it is attached, are generally allowed to fall to the ground where they are picked up; the nuts are then removed from the apples by hand. Less frequently the ripe fruits are plucked from the trees.

Most cashew trees start bearing fruit in the third or fourth year and are likely to reach full bearing by the seventh year under favourable conditions. The average yield of nuts of a mature tree is in the range of 7 to 11 kg per annum and with trees planted 10 metres apart, which is considered to be the most productive spacing for mature trees, the average yield per hectare is 700 to 1,000 kg. However cashew trees are found under a great variety of conditions, for example in wild stands, intermixed with other trees and at densities higher than that indicated above. This makes references to national areas under cashews and yields per hectare of limited value. Moreover yields per full-bearing tree tend in practice to be below the range quoted above; in Kenya for example, maximum yields of 5 kg to 7 kg are typically obtained 15 to 20 years after planting (JETRO, 1980).

There is much scope for increasing yields worldwide by use of improved varieties and cultural practices, and in recent years resources have been increasingly devoted to that end, particularly in India and Brazil.

1.4 Primary Processing of Raw Nuts

(a) Extraction of Kernels

Until the 1970s the world cashew crop was mainly processed in India, where

very low labour costs favoured the manual operations used. Cashews produced in East Africa were not processed locally but were exported as raw nuts to India where they were processed for re-export.

The traditional process used in India is as follows. The nut is first roasted to make the shell brittle and to loosen the kernel from the inside of the shell. The latter is assisted by soaking the nuts in water, which also raises the moisture content of the kernel, reducing the risk of being scorched during the roast and making it more flexible so that it is less likely to break. The shell liquid is released when the nuts are roasted, but some remains in the shell. As the liquid has a harmful affect on the skin, the nuts are tumbled in sawdust or ashes to absorb the liquid coating the outside of the shell before they are handled by the sheller. The shell is cracked with a small hammer. Care must be taken not to break or split the kernel at this or subsequent stages as whole kernels are more valuable than broken kernels. Once the kernel is removed from the shell, it is dried, the testa is peeled off and the kernel is graded and packed.

When processing started in Brazil, the system used was also mainly manual, but a pedal-operated cutter was introduced as a cracking device in place of the hammer used in India. However the shape of the raw nut and the brittleness of the kernel for long defeated further attempts at mechanical decortication, and it was not until the late 1960s that systems incorporating a high degree of mechanisation were used on a large scale in certain countries, notably in East Africa and Brazil. Three such systems are known to have been employed to date. The first system, the Oltremare, was developed by an Italian firm of that name in Bologna and was introduced in the mid-1960s. Then a British system, based on the results of a programme of research and development started in 1965 by the Tropical Products Institute (now Tropical Development and Research Institute, TDRI) was manufactured from 1970 onwards. It is now marketed by Fletcher and Stewart Ltd (formerly by Sturtevant Engineering Ltd). The third system was developed and marketed by the Cashew Co Ltd of Japan and appears to have been used exclusively in Tanzania. The main difference between the systems is the method by which the shell is broken. In the Oltremare process the nut is cut by blades and levered open; in the Fletcher and Stewart process the nuts are fed into a centrifugal cracking machine where they are projected against target plates to shatter the shell; the Japanese system decorticates with revolving knives using a mixture of shock and cutting.

(b) Extraction of Cashew-Nut Shell Liquid (CNSL)

CNSL is mainly extracted by the hot oil-bath method, where the nuts are passed

through a bath of hot CNSL. As the nuts are roasted, the cells in the skin burst, releasing the liquid into the bath. The excess liquid overflows out of the bath and is collected. Estimates of the extraction rate by this method vary from 6% to 12% of the raw nut by weight depending on the method of extracting the kernel and the origin of the nuts. This is considerably below the actual content of CNSL in the raw nut which is usually in the range 20% to 25%.

The residual CNSL can be obtained through solvent extraction or with an expeller, or these methods may be used on their own if the kernels are extracted by a cold process. The extraction efficiency can be increased to 80% by these methods. The disadvantage of solvent extraction is that it is an additional and expensive processing system, whereas the hot-oil-bath can be a stage in processing the kernels and is an integral part of the mechanical processing systems which are commercially available. The hot-oil-bath system is easily substituted for the drum-roasting stage in traditional manual processes such as are used in India, though its use is said to have an adverse effect on the revenue from kernels as the percentage of scorched kernels is greater than with drum-roasting.

The high capital cost of solvent extraction plant has limited its use. Until the late 1970s, such plants had been installed only in Brazil, but high prices for CNSL between 1977 and 1980 caused a number of additional plants to be installed in Brazil and some were also installed in India. In view of the temporary and exceptional nature of these high prices, the installation of these plants may have been inadvisable.

Solvent-extracted CNSL has slightly different properties from hot-oil-bath extracted CNSL, as the process of heating the liquid in the hot-oil-bath converts anacardic acid, which makes up to 90% of the CNSL in the shell, into cardanol. As a result buyers may be involved in an additional processing stage with solvent-extracted CNSL and, therefore, some take only hot-oil-bath extracted CNSL.

(c) The Extent of Mechanical Processing and Its Performance vis-a-vis Hand-Cracking

Mechanical processing has been most extensively adopted in East Africa and has been encouraged by Governments as a means of increasing export revenues and generating employment in these countries. Installed capacity, at some 260,000 tonnes of raw nuts per annum, is now considerably greater than production and the flow of raw nuts to India has been greatly reduced. However, local problems in Tanzania have prevented full utilisation of the installed capacity there and exports of raw nuts have continued, although at a progressively reduced level.

Brazil has processed her own crop for many years in order to maximise export earnings and to create employment. However, there has been a transition from manual to mechanical processing. After the installation of one Fletcher and Stewart plant, a number of similar locally designed plants have been built. Mechanical processing capacity is now estimated at nearly 80,000 tonnes per annum although plants using pedal operated knife cutters continue to operate.

The capacity of China's processing facilities is not known accurately but it is substantial and, at present, supplies of raw nuts are mainly imported. It is known, however, that one Fletcher and Stewart plant has been installed.

In contrast India has continued to use processes based on hand-cracking and the introduction of mechanised systems has been resisted as this would displace much of the large labour force employed in the traditional industry. Besides this it is doubtful if any of the mechanical systems would be competitive with hand-cracking, which has remained viable because of low labour costs and the labour force's extremely high degree of manual dexterity.

The labour-intensive Indian system therefore has a number of advantages over mechanised proceedures used elsewhere. Firstly the yield in kernels from hand-cracking is typically 22.5% to 23% of good quality kernels (ie. not including certain poor grades such as "dessert pieces", "baby bits" and "scorched small pieces"). The yield of good kernels from mechanical processing is typically around 20.5%, although there is much variability between different plants and in different countries. Secondly, the percentage of whole grades obtained in India is over 75% while with mechanical systems 45% to 65% is generally obtained. Thirdly capital costs are much lower.

1.5 Usage of Cashew-Apples

One problem facing cashew producing countries has been whether or not they can utilise the potentially large harvest of cashew apples. While cashew-apples are consumed as fresh fruit in all producing countries their astringent taste generally limits their popularity, both for fresh consumption and for processing. The development of processing has also been limited by their high degree of perishability and consequent difficulties in transportation from growing areas to distant processing plants.

In India it is estimated that some 85% of the crop is wasted and that part of the remaining 15% is used as pig feed. However, in the state of Goa about 70% of the crop is used to distill a liquir called feni; out of the total farm income

from cashews, 35% is derived from the sale of apples.

The possibilities of commercial utilization were investigated by the Central Food Technological Research Institute, Mysore, India, resulting in the development of a number of edible products including a variety of juices, wine, brandy, candies, jam and chutney. It was also found that these products could be manufactured on a cottage scale, with a small investment by the growers themselves, thereby overcoming the perishability problem.

However, except for Goa, it is only in Brazil that a large part of the crop is processed. Juice is the most popular of the cashew-apple products; it is sold in both a "cloudy" and a clarified, pasteurised form. Various preserves are made from the residue left over from the extraction of juice (Johnson, 1977).

2. QUALITY, GRADING AND PACKAGING

2.1 Quality and Grading

Cashew-nut kernels are graded for export according to size and condition. The grading system most commonly used is referred to within the trade as the American Standard. The American Standard is incorporated in the Indian Government export specifications, which are set out in full in Appendix 1, and in general these standards are followed by other countries. The main characteristics of the standards are described below.

Kernels are categorised into types according to their condition: white kernels are white or very pale colour, without any blemish; 'scorched' kernels are overroasted so that they are a light brown in colour and may have brown spots; 'dessert' kernels are the lowest quality and may be shrivelled and scorched and are permitted brown and black spots. All types are then divided into whole or broken grades, and the grades are subdivided according to the size. There is also an intermediate grade between scorched and dessert kernels called 'scorched wholes 'A'.

White, whole kernels are graded according to their size on the basis of the number of kernels per pound (avoirdupois). The most common count is 300 to 320 per lb, follwed by 400 to 450, 220 to 240, and 200 to 210. Brazil, whose crop has a proportion of large kernels which other countries crops do not have, markets a 160 to 180 count also. The counts are normally known by the maximum figure, thus 300 to 320 kernels per lb become '320's. Whole kernels of the scorched and dessert type are not graded according to their count.

White kernels, which are not whole, are graded according to the way they have broken. 'Splits' are kernels which have divided naturally lengthways; 'butts' are kernels broken crosswise, but which have not split; other pieces of kernels, which have broken into more than two parts, are graded according to their size - large white pieces (LWP), small white pieces (SWP) and baby bits (BB). Broken grades of scorched and dessert kernels also have a simplified structure including 'butts', 'splits', 'pieces' and 'small pieces'.

The variation in quality between produce of like grades from the main origins is relatively small when compared to groundnuts, walnuts and macadamia nuts; thus differentials in price for similar grades from different sources are relatively small. Nevertheless, there are basic variations in quality by source, which are reported by the trade as follows. Indian produce has the best quality, and is the standard against which others are judged and discounted. The quality of cashews from Mozambique and Tanzania has fallen in recent years and adherence to standards is less strict than in the case of India, though in Mozambique there is much variation between the performance of individual companies. Declining standards are indicated by the fact that in early 1981 East African cashew wholes were sold in Europe at discounts of up to 10¢ per lb on those from India, compared to 3-4¢ in previous years. According to the trade, discounts would probably be greater were it not for the fact that buying from India sometimes involves the risk that shippers will not fulfil contracts. The main problems mentioned concerning the quality of cashew from Mozambique and Tanzania are infestation, which is normally controlled by freezing on arrival at destination, scorching, crushing and lack of freshness.

Whole grades from Brazil are typically discounted by 7-10¢ per lb compared to Indian wholes in the New York market. They are less accurately graded and when roasted are said to be of a less uniform colour than those from India and Africa. The standard of cashews from Indonesia and Sri Lanka is said not yet to have reached international standards. However the quality of Chinese kernels is high; in appearance they are said to be better than Indian kernels, though with poorer flavour.

Despite these generalised comments on the performance of different origins, some processors, who have won reputations for reliability in both quality and delivery performance, can still command a small premium regardless of origin.

2.2 Packaging

The normal method of packing is in 25 lb tins, from which the air is evacuated

and replaced with CO_2. For export, the tins are placed in two's in carboard cartons. The case remains the normal unit of volume in the cashew trade, signifying 50 lb or 22.68 kg of kernels.

New systems of packaging are beginning to be used, as the 25 lb tins are considered expensive both in terms of material costs and utilisation of shipping space. Some Brazilian and Tanzanian supplies are now packed in a gas-infused aluminium laminated foil bag within a heavy-duty carboard container.

3. WORLD SUPPLIES

3.1 Overall Supplies

Production. Total commercial production of raw nuts, with the exception of certain minor producers, is shown in Table 1. Most notable is the fall in the level of production in the mid-1970s; average output for the seasons 1976/77 - 1979/80 was 362,000 tonnes per annum, 25% below the average for 1972/73 - 1975/76 and 35% below the peak of 560,000 tonnes in 1974/75. The fall between the two four year periods was most dramatic for the three main East African producers, Mozambique, Tanzania and Kenya (60%, 41% and 45% respectively). Contrary trends were evident for the other two leading producers, India and Brazil, where increases of 9% and 53% were registered, but these were insufficient to off-set the fall in East African output. In the 1980/81 crop year there was some recovery in overall production as India, Mozambique, Tanzania and Brazil all recorded crops which were 10,000 tonnes higher than in 1979/80. However, in 1981/82 the crop fell back to previous levels, and Tanzania recorded its lowest crop for many years (46,000 tonnes).

The FAO World Production Yearbook lists the following minor producing countries, with their respective estimated tonnages for 1980: Philippines (4,500 tonnes), Malaysia (700), Sri Lanka (850), Madagascar (3,400), Guinea Bissau (3,000), Angola (1,200), Ivory Coast (550), El Salvador (2,200), Dominican Republic (870). However some other minor producers are not shown, for example Indonesia which is believed to produce about 3,000 tonnes per annum and Togo, with a crop of 1,500 tonnes per annum, which is expected to rise to 3,000 tonnes by 1983.

China produces some 900 tonnes per annum at present, from 8,000 hectares planted in the late 1950s in Hainan Island. With better attention, including the introduction of irrigation, it is envisaged that China's production could increase to 5,000 tonnes per annum by 1986 from the existing area, while it is believed there is a further 20,000 hectares which might be developed under irrigation in the future.

TABLE 1

COMMERCIAL OUTPUT OF RAW NUTS IN MAIN PRODUCING COUNTRIES

'000 tonnes

	Annual Average							
	1972/73 to 1975/76	1976/77 to 1979/80	1976/77	1977/78	1978/79	1979/80	1980/81	1981/82
India	130	142	150	130	150	140	150	140+
Mozambique	174	70	91	61	66	61	71	66
Tanzania	118	70	86	76	66	51	61	46
Kenya	22	12	13	5	10	18	15	18
Other Africa	5	5	5	5	5	12	12	12
Brazil	41	62	46	71	66	66	76	76
TOTAL of countries listed	484	362	391	348	363	348	385	358

\+ estimate

Sources: India - USDA Foreign Agricultural Circulars
Other Countries - Gill and Duffus, Edible Nut Market Reports.

Planting has been taking place in some of the other minor producing countries also and production is increasing quite fast, but from a low base. However, it is doubtful if any of them will have a major impact on world supplies in the foreseeable future.

Exports

Exports of raw nuts Cashews are exported both as raw nuts and kernels. Exports of raw nuts peaked in the early 1970s ranging, as Table 2 shows, from 154,000 tonnes to 208,000 tonnes per annum from 1973 to 1975. Tanzania, Mozambique, and to a much smaller extent, Kenya, were the only large suppliers. However as a result of both increasing processing capacity in East Africa and dramatic declines in production in Mozambique and Tanzania, exports of raw nuts have fallen dramatically, reaching 44,000 tonnes in 1978 and 3,900 tonnes in 1979. Although published data are not available, Mozambique's exports are known to have been nil since 1977. The corresponding import trade is discussed in Section 4.

Export of kernels from main producing countries - see Table 3, fell from around 100,000 tonnes per annum from 1973 to 1976 to a level of around 70,000 tonnes per annum thereafter. India has remained the leading exporter, accounting for over half of the total in every year except 1978 and 1979, but the quantities shipped by India have declined greatly as the supply of raw nuts traditionally provided from East Africa has fallen. Mozambique and Brazil have been the second and third largest exporters respectively, in recent years.

China has emerged as the fourth most important supplier, exporting 5,000-6,000 tonnes per annum to major markets from 1976-1979, but the Chinese industry is mainly based on raw nuts imported from Tanzania and other producers. On occasions China has purchased kernels in the international market in order to fulfil contracts. Hong-Kong has occupied a role as a re-exporter both of raw nuts, which are trans-shipped from minor producing countries to China, and of kernels and CNSL trans-shipped from China to final destinations.

Exports of CNSL. Trade in CNSL is discussed in detail in Section 6 but annual exports to the main markets were in the range of 20,500 tonnes and 25,000 tonnes per annum between 1974 and 1978, rising to 30,200 tonnes in 1979, and then falling back to previous levels. It is estimated that total world usage is over 35,000 tonnes per annum, including substantial local usage in India and Brazil. Consumption in India is reported to have risen from 3,600 tonnes in 1974 to 7,800 tonnes in 1978.

TABLE 2

EXPORTS OF RAW CASHEW-NUTS

'000 tonnes

	1973	1974	1975	1976	1977	1978	1979	1980
TOTAL	154.4	207.8	179.1	104.7	75.9	44.2	3.9	...
of which from								
Tanzania(1) (3)	109.9	113.9	97.3	66.5	74.8	44.2	3.8	...
Mozambique(1) (4)	33.2	72.9	65.6	26.8	-	-	-	...
Kenya (1)	9.4	20.4	14.3	11.5	1.1	-	0.1	10.7
Madagascar(2)	0.9	0.6	0.4	-	-	-	...	...
Dahomey(2)	-	-	1.5	-	-	-	...	...
Ivory Coast(2)	1.0	-	-	-	-	-	...	...

Source: (1) Gill and Duffus Edible Nut Statistics, April 1981
(2) Official trade statistics
(3) USDA Foreign Agriculture Circulars FN 2-81
(4) Trade comment

TABLE 3

EXPORTS OF CASHEW NUT KERNELS FROM PRODUCING COUNTRIES

'000 tonnes

	1973	1974	1975	1976	1977	1978	1979	1980
TOTAL EXPORTS	95.6	100.6	99.1	99.0	76.2	63.3	72.7	...
of which from								
India	56.1	64.4	59.8	55.3	39.2	23.8	27.3	36.5+
Mozambique	29.6	24.4	21.2	21.1	17.0	16.9(1)	11.8(1)	...
Brazil	6.0	7.6	11.4	9.3	7.3	11.2	11.9	14.5
Tanzania	3.7	4.0	4.0	6.1	3.9	3.6	3.9	...
Kenya	0.2	0.1	0.2	1.6	3.0	1.7	2.7	3.1
China(2)	-	0.1	2.5	5.6	5.7	6.0	5.0	...
Benin	-	-	-	-	0.1	0.1	0.1	...
Re-exports from Hong Kong	0.1	0.2	0.6	1.0	0.8	1.0	0.5	...

Notes: + estimated

(1) Estimated from importing countries trade statistics

(2) Chinese exports are estimated from the import statistics of importing countries.

(3) Sri Lanka exported 3 tonnes in 1976, 27 tonnes in 1977 and 29 tonnes in 1978.

Source: Gill and Duffus, Edible Nut Statistics, April 1981.
Official trade statistics
USDA Foreign Agriculture Circulars

The contribution of CNSL to the revenue earned by processors has normally been small, and is estimated in the first half of the 1970s to have averaged 3% to 4% of the total. However the figure for individual processors varied greatly, from nil for processors who did not extract CNSL to over 10% for those using solvent-extraction plant. Under the conditions of exceptionally high prices in 1979 it is estimated that processors' average revenue from CNSL rose to about 11% of total revenue. For processors having solvent-extraction plants the figure may have been in excess of 25%.

3.2 Details of the Main Producing Countries

(a) India

Cashews are grown throughout the East and West Coast of Peninsular India. There are some 486 processing facilities, concentrated mainly around Quilon in Kerala State, and employing about 150,000 people. Cashews are one of India's leading exports. In the past the processing industry has depended predominantly on imported nuts but the near elimination of this source has left the industry, which has a capacity of over 450,000 tonnes per annum, with sufficient supplies to work for only 90-100 days per year.

The increase in domestic production has been insufficient to compensate for reduced imports. Production has been limited by the fact that other crops like rubber and coconuts were more profitable, except on poor land where these could not be grown. A further constraint is a lack of spare land in South-West India for raising fresh cashew plantations, and in Kerala State the land ceiling for holdings by individual farmers is thought to have been a major constaint on increasing output. It is also reported that up to 1975 or 1976, owing to low returns Indian farmers paid little attention to the cultivation and maintenance of cashews. However, because of high prices from 1976 to 1981 interest in the planting of cashews and improvement of existing plantations is believed to have greatly increased. By improving varieties and cultural practices, there was reported to be scope for raising yields from around 500-600 kg per hectare to 1,750 kg per hectare (Dattatreyulu, 1977). The Indian Government has put a high priority on increasing output, and the Sixth Five Year Plan (1980/81 - 1984/85) involves an outlay of US$625 million, including a US$48 million World Bank contribution, for expanding the planted area and increasing productivity.

In 1970 imports of raw nuts were centralised in the hands of the Cashew Corporation of India (CCI), a subsidiary of the State Trading Corporation, with a view both to obtaining all available supplies and thus ensuring more employment for

cashew factory workers, and to saving foreign exchange through bulk imports at competitive prices. In addition, allocation of nuts to processors in Kerala State has been centralised in the hands of an official body. The CCI's monopoly of imports continued until 1981 when it was relaxed; private companies are now allowed to procure raw nuts on condition of supplying 50% to the CCI.

With the exception of the Kerala State organisation which exports some of the produce from that State, exports of cashew kernels remain in private hands. Importers complain of cases of non-completion of contracts. This problem is partly due to the buying pattern of the USSR, which is somewhat unpredictable; massive purchases by the USSR can change prices over a very short period of time and make it difficult for shippers to complete previously arranged contracts at agreed prices. It is also alleged that official control over the allocation of raw nuts is a cause for non-completion, as processors often cannot foresee the available supplies until shortly before they are rejected.

The volume of raw nuts processed for domestic consumption is reported to have been about 35,000 tonnes per annum from 1978 to 1980, equivalent to just over 8,000 tonnes of kernels (USDA, 1980).

(b) Mozambique

Mozambique's decline from being the foremost world producer is attributed to a breakdown in the system of primary marketing of raw nuts after Independence. Previously Asian and Portuguese dealers in many remote locations bartered consumer goods (soap, shirts etc) for raw nuts, but most of these traders departed following Independence. The Government established prices for raw nuts after Independence but these did not keep pace with rising prices for barter goods, so that there was less incentive to harvest the available crop. Deteriorating road and rail transport also hindered primary marketing, and cashews were increasingly consumed locally as a substitute for staple foods. Besides this, tropical storms and drought caused crop damage in successive years.

The Mozambique Government is reported to be aware of these problems and to have taken certain remedial steps. Firstly, buying depots were established in the interior and farmers were paid in cash, but it was found that there was a lack of consumer goods on which to spend the money obtained. Attempts were then made to induce Asian traders to return, but this is expected to be and lengthy process. There have also been media campaigns to encou ing production.

Output is expected to increase moderately but it is unlikely to return to former levels. There has been little planting since Independence and existing trees have been insufficiently attended; many are believed to be reaching the end of their life.

The processing sector consists of 14 plants, eight of which are State-owned while six are private; total capacity is about 140,000 tonnes per annum. With existing production at a level of around 70,000 tonnes per annum, plants are operating at 50% capacity. As in Tanzania there has been a shortage of tinplate. Nevertheless the processing sector is said to have been inventive, for example by creating new shelling equipment (USDA, 1980).

(c) Tanzania

The following factors have contributed to declining production in recent years: (a) low producer prices, (b) the Government policy of moving people away from producing areas within the programme of establishing "Ujaama" villages (ie community villages), (c) pest and disease build-up, and (d) poor weather. Trees grow in small clumps on scattered locations, and have traditionally been cultivated and maintained by smallholders. When the population was moved away from its former villages, trees ceased to be maintained and the spreading undergrowth made them increasingly inaccessible and susceptible to bush fires.

The Cashew Nut Authority (CATA), which is the sole buyer, processor and exporter of cashew nuts, financed the planting of 31,000 hectares from 1976 to 1979. The total standing area in 1978 was estimated at about 370,000 hectares (USDA, 1980). In spite of continued plantings, it is doubted that output of raw nuts will grow any faster than in Mozambique, and production in the entire East African region is considered unlikely to grow at more than 5% to 6% yearly. According to one dealer, while both Tanzania and Mozambique face similar difficulties, there has been less willingness in Tanzania to recognise the factors holding back production and to take remedial action.

Processing capacity is now about 110,000 tonnes per annum. This is greatly in excess of recent harvests (46,000-60,000 tonnes) and only about 20,000 tonnes per annum have been processed recently. The remaining quantities of raw nuts have been exported for processing in India and China. Tanzania has experienced severe financial problems in recent years and shortage of foreign exchange has made it very difficult to service the processing industry, eg. purchase of tins, and this has greatly contributed to the low utilisation to date of processing capacity.

(d) Kenya

There are no known programmes underway to improve or expand production (USDA, 1980). The crop is grown along the coast, and there is one factory located at Kilifi with a capacity of 15,000 tonnes per annum.

(e) Brazil

Although there is a vast area of native stands, most cashews are harvested on plantations; this contrasts greatly with East Africa and India where smallholder cultivation predominates. It was estimated that in the late 1960s and early 1970s, 150,000 hectares were planted in North-East Brazil under the Government's regional development programme. Brazil is now capable of producing an annual crop of 100,000 tonnes and this figure is likely to double in 10 years. However the last three crops have been depressed by drought and annual production has not yet exceeded about 76,000 tonnes per annum. Processing and exports are handled by the private sector and mechanised plants have a total capacity of nearly 80,000 tonnes per annum.

4. MARKETS FOR RAW NUTS

Domestic Prices - Information on prices paid to producers for raw nuts in 1979 and 1980 is shown in Table 4. Prices are highest in India followed by Brazil, but in East Africa the prices shown are between 30% and 40% of those paid in India.

International Markets and Prices - Imports of raw nuts into India and imports into China from Tanzania and Hong Kong are shown in Table 5.

In the past India was by far the main importer; her imports peaked at 177,000 tonnes in 1974 but since have declined dramatically to 20,700 tonnes in 1980 as supplies from East Africa have fallen away. There was a minor recovery to 31,600 tonnes in 1981. China, however, has appeared to maintain her level of imports, with supplies from Tanzania being on the basis of a bi-lateral agreement. There is a very large potential market for raw nuts for the foreseeable future for any countries wishing to export cashews in this form (see section 3.2 (a)).

As a guide to price levels, Table 6 shows average unit values of imports into India in constant 1980 US$ and compares them to prices for 450 white whole

TABLE 4

PRICES OF RAW CASHEW NUTS TO PRODUCERS IN MAJOR EXPORTING COUNTRIES

$ per kg

Country		Season	Price per kg (Approx)	Season	Price per kg (Approx)
India	(1)	1979/80	0.70-0.74	1980/81	1.00-1.10*
Tanzania	(1)	1979/80	0.22	1980/81	0.37
Kenya	(2)	1980	0.30		
Brazil	(1)	1980	0.49-0.68		

* Expected price

Sources (1) USDA Foreign Agriculture Circulars FN 1-80 and FN 2-81
(2) JETRO (1980)

TABLE 5

IMPORTS OF RAW CASHEW-NUTS INTO INDIA, CHINA AND HONG KONG

'000 tonnes

	1974	1975	1976	1977	1978	1979	1980	1981
India (a) (1)	177.3	135.8	74.5	64.0	23.0	34.2	20.7	31.6
Hong Kong (b)	-	0.2	-	-	1.3	1.5	...	...
China (2)	14.0	20.0	18.1	...	19.7	...	...	...
of which from								
Tanzania (c)	14.0	20.0	17.7	...	18.5	...	...	...
Hong Kong (b)	-	-	0.4	-	1.2	2.0	...	...

Notes: (1) Figures for imports into India refer to the year beginning 1 April of the year shown.

(2) Apparent exports from Tanzania and Hong Kong. Chinese import statistics are not available.

Source (a) USDA Foreign Agricultural Circular FN 1-80

(b) Official trade statistics for Hong Kong and Tanzania

(c) Gill and Duffus Edible Nut Market Reports

TABLE 6

UNIT VALUE OF RAW NUTS IMPORTED INTO INDIA AND RELATIONSHIP TO KERNEL PRICES
(Constant 1980 US $)

	RAW NUTS	KERNELS	RELATIONSHIP	LARGE WHITE PIECES	RELATIONSHIP
Year	Unit Value (I) of Indian Imports	450s c&f UK	Raw Nuts to 450s Kernel Price	LWP c&f UK	Raw Nut to LWP Price
1970	692	5,245	13%	3,508	20%
1971	641	4,822	13%	3,097	21%
1972	572	4,530	13%	2,992	19%
1973	554	5,219	11%	3,829	14%
1974	512	4,866	11%	2,954	17%
1975	462	4,065	11%	2,084	22%
1976	436	4,340	10%	2,368	18%
1977	542	7,006	8%	3,712	15%
1978	691	5,225	13%	2,693	26%
1979	635	4,560+	14%	2,860	22%
Average			11.7%		19.4%

Note: (I) Indian data refers to the 12 months beginning on April 1 of the stated year

\+ estimated

Source: Indian import statistics, and Gill and Duffus Edible Nut Statistics April 1981.

kernels and large white pieces (LWP). Unit values of raw nuts fell from US$692 in 1970 to US$436 in 1976 but recovered sharply to US$691 in 1978. These values are believed to be similar to prices paid to growers in India. Freight costs for raw nuts between East Africa and India were estimated at US$40 per tonne in early 1981, only a small percentage of revenue.

The relationship of raw nut prices to 450s has averaged 11.7% from 1970 to 1979, while the relationship between raw nut prices and LWP has averaged 19.4%. Wilson (1975) noted that prices for raw nuts had outpaced kernel prices up to 1972 and it was suggested that this was due to the expansion of mechanical processing in East Africa. However, in the period 1973 to 1977 this trend was reversed (see Table 6); this suggests that the CCI was successful in keeping down prices, due to its position of monopoly buyer on behalf of Indian processors. However, in 1978 and 1979 the earlier relationship recurred; this probably reflects the much reduced availability of raw nuts traded (see Table 5).

5. MARKETS FOR CASHEW-NUT KERNELS

5.1 Overall Imports

World trade in cashew nut kernels doubled from 51,000 tonnes in 1962 to 102,000 tonnes in 1972. This latter level declined slightly to an average of 97,000 tonnes per annum from 1973 to 1976, but then fell to around 70,000 tonnes per annum for the remainder of the decade - see Table 7. Wilson (1975) projected that world trade would reach 134,000 tonnes by 1980; supply problems, particularly in East Africa, are the main reason why this figure has not been attained.

North America (including the USA and Canada) and the USSR are the leading importers, taking between them from 70% to 80% of the total from 1973 to 1980. The USSR is supplied almost exclusively by India under a bi-lateral agreement relating to capital aid provided to India. Although in 1978 and 1979 the USSR's purchases fell sharply below previous levels they recovered in 1980; this level is likely to be maintained in the 1980s, as cashews are an important item in India's export trade and ability to meet Aid repayments.

Other markets are Western Europe (about 14% of world tonnage from 1977 to 1980). Japan and the Far East (about 7%), and Australasia (4%). The Middle East and Latin America are also significant consuming areas. For the following countries, which are not shown in Table 7, apparent annual imports from India, Brazil, Kenya and Tanzania averaged as follows:-

TABLE 7

IMPORTS OF CASHEWNUT KERNELS INTO MAJOR CONSUMING MARKETS

('000 tonnes)

	1977	1978	1979	1980	1981	Average 1973-76	Average 1977-80	% Increase from 1973-76 to 1977-80	Approx. imports per Capita 1977-80 grams
TOTAL[1]	75.9[2]	62.5[2]	71.1[2]	72.9[2]	...	97.0	70.6	-27%	
of which									
USA	34.1	31.1	33.9	29.6	27.6	45.3	32.2	-29%	150 g
Canada[3]	4.3	3.9	3.7	3.2	2.5	4.8	3.8	-21%	165
USSR	18.9	8.8	13.1	22.2	...	26.4	15.8	-40%	60
Germany, Democratic Republic	...	...	...	...	...	0.6	...		
Federal Republic of Germany	2.6	2.2	3.2	3.1	2.4	2.8	2.8	1%	45
Netherlands	2.8	3.0	2.7	3.5	2.7	2.8	3.0	5%	215
UK	2.7	2.5	2.6	2.4	...	3.3	2.6	-23%	45
France	0.8	0.8	1.0	0.8	0.6	0.9	0.9	-6%	15
Belgium	0.3	0.4	0.6	0.4	0.3	0.4	0.4	13%	40
Italy	0.2	0.3	0.4	0.3	...	0.6	0.3	-48%	5
Sweden	0.1	0.1	0.2	0.1	0.1	0.2	0.1	-38%	10
Sub-total Western Europe	9.5	9.3	10.7	10.6	...	11.0	10.0	-8%	
Japan	4.6	3.9	4.5	2.8	2.2	4.1	4.0	-4%	35
Hong Kong[4]	0.5	0.8	1.1	0.9	...	0.9	0.8	-11%	200
Singapore[5]	0.2	...	0.6	0.1	...	0.2	...		...
Malaysia	0.2	...	...	...	...				...
Australia	2.8	3.4	2.5	2.3	2.7	3.1	2.8	-11%	200
New Zealand	0.3	0.3	0.3	0.4	0.4	0.5	0.3	-52%	95

Notes: (1) Certain discrepancies in figures shown are due to rounding errors.
(2) Totals in certain years include estimated quantities imported into certain countries for which statistics are missing.
(3) Canadian imports are net of quantities shown by US statistics to be re-exported to the USA.
(4) Hong Kong imports are net of re-exports, and have been adjusted to exclude the trade in raw nuts.
(5) Singapore imports are net of exports.

Source: Gill and Duffus, Edible Nut Statistics and official trade statistics.

Kuwait	1975-77	510 tonnes
Bahrain	1975-77	220 tonnes
Iran, Saudi Arabia, Syria United Arab Emirates, Lebanon	1975-77	450 tonnes
Argentina	1975-79	500 tonnes
Mexico	1975-79	300 tonnes
Venezuela	1975-79	140 tonnes
Czecoslovakia	1975-77	120 tonnes
Switzerland	1975-77	160 tonnes

Argentina, Mexico and Venezuela are believed to be supplied exclusively by Brazil, and imports into Argentina were noted to be increasing rapidly. For the remaining countries the figures shown may understate total imports, as export statistics were not available for Mozambique.

Countries with high annual per capita imports from 1977 to 1980 are the USA (150 g), Canada (165 g), the Netherlands (215 g), Hong Kong (200 g), Australia (200 g), New Zealand (95 g) and the USSR (60 g). Consumption per head in Western European countries other than the Netherlands and in Japan appears to be relatively low and in no case exceeds 50 g per capita.

Table 7 compares average imports from 1973 to 1976 with those from 1977 to 1980, and shows that the world shortage has had very varied effects on consumption in different markets. Most of the decline in availability was reflected in lower consumption in North America and the USSR while consumption in Western Europe, which has traditionally been low, has fallen by less than 10%. Imports into Far Eastern countries were also sustained until 1979, although in 1980 and 1981 Japanese imports declined greatly as a consequence of high prices and the uncertain supply situation.

Scarce supplies were rationed by price after 1977, and Figure 1 in Section 5.5 shows that real prices have tended to be higher from 1977 to 1980 than from 1970 to 1976.

5.2 Consumption Patterns

Cashew kernels are primarily a snack item and for this purpose are sold roasted

and salted in straight and mixed packs. Overall they are the most popular of tree-nuts used as a snack item and they are particularly preferred in mixed packs both because of their bland and pleasant taste and their size. In relation to cashews, hazelnuts are considered to be too small and brazil nuts too large to constitute more than about 10% of a mixed nut pack. In North America one of the most popular mixed packs is the 12 oz tin of fancy roasted nuts and these have traditionally contained 50% cashews, though high prices in 1980 and early 1981 have caused this percentage to be reduced.

The high price of cashews relative to groundnuts, and in recent years relative to most other tree-nuts, has meant that they tend to be consumed predominantly by the higher socio-economic classes, and that overall consumption is highly income-elastic. The importance of living standards in part explains why consumption is greater in North America than in Western Europe and Japan. Though living standards in the latter countries have by and large caught up with North America, this has happened quite recently. Shortages in the later 1970s and consequent high prices have prevented significant expansion of the market and consumption has remained far lower in these countries than in North America.

Another reason for varying levels of per capita consumption is variation in the taste for nuts between countries. Cashews are especially popular in the USA, because their bland taste is suitable as a cocktail accompaniment. Groundnuts are considered to suit the stronger tasting beers as drunk in the UK, and the more active and sharper taste of almonds and hazelnuts are often preferred in heavy wine-drinking areas such as France, Spain and Italy. Drinking habits and tastes are, however, becoming more international and more closely associated with levels of income rather than tradition.

Consumption shows a strong seasonal pattern with a pronounced peak around Christmas in most countries. A Canadian importer estimated that 60% of roasted cashews sold in North America are consumed at this time.

For roasting and salting, white whole grades are mainly used and it is considered important for the consumer to be able to recognise the traditional cashew shape, particularly in mixed packs. When butts and pieces are used shape becomes increasingly difficult to recognise. Lower grades including scorched and dessert wholes, butts and splits are used in cheaper packs, especially in periods of scarcity. Similarly the count of white wholes used depends on the price of the finished product; as 320s are the most available

count they are most used; 450s are used in some cheaper packs and are particularly in demand in the United Kingdom; larger counts are predominantly used in North America in 'fancy' gift-packs.

Confectionery and bakery uses are the main outlets for cheaper grades, especially large and small white pieces. However, almost invariably they are used as a substitute for other tree-nuts. The bland taste of cashews is lost in chocolate and bakery products. This allows cashews to be used in confectionery to extend the nut texture without masking the primary nut flavour, but means cashews are unlikely to be used on their own. Cashews are used in chocolate bars, nut candies, nougatine and mock marzipan, amongst other applications. Unlike whole grades broken grades cannot command a premium over other tree-nuts.

Sales of cashews as a health food are small, but are growing fast in relation to other uses, especially in North America. For this purpose they are usually sold plain, without roasting and salting.

Cashew nuts are used in Chinese cookery all over the world. It is likely that this explains the high levels of per capita consumption in certain Far Eastern countries.

In the USSR consumption patterns are entirely different. Cashews are not consumed greatly with cocktails but are ground to a paste for use in confectinery.

Although the introduction of cashews to the USSR owes more to politics than to tastes, it is believed that there is now a substantial genuine demand for cashew confectionery. All qualities are bought by the USSR, from 320s down to the cheapest grades, though the cheaper broken grades are generally preferred if India can supply them.

5.3 Details of Individual Markets

(a) The USA

On the basis of comments from trade sources, it is estimated that the breakdown of consumption for cashew kernels in the USA is as follows:-

Roasted kernels (mainly salted)	75-80%
Raw kernels for health-food uses	15%
Bakery/confectionery/ice cream	5-10%

According to one dealer the most important ways in which roasted and salted kernels are packed are as follows:-

1. 12 oz tins and small ½ oz cello-bags (straight packs)
2. 7 oz tins, dry roasted
3. 12 oz tin of fancy mixed nuts containing 30-60% of cashews by weight
4. Mixed nuts containing 50% groundnut

In addition they are sold loose-packed, especially through display machines.

The US public has a very strong preference for cashews over other tree-nuts used for cocktails, and though prices were at a substantial premium from 1977 to 1980, annual imports remained around 30,000 tonnes. Even in 1981 when prices were higher in real terms than at any time during the previous 11 years, imports only fell to 27,600 tonnes.

High prices have also resulted in a lower proportion of kernels being used in mixes and greater use of inferior grades. According to one importer, processors could not reduce the percentage of cashews in fancy mixed packs below about 30% without greatly impairing the acceptability of the product. Almonds and pistachios are considered to be the main substitutes for cashews and domestic supplies of both will be abundant in the 1980s. It is expected that the price of pistachios will fall considerably below historical levels making this nut a much stronger competitor to cashews.

The USA imports substantial quantities from all major origins and is the main outlet for Brazil because of geographical proximity and the speed of shipments from Fortaleza. Deliveries take about two weeks from the time of order. Some importers and roasters handle business through agents in Brazil.

(b) Canada

Consumption patterns in Canada are very similar to those in the USA. About 90% of Canada's imports are for roasting and salting, the remainder being for confectionery and health-food uses. About 60% of annual consumption takes place around Christmas, and the volume sold in straight packs is about twice that sold in mixed nut packs.

320s are the main grade used, but in the period of high price experienced in 1981, almost all roasters were using some scorched wholes. There is also a

demand for larger kernels (210s and 240s) for use by up-market packers. Brazilian kernels are now in considerable demand, both on account of their size, and the reliability of supply from that origin.

(c) Western Europe

Despite a major fall in consumption in 1981, this market has a large potential as yet unfulfilled. One trader believed that, were supplies to increase, the market could grow by a factor of 2-4 before saturation was achieved. The greatest potential exists in countries with low per capita consumption including Scandinavia, Switzerland and Austria.

In West Germany it is estimated that 70%-80% of imports are accounted for by whole grades and 20%-30% by brokens; 2,000-2,5000 tonnes are sold roasted and salted, mainly through grocery outlets. Quality standards are high both for the product, as a premium is placed on whiteness, and for packaging of retail products. According to one trade estimate, 60% of sales are in mixed packs. There is also a small health-food usage. In contrast to North America there is not a strong seasonal pattern to demand except for a slight peak at Christmas.

In France annual imports of raw cashew kernels averaged 900 tonnes from 1977 to 1980, a level which changed little throughout the 1970s; in addition imports of roasted kernels from West Germany and the Netherlands may be as much as 300 tonnes.

About 80% of raw kernel imports is estimated to be roasted and salted with 320s being mainly bought. The outlook for demand of roasted kernels depends largely on price and it is believed that given price levels similar to 1973-76 the level of sales could eventually double.

In the Netherlands about 70% of the quantities imported is distributed to nut-vending bars, and it is the growth of these outlets which has contributed most to the high level of per capita consumption. These outlets, of which about a thousand exist , display warm and freshly roasted kernels, whose appetising appearance and smell stimulates impulse purchases. The proportion of imports packaged for the grocery and catering trade is relatively small, and of this a significant part is exported. Only a small percentage of broken grades is imported as confectionery accounts for less than 10% of the cashews used in the Netherlands.

In comparison with West Germany, the Netherlands buys higher percentages both of scorched and dessert wholes, which are cheaper than white wholes, and of large wholes (240s, 210s), which are preferred by some nut-vending bars.

The United Kingdom. According to statistics of the Cocoa, Chocolate and Confectionery Alliance, about 19% of UK imports of cashew kernels were used in confectionery in the period 1977 to 1979. The remainder was almost all used in salted cashew packs, mixed nuts or sold unroasted as a health food or for cooking. The largest user, UB (Foods) Ltd, is estimated to take most of the quantity used for roasting and salting. 320s, and particularly 450s, white wholes are the grades mostly used in the UK.

(d) Japan

Total annual imports of unroasted tree-nuts, excluding chestnuts, were around 18,000 tonnes in the period 1977 to 1980 and most of this quantity was accounted for by almonds and cashews, which averaged 10,000 tonnes and 4,000 tonnes respectively. Imports of nuts stagnated in the late 1970s because of high prices for cashews and almonds and latterly because of a poor economic climate. Imports of cashews have declined from 6,600 tonnes in 1976 to only 2,200 tonnes in 1981.

About 80% of imports of cashew kernels were obtained from India which supplies almost exclusively whole grades, while Indonesia emerged as the second most important supplier in 1980, with 234 tonnes being received from that origin. Mozambique has ceased to supply Japan.

90% of cashews are used as a salted snack nut, mainly in straight packs, and 320s are preferred for this purpose. The remaining imports consist of broken grades, used for confectionery.

About 4,500 tonnes per annum of almonds are salted for the snack trade, and this has provided most of the competition for cashews. Almonds have been promoted by the Californian Almond Growers Exchange in particular by selling almonds together with Coca Cola. Almonds have been preferred to cashews on account of their lower prices and greater stability and reliability of supply. Nevertheless, given identical prices and conditions of supply, cashew kernels would be preferred to almonds for salting purposes.

Japanese importers have expressed much concern over cashews' declining market

share, so that in 1980 JETRO, the Japanese External Trade Organisation, invited representatives of cashew exporting countries to an import promotion seminar. One Japanese importer stated that, given a stable supply position, imports of cashew kernels could increase appreciably and match imports of almonds (Indian Cashew Journal, No 1, 1980).

5.4 Marketing Systems

The marketing systems for cashew kernels in the main importing countries follow a basic pattern, within which national variations occur. The most common pattern is for processors at origin to sell to dealers in the importing countries, either directly or via a selling agent in the importing country. Dealers in turn sell to manufacturers, often directly by occasionally via brokers or local dealers. The manufacturers process the cashew-nut kernels and prepare them for retail sale.

Some small processors sell to shippers who arrange shipments and export sales, but the large processors perform these functions themselves. Two of the most prominent processors are members of international companies with offices in importing areas from which they conduct their trade. They, like other processors, may appoint selling agents in the main markets to circulate their offers amongst potential buyers, normally dealers, and to represent the processor in the event of subsequent problems, such as quality claims.

Agents are favouably placed to assess the volume and prices of the trade and, being in direct contact with buyers and the shippers, to predict trends in the market. They exist mainly because shippers find they provide a useful service. It would be expensive in terms of cabling costs alone for a processor to cover, say, ten dealers from origin, and difficult to split offers among many buyers. Buyers in importing countries, and especially in the USA, find the agents particularly convenient when dealing with origins where there are significant risks of non-standard quality or default. The agent, who normally travels extensively, is expected to check out such factors at origin. Both shippers, and buyers in importing countries, find agents a valuable source of information and advice on buying and selling.

The following paragraphs contain comments on the organisation of the trading in different markets.

The marketing system in the USA was based traditionally on a formal structure

of intermediaries; shippers sold through their agents in New York to dealers who were mainly based around New York. Dealers sold either directly to manufacturers in their own vicinity or through agents or local nut brokers to manufacturers in other regions of the USA.

Virtually all shipments from India and Africa are handled through agents, New York-based, but with Brazil much trade has been conducted directly at origin between local processors and agents of US buyers based in Forteleza. Otherwise US buyers work through a New York agent who splits the commission with a Brazilian agent. The following reasons account for the diminished role of New York agents in dealing with Brazil. Firstly Brazilian shippers, unlike those in India and Africa, do not sell on long forward contracts but for prompt delivery, normally within a month. Sales are made from stock and there is little risk of non-completion. Secondly communications with Brazilian are excellent. Thirdly, the difference in time zones is small compared with Africa and India, and business can be carried out in the normal working day without the need for special night-shift operators.

Agents are renumerated by shippers with a commission on the contract value but rates vary according to origin. According to a New York source, Indian shippers pay 2½% on the cif value of the contract, Brazil 2% fob, Tanzania 2½% fob and Mozambique 1½% fob. Generally speaking buyers are satisfied with the role of agents especially in view of the uncertainty of supplies in recent years, and except in dealing with Brazil and China (China does not use the agency system), it is unlikely that they will seek to by-pass them to a significant extent.

US dealers are also based in the New York area and some of the most important are thought to be Hollander Trading Co., Zaloom Bros., Jos A Zaloom, J.F. Braun, and Kane International. In the past they handled almost all imports into the USA, the world's largest market, and were therefore probably the most potent influence on cashew prices in the world. Their control is demonstrated by the fact that at one time only one manufacturer was able to buy directly from shipper's agents in New York. However, by 1974 their control had been considerably eroded by an increase in direct buying and by intervention of Canadian dealers, as described by Wilson (1975). Direct buying has been facilitated by the concentration of the salting industry into fewer and larger units, often parts of larger food corportions, and these companies have wished to purchase as directly as possible. At present large salters, such as the Nabisco Bands Group and Fisher Nut, buy part of their supplies direct from origin, usually through agents and partly from New York dealers.

Canada

Canadian dealers tend to import on a back-to-back basis (contracting simultaneously to buy and to re-sell), and to deal directly with shippers in producing countries without recourse to shippers' agents. Importers include Balfour Guthrie (Canada) Ltd., Khazzan, Watt and Scott (all in Montreal area), Rowes Co. and Gibbs Nathaniel (Toronto areas) and East Asiatic (in Vancouver).

Western Europe

A part of imports, and especially those from Mozambique, are handled by the agency system, but the role of agents is less important than in the USA. Dealers, based mainly in London, Hamburg and the Netherlands, have a more important role and this has been strengthened in recent years owing to risks of non-completion of long-term contracts. Some of the main dealers in London are Rayner and Co., Barrow Lane and Ballard, and G.C. Williams, who are also agents for an associated processing company in Mozambique. A leading firm dealing in cashews in continental Europe is International Emporium Aussenhandel, in Hamburg. Sales to France, Switzerland, Scandinavia and other countries are largely handled by dealers in London and Hamburg.

In the Netherlands dealers tend to combine their role as importers with roasting, packaging and distribution.

Japan

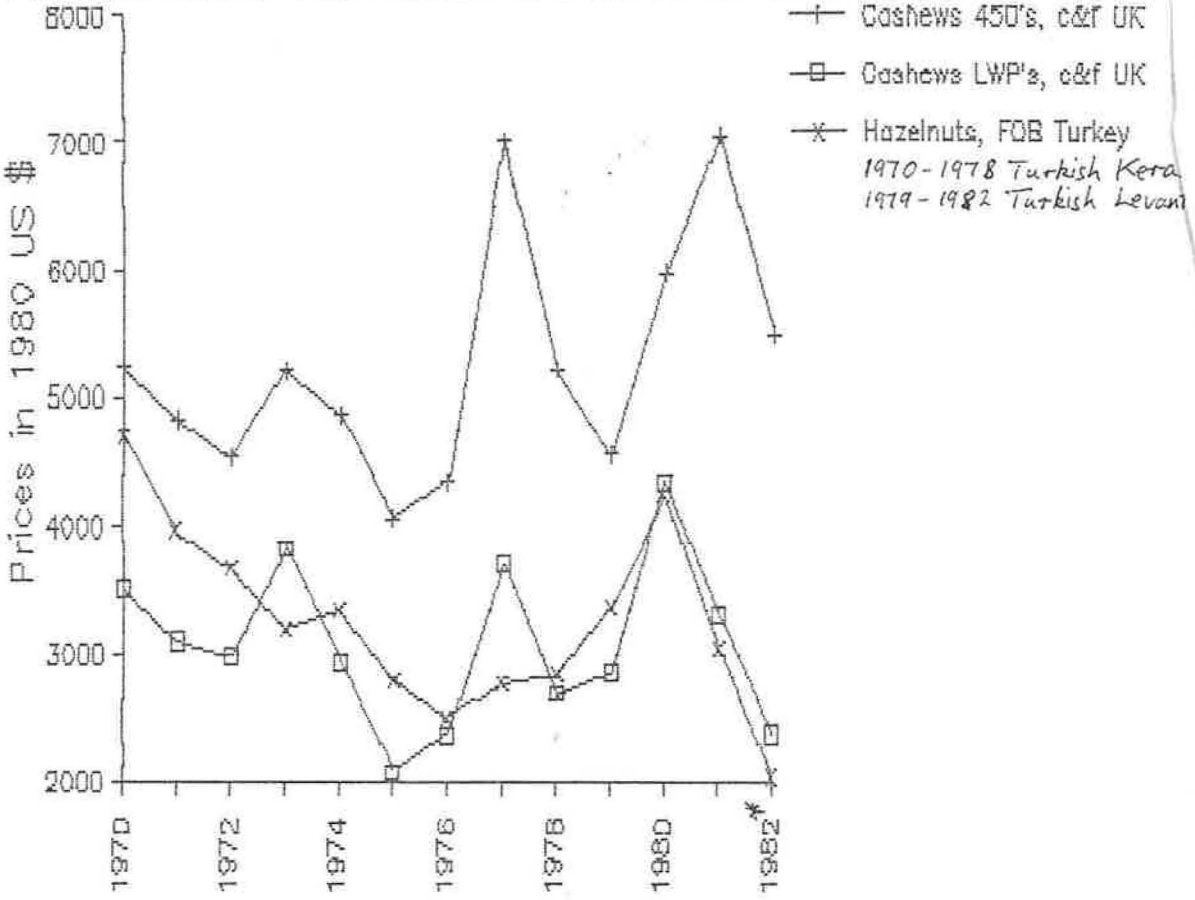
Imports are handled by "major trading companies", mainly without the intervention of local agents, since major trading companies generally have overseas offices and contacts which allow them to bear all the risks involved in importing. The leading importers of cashews include Cashew Trading Co. Ltd., Toshoku Co. Ltd., Shoei Food Industrial Co. Ltd., Itoh and Kanematsu-Gosho Ltd.

5.5 Prices

Trends - Figure 1 compares annual average prices for cashew and hazelnut kernels, in constant 1980 US$, from 1970 to 1982. While prices for the 450 count whole grade have fluctuated in the range of $4,000 to $7,000 per tonne c & f UK, large white pieces (LWPs) have been between $2,000 and $4,350 per tonne. Notably the difference between these two grades has been greater in the last

FIGURE 1

AVERAGE PRICES FOR CASHEW AND HAZLENUT KERNELS, 1970 – 1982*



Source: Gill and Duffus Edible Nut Statistics

* 1982 : Figures refer to first half of year only

half of the period (1977-1982) when supplies have been more restricted. Price levels for LWPs have generally been similar to those for hazelnuts, for which they are substituted in many confectionery products.

Price differentials between whole grades. Differentials vary constantly according to availability of particular grades, but some generalizations can be made. Traders interviewed in March-April 1981 stated that differentials had widened more than porportionately as price levels had increased overall. This is shown in Table 8 which compares differentials for March-April 1981 to those in the period 1977 to 1979.

TABLE 8

PRICE DIFFERENTIALS BETWEEN 320 COUNT AND OTHER WHOLE COUNTS

COUNT	DIFFERENTIAL TO 320 COUNT	
	Normal differential 1977 to 1979	March - April 1981
210 white wholes	+ 5%	+ 5 - 6%
240 white wholes	+ 1.5-2%	+ 2 - 2.5%
320 white wholes	Standard	
450 white wholes	- 1.5-2%	- 3.5 - 4%
Scorched wholes	- 3.0%	- 7.5 - 8%
Dessert wholes	...	- 18.5%

Source: The US and German trade.

Price differentials between broken grades and between whole and broken grades. Differentials between broken grades are extremely variable, but some idea can be obtained from the following figures relating to April 1981.

Price of broken grades as a percentage of 320s

(cif per tonne New York, April 1981)

320s white wholes	100%
Butts	80%
Splits	77%
Large white pieces (LWP)	54-55%
Small white pieces (SLP)	51-52%

Price of butts and splits are much closer to whole grades because they are extensively used in roasting and salting.

The relationship between average annual prices for white wholes (450s) and LWPs has varied as follows in the period 1970-1981. From 1970 to 1974 the annual average prices of LWPs varied between 61% and 73% of the prices of 450s. From 1975 to 1978 the range was 51% to 56%, but in 1979 and 1980 it rose to 62% and 74% respectively. In 1981 the figure fell to 47% and in the first half of 1981 further to 42%, as a consequence of the very heavy supplies of hazelnuts and almonds mentioned previously. Given that in the period 1961-1970 LWPs were on average 71% of the price of 450s, it is clear that the differential has increased over the past two decades, and that there is now greater reason for processors to seek a high out-turn in whole grades.

5.6 Trade Barriers

Duties applicable to imports of cashew kernels into the markets investigated are shown in table 9. No duty is levied on imports of unroasted kernels from cashew exporting countries, and there also appears to be opportunity for certain categories of countries to export roasted kernels to the EC, Japan and the USA without paying duty. Brazil and India are the countries most likely to be able to do this on account of their more developed domestic roasting industries.

However no cashew producing country is known to export significant quantities of roasted kernels at the present time, and it is thought that competition with established processors in importing countries is likely to be difficult since (a) shelf-life is likely to be a significant problem for exports from distant locations, and (b) unlike their competitors in importing countries, manufacturers in cashew producing countries will find it difficult to provide a range of snack items and will lack comparable marketing.

6. CASHEW-NUT SHELL LIQUID (CNSL)

6.1 Exports and Imports

a) Overall Trade

Tables 10 and 11 show respectively annual exports and imports of CNSL into the main consuming markets. Imports were in the range 20,500 to 25,000 tonnes

TABLE 9

CUSTOMS DUTIES ON CASHEW KERNELS IMPORTED INTO CONSUMING COUNTRIES

Importing Country	Tariff Nomenclature	Description	RATE		
			General	Most Communist countries	
USA	145.44	Shelled, blanched or otherwise prepared or preserved	Free	2¢ per lb	
				'Most Favoured Nation" Rate'	GSP
CANADA	100900-1	Not prepared beyond blanching, drying, cutting, chopping or slicing		Free	Free
	11400-1/2	Processed or prepared in any manner		10%	7.5%
			"Temporary" rate	GATT Rate Up to (31/3/82)	GSP
JAPAN	0801 430	Fresh or dried	-	3.1%	Free
	2006 277	Roasted	16%	-	7.5
			General	ACP	GSP
EUROPEAN COMMUNITY	0801 F	Fresh or dried	Free	Free	Free
	2006 AI	Roasted, in packings of more than 1 kg	14.8%	Free	7% Free(1)
	AII	Roasted, in packings of 1 kg or less	16.8%	Free	8%/Free(1)

Note: (1) The EC gives duty free treatment only to the "Least Developed Countries" under the Generalized System of Preferences (GSP)

from 1973 to 1978, and a slight upward trend was discernible, but increased dramatically to 30,200 tonnes in 1979. This was the result of building up stocks, and some speculative buying which started in 1977, following a poor crop in Brazil, and which by 1979 had created a worldwide shortage. In this period, prices rose from their customary level (ie not more than $400 per tonne c&f New York or Western Europe), to reach a peak of around $1,800 per tonne in the second half of 1979. However, in 1980 and 1981 imports fell to previous levels at 21,590 tonnes and 22,362 tonnes respectively; the high level of stocks built up in 1979, together with the impact of higher petrol prices and the worldwide recession caused this return to previous import levels. The high prices of the 1977 to 1979 period had brought forward a massive increase in supplies, particularly from India. However, by 1981, when prices fell to usual levels Indian supplies also fell back to more normal levels.

b) Supplying Countries

Table 10 shows that while India, Brazil, Mozambique and Tanzania have continued to be the main sources, the pattern of supplies changed considerably in the period 1973 to 1981.

In the period up to 1973, mechanized processing had allowed Mozambique to become the world's leading supplier, well ahead of India where over 60% of the world cashew crop was being processed. Although the oil bath method was widely used, many Indian processors found that existing price levels in the early 1970s were insufficiently remunerative for extraction of CNSL to be worthwhile, since the gain in revenue from sales of CNSL was counterbalanced by a loss of revenue caused by scorching of a larger percentage of kernels. In contrast the mechanised plants installed in East Africa and Brazil were designed in such a way that oil-bath roasting was a stage in the process. With mechanical processing CNSL is an automatic by-product and the level of supply is unresponsive to price.

Since 1974, exports from Mozambique have fallen from 11,600 tonnes to 3,200 tonnes in 1981 and this appears to reflect principally the lack of availability of raw nuts in that country. In contrast, Brazil has increased supplies in line with availability of raw nuts and the increasing degree to which processing has been mechanised. Brazil can confidently be expected to be the world's leading supplier of CNSL during the 1980s.

TABLE 10

CNSL, APPARENT EXPORTS OF CNSL TO MAIN IMPORTING MARKETS[1]

tonnes

	1973	1974	1975	1976	1977	1978	1979	1980	1981
TOTAL	21,108[2]	24,031	20,623	24,598	24,600	24,112[3]	30,216	21,590	22,362
of which from:									
India	3,651	5,016	5,147	6,194	3,349	4,848	11,755	11,301	6,267
Brazil	5,048	6,243	6,932	6,734	6,110	8,151	11,279	6,199	8,242
Mozambique	10,565	11,623	5,948	6,948	9,840	6,115	4,039	1,659	3,202
Tanzania	981	474	1,321	1,612	1,437	1,355	1,281	911	2,090
Kenya	-	-	-	-	626	283	399	236	1,348
China	-	-	92	12	2,533	1,696[3]	552	451	162
Philippines	-	-	-	-	-	110	179	131	21
Malaysia	-	-	-	-	-	12	62	-	50
Sri Lanka	-	-	-	-	8	18	25	-	-
Hong Kong	-	-	-	-	616	1,098	232	-	75
Indonesia	36	-	42	30	27	121	222	278	50
S Africa	-	-	69	-	-	-	-	-	-
Thailand	-	-	-	-	-	-	45	-	71
Benin	-	-	-	-	-	-	50	-	-

Notes: (1) USA, Japan, the European Community and the Republic of Korea
(2) In 1973, UK imports for only 11 months of the year are recorded
(3) Because of an anomaly in US import statistics for 1978, US imports of CNSL from China are estioated at 1,600 tonnes

Source: Official Trade Statistics of the importing countries

TABLE 11

CNSL, IMPORTS INTO MAIN MARKETS

tonnes

	1973	1974	1975	1976	1977	1978	1979	1980	1981
TOTAL	21,108(1)	24,031	20,623	24,598	24,600	24,112(2)	30,216	21,590	22,362
of which:									
USA	10,961	12,410	9,055	11,649	11,448	10,625(2)	14,033	7,236	9,354
Japan	4,171	5,372	4,393	5,807	4,291	5,396	6,886	6,756	5,244
Korea, Republic	663	501	528	665	854	738	1,059	1,062	1,005
European Community(3)	5,315(1)	5,748	6,647	6,477	8,007	7,353	8,238	6,536	6,759
of which:									
UK	4,462(1)	4,729	5,551	4,956	6,623	5,937	6,714	5,494	6,017
Federal Rep. of Germany	500	496	353	593	615	434	694	396	335
France	235	448	605	918	691	981	655	608	407
Italy	110	75	116	10	51	1	141	28	-
Other EC countries	6	-	22	-	27	-	34	10	...

Notes: (1) UK imports for 1973 for only 11 months of the year are recorded.
(2) Because of an anomaly in US export statistics, Chinese exports to the USA have had to be estimated for 1978. Total imports and US imports in 1978 may be ± 300 tonnes of the stated figure.
(3) EC trade statistics classify CNSL as "Vegetable Saps and Extracts NES o/t medicinal" and it has been assumed that all imports from cashew producing countries under this category are CNSL.

Source: Official Trade Statistics

The period of high prices brought forth a massive increase in supplies from Brazil and above all India in the period 1977 to 1979. In Brazil new mechanical processing plants, equipped for extraction of CNSL were installed while in India, many processors, who had previously not considered extraction to be profitable installed oil-bath equipment and other processors are reported to have bought cashew shells in order to extract CNSL. Solvent plants were installed in Brazil and India to take advantage of the scarce supply situation.

From 1978 to 1979 imports from India into the USA, Japan, the EC and the Republic of Korea increased by over 140% to 11,755 tonnes, slightly in excess of Brazil's exports to the same markets. The high level was maintained in 1980, but owing to falling prices, Indian supplies in 1981 fell back to the pre-1979 level.

c) Markets

The main markets are the USA, the EC, Japan and South Korea (see table 11) and their imports are believed to account for over 90% of world trade. However the countries listed below are also significant users, and the available information on their imports is shown below:

TABLE 12

CNSL: IMPORTS INTO SELECTED MINOR MARKETS

		tonnes	
		1976/77	1977/78
Korea (North)	Apparent imports from India and Brazil	360	140
Rumania		350	60
Yugoslavia		10	85
Czecoslavakia		102	-
Mexico		214	211
Australia - imports from all origins		381	864

Note: Split years are shown because Indian and Australian trade returns are shown in this form

Sources: Australia, Import Trade Returns
Other countries shown, Exports from India and Brazil

6.2 Patterns of Usage

In the major importing countries, there are only two major applications, firstly as friction modifying material for brake linings and secondly in lacquers for decorating vases and other objects. Outside of the Far Eastern countries (Japan and Korea) the latter use is of minimal importance. Small quantities of CNSL are also used in a wide variety of industrial applications such as acid resistant paints, rubber products, adhesives, insulation tape, printed circuit boards and electrical appliance parts.

In India usage appears to be extremely diversified with substantial quantity being used in making paints and varnishes, foundry core oil and other applications (CPCRI, 1979).

Use in Friction Materials

Approaching 90% of CNSL traded worldwide is processed into resins for use in brake linings and, to a much smaller extent, clutch facings. CNSL-based resins, known as cashew resins, have the property of absorbing the heat created by friction in the braking action, while losing their braking efficiency only slowly. This loss of efficiency due to heat build-up is known as "fade". The most important way in which cashew resins are used is as a filler, commonly called friction-dust or particles. They are also used as a binder, either without modification or in cashew-modified phenolic resins. The latter, which are more expensive than straight cashew binders, have been used predominantly in Europe.

There are various other friction materials which can be used in brake linings and which may in certain circumstances be preferred to cashew resins, and these include asbestos, metal fibre, and synthetic phenol resins. In the 1950s the bulk of resins were made from coal-tar materials and linseed oil was also used as a binder. Coal-tar materials became less available and manufacturers sought phenolic replacements, which included both synthetically manufactured phenol and CNSL. Synthetic phenolic resins perform better at high temperatures and for this reason are used to the exclusion of cashew resins as a binder in disc pads. However friction dust made from cashew resins is used to a limited extent in disc pads as a filler. For many uses moreover, CNSL has been preferred to synthetic phenolic resins on account of its price. Prices for synthetic phenolic resins are directly dependent on the price of mineral oil.

Sharp rises in prices for CNSL in 1964, and above all the price "explosion" from 1977 to 1980, have prompted research into materials to replace CNSL. Research in recent years has involved attempts to use asbestor-based brake-linings and semi-metallic brake-linings, but has not proved very successful, though in the USA changes following from this research caused CNSL to lose a small percentage of its market there owing to manufacturers of brake-linings (a) changing their formulations, (b) learning how to reduce wastage.

Most resin-manufacturers who were interviewed during fieldwork were sceptical about the brake-lining industry's ability to find acceptable substitutes which could greatly reduce dependence on CNSL. However, one major manufacturer stressed that if there was a repetition of the recent price explosion this would result in manufacturers permanently changing some of their formulations in favour of other materials. Once such changes have taken place it would be difficult for CNSL to recover the lost market.

Although the degree of substitution occasioned by the price explosion was very small the period of high prices was a considerable shock to the friction-materials and brake-lining industry. CNSL, which was formerly a low-cost material, suddenly became a significant portion of total manufacturing costs.

Given that changes in the technology of brake-lining manufacture are not greatly affecting the level of usage, the main factors influencing the demand for CNSL are (a) the number of cars manufactured, (b) the size of the cars manufactured, (c) the preference for either disc, or drum brakes, and (d) the relative importance of the replacement market (ie for spares) and of the original equipment (OE) market. The increase in the number of cars used world-wide has guaranteed an increased demand for CNSL since its introduction as a friction material. However the trend from larger to smaller cars, which has been particularly important in North America, has diminished the rate of increase, since smaller cars require smaller braking surfaces. During the early 1970's the rate of growth of usage in all major markets was greatly diminished by a trend from drum brakes to disc brakes on the front wheels of vehicles. This trend is reported to be continuing in North America but in Western Europe and Japan a stable situation is thought to have been reached.

The replacement market is estimated to account for 70% of total usage in the USA. Replacement usage acts as a cushion between changes in the level of OE sales and the demand for CNSL. Lower OE sales are usually accompanied by an

increase in replacement sales, and this softens the impact of economic recession on the brake-lining industry.

Lacquer

Formerly a resin from the "lacquer tree", which grows in China, was used for decorating vases and similar objects, but a Japanese company, Cashew Co. Ltd., developed a lacquer paint from CNSL and this is now manufactured in Japan and Korea. The resin from the lacquer tree is very expensive in relation to CNSL so that the recent price explosion did not cause any substitution of CNSL by other materials.

New Uses

Much research has been done on CNSL applications and there is an extensive patent literature, but there have been no major new applications. Attempts have been made, for example, to use CNSL as a drying oil, instead of tung oil, and in epoxyised derivatives. There are three main drawbacks to using CNSL. Firstly its toxic nature makes handling difficult and this can cause labour problems; secondly the dark colour of CNSL makes it unsuitable for some uses; thirdly and above all, uncertainty of supply is a powerful disincentive to finding further uses, and the experience of the recent price explosion has made manufacturers extremely cautious in this project.

The following institutions have carried out research into new uses for CNSL:

Brunel University	Regional Research Laboratory
Uxbridge, UK	Hyderabad, India

6.3 Details of Individual Markets

USA. Imports averaged about 11,000 tonnes per annum from 1973 to 1978 with no marked trend, but in 1979 jumped to around 14,000 tonnes as manufacturers sought to increase their stocks. Imports plummeted to 7,236 tonnes in 1980 but recovered somewhat to 9,354 tonnes in 1981.

90-95% of imports are used in friction materials, which are manufactured in approximately the following proportions:-

Friction dust	80%
Polymerized cashew resin	15%
Cashew-modified phenolic resin	5%

There are three major resin manufacturers: Palmer Products, Colloid Chemicals and 3 M Co., and one smaller user, Polyrez. All imports into the USA are made in bulk and drums are not used at all, as they proved to be too expensive and because disposal is an ecological problem.

The European Community. EC imports increased from 5,748 tonnes in 1974 to 8,238 tonnes in 1979. These figures suggest that demand was growing by at least 4% annually during this period. However in 1980 and 1981, imports fell to 6,536 tonnes and 6,759 tonnes respectively. The UK regularly takes in excess of 80% of total EC imports, while France and West Germany take most of the remainder.

Imports into the UK averaged 6,157 tonnes per annum from 1977 to 1981, and two firms import and process almost the entire quantity. These are BP Chemicals, whose purchases account for around 75% of the total, and Ferodo Ltd. BP Chemicals manufacture resins which are sold to the makers of brake-linings, mainly in the UK, continental Europe, Africa, and South America, and to a small extent in the USA. BP resins are also used in electrical products. Ferodo is a major brake-lining manufacturer and makes resins for use in its own friction materials. They also supply Ferodo Italiano who make resins to the UK company's formulations. A third company, Mintex, imports 150 tonnes to 300 tonnes per year.

The fall in imports since 1979 is due to industrial recession, increasing imports of foreign cars and a ban by foreign car manufacturers on their distributors using spares not from OE suppliers. However in the long-term demand for CNSL in the UK is expected to continue growing, due to growing overseas demand for friction materials, and a strong home replacement market.

In continental Europe, a number of brake-lining manufacturers make a few of their own resins, and in West Germany there is reported to be much use in paints. The following manufacturing firms were reported to be buyers of CNSL: Valeo (Conde-sur-Noire, France), Rousselot (France), Fers (Spain), Juridwerke GmbH (Reinbeck, West Germany) and Raschig (West Germany).

Japan. Imports increased from 4,171 tonnes in 1973 to 6,756 tonnes in 1980

and the average annual rate of growth in demand over that period is estimated to be at least 6%. In 1981 imports fell back to 5,224 tonnes. About 70% of imports are for use in making friction dust of which there are two manufacturers and about 15% for lacquer which is made by three companies. The remainding 15% is used mostly in making insulating varnish, and binder resins which are also used in the brake-lining industry.

Demand for CNSL has grown due to increasing usage in friction materials required for the growing motor industry, but in early 1981 was reported to have reached a peak. Patterns of usage of CNSL in friction-materials are stable and demand is expected to continue to grow in the 1980s in line with growth in the motor industry, but it is likely that restrictions on Japanese car imports into the USA and Europe will cause growth to be less than from 1973 to 1980. Usage of CNSL in lacquers has not increased and recently is said to have suffered from the relative stagnant condition of the Japanese economy.

Republic of Korea. Imports rose from 663 tonnes in 1973 to 1,059 tonnes in 1979 at which level they remained more or less static in 1980 and 1981. CNSL is mainly used for making lacquer of which there are three manufacturers, but one company also makes friction materials.

6.4 Marketing Systems and Specifications

North America

CNSL is sold to the USA through the same agency system in New York which handles cashew-nut kernels. There is virtually no dealer trading, probably because of the difficulty in obtaining tank space and the expense in moving stocks in and out of tanks. Agents sell nearly all the raw CNSL to the four processors, who manufacture cashew resins, and the processors sell mainly to friction-material manufacturers in the USA and Canada. The agent's commission is typically 2½% of the c&f value.

The normal buying pattern is for processors to cover their basic requirements with contracts calling for shipments over 6 to 8 months, or even a whole year. These contracts reflect their commitments to supply cashew resins to friction material manufacturers. The processors' contracts with friction material manufacturers often allow for flexibility on the quantity to be supplied and, therefore, they may place 'fill in' order for additional quantities of CNSL or ask for shipments to be delayed, depending on the demand for friction materials.

All buyers insist on quality standards, which conform closely to the 'Irvington' standard; this is set out in full in Appendix 2. Contracts do not specify whether the liquid is to be solvent extracted or hot-oil bath extracted. Manufacturers of cashew resin will use either type. Shippers are expected to test the quality of their CNSL before shipment.

Western Europe

Both BP and Ferodo buy direct from shippers of CNSL or from the latter's agents in the UK. They take only bulk shipments in excess of 400 tonnes, through BP's private dock at Barry in South Wales, where vessels are guaranteed a quick turn-round. Mintex, however, buys 50 tonne lots supplied in drums.

BP have their own technical specifications, which are set out in Appendix 2. Ferodo's quality requirements are similar to the Irvington standard. Both require the quality of CNSL to be sampled and tested before shipment by approved or authorised surveyors or chemists.

Small buyers normally purchase from local dealers, who are usually traders in cashew kernels as well. Orders are often so small that buyers take deliveries in drums and have to accept the normal technical specifications established by BP and Irvington. Shipments of as little as ten 200 kg drums are made.

Japan

Most CNSL used in Japan is imported by Cashew Trading Co. Ltd., whose associated company Cashew Co Ltd is a major user of this commodity. Most CNSL is received in bulk and only 3-4% is imported in drums. Shipments must conform to the Irvington Standard.

6.5 Shipping

Shipping is an important consideration in the economics of CNSL. It is a low value commodity and freight costs typically account or 15-35% of c&f prices. The following freight rates were typical in early 1981:

East Africa to New York	$124 per tonne
India to New York	$160 per tonne
Brazil to New York	$80 per tonne
Brazil to UK	less than $90 per tonne
East Africa to UK	$170 per tonne

It will immediately be noted that rates for East Africa and India are much higher than those for Brazil and it is thought that high freight costs may have acted as a serious disincentive to Indian producers. However India is better placed than its competitors in relation to the Japanese market.

CNSL has typically been shipped in dry cargo ships with deep tanks at the bottom, but the number of these available has been becoming fewer because of containerization. In particular it is becoming increasingly difficult to find suitable ships sailing between East Africa and Europe. In the long term it will probably be necessary to change to small parcel tankers which carry bulk chemicals, wine etc., but this is likely to result in freight costs between East Africa and the UK increasing by $30-$40 per tonne.

Some minor difficulties were also reported concerning shipping from East Africa to New York: there was only one shipping line available and occasionally there has been a lack of tank space. There is also port congestion at times in East African ports.

The following problems were mentioned in either the UK or the USA concerning shipping from India: lack of availability, no heating coil being available for pumping on arrival, and difficulties in Indian ports. The service from Brazil is good and in Eastern USA shipments can be received into docks within 10-14 days, compared to 30/35 days required for shipping from East Africa.

6.6 Prices

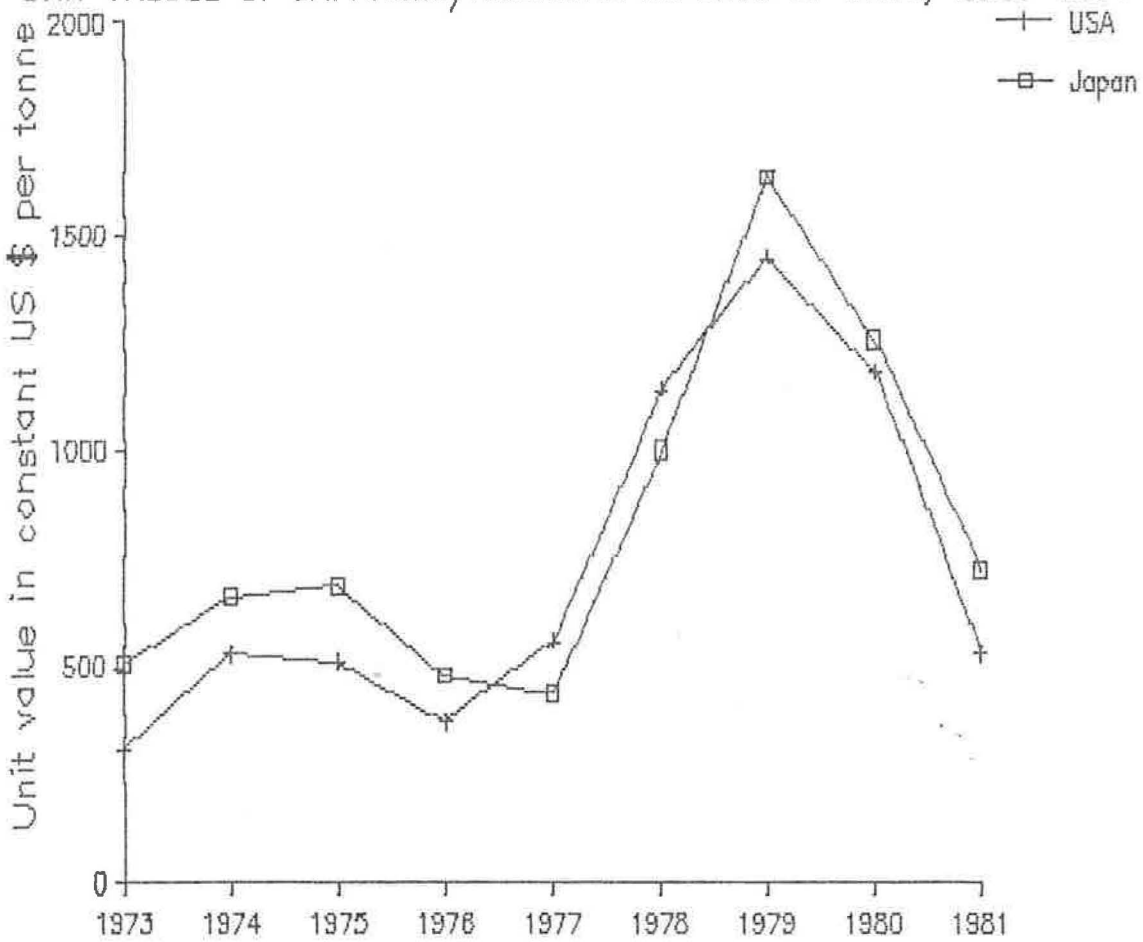
Movements in market prices during the 1970s have already been referred to in Section 6.1.

Figure 2 shows that unit values of CNSL imported into Japan averaged approximately constant 1980 $550 from 1973 to 1977, rose to a peak of $1,637 in 1979, then fell to $530 in 1981. It should be noted that unit values of imports into the USA are in most years at a substantial discount to Japanese imports, averaging about constant 1980 $150 per tonne less, and this is at least partly due to low freight rates between Brasil and the USA. However Japan appears to have obtained cheaper supplies in 1977 and 1978.

CNSL is a commodity for which there are standard requirements and there are no significant differentials between supplies from different origins. However, Brazil is described as the market leader, and Brazilian prices generally move ahead of other suppliers.

FIGURE 2

UNIT VALUES OF JAPANESE/AMERICAN IMPORTS OF CNSL, 1973–1981



Source: Official trade statistics

Prices for CNSL in 200 kg drums, for which there is a small demand in Western Europe, Japan and some other markets, are higher than for bulk shipments, as the following quotations received in March-April 1981 show:

Bulk c&f Hamburg	$600 per tonne
In drums c&f Hamburg	$720 per tonne
Bulk c&f Yokohama	$450 per tonne
In drums c&f Yokohama	$500-$520 per tonne

7. FUTURE PROSPECTS

7.1 Cashew Kernels and Raw Cashew-nuts

Supply High prices in the early 1980s are expected to encourage increased plantings, better disease control and improved cultural practices and consequently increased output in India and Brazil. In contrast it is not thought that production in East Africa will return to former levels but that an increase in annual harvest of 5-6% is the best that can be expected. The following maximum and minimum levels of production are projected for 1990:-

	Projected Level of Production (Tonnes)	
	Min.	Max.
India	200,000	300,000
Brazil	150,000	200,000
East Africa	160,000	245,000
Others	20,000	40,000
	530,000	785,000

Production in 1990 is projected to be between 10 and 62% above the high level of world output, 484,000 tonnes, from 1972/73 to 1975/76. Greater precision is not possible since this report does not include a detailed survey of supplying countries; these forecasts are based on trade comment and some published information.

Demand In the previous TDRI (then TPI) report on cashew markets (Wilson, 1975) it was stated that markets in Western Europe and Japan had scarcely been exploited and that the North American market showed no sign of reaching saturation. This conclusion is still valid and it is believed that in the absence of supply shortages sales of cashew kernels would have risen to 130,000 tonnes in the early 1980s. This is equivalent to world production of

600,000 to 650,000 tonnes of raw nuts if consumption in producing countries is taken into account, a level of supply which may be reached by 1990. However by 1990 cashews will face greatly increased competition from other tree-nuts including almonds, pistachios, macadamias and pecans and it is thought that this may adversely affect demand.

Demand in the USSR is very difficult to foresee but it is likely that purchases will average in excess of 20,000 tonnes per annum.

Prices

(a) Cashew wholes It is forecast that until 1985 prices will remain high, around constant 1980 $5,500 per tonne c & f London for 320s, though by the end of the decade, depending on the growth of output, they may have returned to levels close to those in the early 1970s ie. constant 1980 $4,000-$4,500 per tonne.

(b) Cashew pieces Prices of cashew pieces are mainly dependent on prices of other tree-nuts, especially hazelnuts. Given growing world output of hazel-nuts and almonds, it is likely that prices for LWPs will be around constant 1980 $2,500 c & f UK.

(c) Raw nuts

There will continue to be a good market for raw nuts in India and China, and given the experience of some countries which have set up their own processing industries, new supplying countries should consider the possibility of exporting the raw nuts without further processing. Historically raw nut prices c & f India have averaged 11-12% of prices for 320 count white whole kernels cif London.

7.2 CNSL

Owing to the use of mechanical processes for extraction of CNSL, output in East Africa and Brazil will tend to grow in line with increased harvests, particularly in Brazil. It is forecast that by 1990 combined annual output of CNSL in these two areas alone could be between 36,000 and 50,000 tonnes, while total world imports are not expected to exceed about 32,000 tonnes (assuming a maximum 3% growth in consumption between 1980 and 1990), unless major new applications are found.

World supply is therefore likely to grow faster than demand, and there is expected to be downward pressure on prices. However when prices fall below constant 1980 $450 per tonne cif New York, historical evidence suggests that most Indian processors will find the production of CNSL for export to be unprofitable; this will ease the downward pressure on prices. Price levels are difficult to forecast but are likely to be in the range constant 1980 $300 to $450 during the 1980s.

With increasing output of cashews, the state of the crop in Brasil is likely to be the major determinant of world prices. There is therefore a possibility that a disastrous harvest in that country will bring about a worldwide shortage and that prices will once again rise to over constant 1980 $1,000 per tonne. Brazilian processors are moreover said to be anxious to increase revenues from CNSL. However, given India's large production capability, such periods of high prices are likely to be shortlived.

BIBLIOGRAPHY

Edible Nut Statistics, and Edible Nut Market Reports. Published by Gill and Duffus Group Plc, St. Dunstan's House, 201 Borough High Street, London SE1 1HW, UK.

USDA Foreign Agricultural Circular, FN Series on edible tree-nuts. Published by the US Department of Agriculture, Washington DC, 20250, USA.

The Indian Cashew Journal. A quarterly publication of the Cashew Export Promotion Council, Ernakulam, Cochin 682016, India.

WILSON, R.J. (1975). The market for cashew-nut kernels and cashew-nut shell liquid. Report G91, Tropical Products Institute, London.

JAPANESE EXTERNAL TRADE ORGANISATION, JETRO (1980). Report on Kenyan, Tanzanian and Indian Cashew-nut industries. In Japanese.

JOHNSON (1977) Cashew-apple products in Brazil. The Indian Cashew Journal. 8, 1, p 17-20.

DATTATREVULU, M. (1977) Export Development of Cashew. Foreign Trade Review, 12, p. 229-240.

CPCRI (1979) Cashew: Monograph on plantation crops, 1. Central Plantation Crops Research Institute, Kerala, India.

Appendix I

Indian grade specifications for cashew kernels

Grade specifications and other characteristics prescribed for export of cashew kernels are:

CASHEW KERNELS (WHOLE)

Grade designation	Number of kernels per lb.	General characteristics
W 210	200/210	Cashew kernels shall have been obtained through shelling and peeling cashew-nuts (*Anacardium occidentale);* shall have the characteristic shape; shall be white, pale ivory or light ash in colour, reasonably dry, and free from insect damage, damaged kernels and black or brown spots. They shall be completely free from rancid kernels. The kernels shall be completely free from testa.
W 240	220/240	
W 280	260/280	
W 320	300/320	
W 400	350/400	
W 450	400/450	
W 500	450/500	

Tolerance: Broken kernels and kernels of the next lower grade, if any, shall not together exceed 5 per cent at time time of packing.

SCORCHED CASHEW KERNELS (WHOLE)

Grade designation	Trade name	General characteristics
SW	Scorched Wholes	Cashew kernels shall have been obtained through shelling and peeling cashew-nuts (*Anacardium occidentale*), shall have the characteristic shape; shall be reasonably dry and free from insect damage, damaged kernels, black spots and testa. They shall be completely free from rancid kernels. The kernels may be light brown, light ivory, light ash or deep ivory in colour due to scorching as a result of overheating.

Tolerance: Broken kernels and kernels of the next lower grade, if any, shall not altogether exceed 5 per cent at the time of packing.

DESSERT CASHEW KERNELS (WHOLE)

Grade designation	Trade name	Blemish	General characteristics
SSW or SW 1 A	Scorched Wholes Seconds or Scorched Wholes I.A.	Slightly Shrivelled Kernels	Cashew kernels shall have been obtained by shelling and peeling cashew-nuts (*Anacardium occidentale*), shall have the characteristic shape, be reasonably dry and free from insect damage and testa. Slightly scorched kernels and kernels with slight speckling and discolouration permitted. They shall be completely free from rancid kernels. The kernels may also be immature. The kernels may be light brown, light blue or light ivory in colour due to scorching.
DW	Dessert Wholes		Cashew kernels shall have been obtained by shelling and peeling cashew-nuts (*Anacardium occidentale*), shall have the characteristic shape; shall be reasonably dry and free from insect damage and testa. Scorched, discoloured speckled and shrivelled kernels permitted. Rancid kernels not permitted. The kernels may show deep black spots.

Tolerance: Broken kernels and kernels of the next lower grade, if any, shall not together exceed

CASHEW KERNELS (WHITE PIECES)

Grade designation	Trade name	Description	General characteristics
B	Butts	Kernels broken crosswise and naturally attached.	Cashew kernels shall have been obtained by shelling and peeling cashew-nuts (*Anacardium occidentale*); shall be white, pale ivory or light ash in colour; reasonably dry and free from insect damage, damaged kernels, and black spots. They shall be completely free from rancid kernels. The pieces shall be completely free from testa.
S	Splits	Kernels split naturally lengthwise.	
LWP	Large White Pieces	Kernels broken into more than two pieces and not passing through a 4 mesh 16 SWG sieve.	
SWP	Small White Pieces	Broken kernels smaller than those described as LWP but not passing through a 6 mesh 20 SWG sieve.	
BB	Baby Bits	Plemules and broken kernels smaller than those described as SWP but not passing through a 10 mesh 24 SWG sieve.	

Tolerance: Up to 5 per cent of the next lower grade or pieces at the time of packing.

CASHEW KERNELS (SCORCHED PIECES)

Grade designation	Trade name	Description	General characteristics
SB	Scorched Butts	Kernels broken crosswise and naturally attached	Cashew kernels shall have been obtained through shelling and peeling cashew-nuts (*Anacardium occidentale*); shall be reasonably dry and free from insect damage, damaged kernels, black spots and testa. They shall be free from rancid kernels. The pieces may be light brown or deep ivory in colour due to scorching as a result of overheating.
SS	Scorched Splits	Kernels split naturally lengthwise	
SP	Scorched Pieces	Kernels broken into pieces and not passing through a 4 mesh 16 SWG sieve.	
SSP	Scorched Small Pieces	Broken kernels smaller than those described as SP but not passing through a 6 mesh 20 SWG sieve.	

Tolerance: Up to 5 per cent of the next lower grade or pieces at the time of packing.

DESSERT CASHEW KERNELS (PIECES)

Grade designation	Trade name	Description	Blemish	General characteristics
SPS	Scorched Pieces Seconds or Scorched Pieces 1A	Kernels broken into pieces but not passing through 4 mesh 16 SWG sieve.	Pieces of shrivelled kernels. May be deformed due to immature nuts and black spots	Cashew kernels shall have been obtained through shelling and peeling cashew-nuts (*Anacardium occidentale*); shall be reasonably dry and free from insect damage and testa. Scorched pieces with surface speckling and discolouration permitted. The kernels may be light brown deep ivory or light to deep blue in colour. May be deformed due to immature nuts and may have spots.
DP	Dessert Pieces	Kernels broken into pieces but not passing through 4 mesh 16 SWG sieve.	More shrivelled than those described as SPS and deeply scorched.	
DSP	Dessert Small	Kernels of the same description as above but smaller than DP and not passing through 6 mesh 20 SWG sieve.	"	Cashew kernels shall have been obtained by shelling and peeling cashew-nuts (*Anacardium occidentale*) and shall be reasonably dry and free from insect damage and testa. The kernels may be deeply scorched may have surface speckling and discolouration may be brown, deep ivory or light to deep blue in colour, may be deformed and shrivelled due to immature nuts and may have spots.
DB	Dessert Butts	Kernels broken crosswise and naturally attached	"	
DS	Dessert Splits	Kernels split naturally lengthwise	"	

Tolerance: Up to 10 per cent of the next lower grade at the time of packing.

Appendix 2

Cashew-nut shell liquid specifications

'BP SPECIFICATION'

	Property	*Specification Limits*	*M.O.T.*
1.	Dirt & foreign matter (excluding moisture) (%)	1.0% max	489/1
2.	S.G. @ 25°C	0.955 – 0.975	001/0
3.	Viscosity @ 25°C (centistokes)	600 max	002/0
4.	Iodine value (cgs/g)	22·0 min	402/1
5.	Moisture content (%)	1.0 max	012/11
6.	Polymerisation hardening time (minutes)	7½ – 16	004/8
7.	Ash content (%)	1.0 max	431/2
8.	Polymerisation time with D.E.S.(minutes)	15 – 23	028/0

THE 'IRVINGTON STANDARD'

I Properties

Form	*Liquid*	*Test Method*
Specific gravity	0.943 – 0.968 at 25°C	NTM ‡ ‡ 32
Foreign matter	1.0% max	NTM ‡ ‡ 68
Total volatile	2.0%	NTM ‡ ‡ 69
Viscosity	600 cps at 25°C – max	NTM ‡ ‡ 13
Test tube gel	7 minutes – max	NTM ‡ ‡ 71
pH	6 – minimum	NTM ‡ ‡ 54

II Penalties

Foreign matter: If foreign matter exceeds 1% a % deduction in the price equal to the % in excess of 1% will be made

Total Volatile loss: If total volatile exceeds 1% a % deduction in the price will be made equal to the % in excess of 1%.

Viscosity

600 – 900 cps 1%
900 – 1200 cps 3%
1200 – 1500 cps 5%
Over 1500 cps Rejection

Test tube gel: If the shipment tests between 7 and 15 minutes, 1% will be deducted from the price for each minute over 7 minutes, up to 8%. Over 15 minutes the buyer may reject the shipment.