Introduction:

Cashew is one of the widely accepted Tasteful, Healthy, and Nutritious Dry Fruit in the world. The major Cashew producing countries are Brazil, East & West Africa, India, Indonesia and Vietnam in the world. Among all, India is major Cashew Producer, Processor, Consumer and Exporter in the world. The present world Cashew cultivation area is around 4.80 Million Hectors producing approximately 3.95 Million Metric Tons of Raw Cashew Nuts per year.

India being the number one country for cashew, with more than one million hectares of land under cashew plantation and produces 7.25 Lakh Metric Tons of Raw Cashew Nuts. But, it processes more than double the quantity of produce, at 16 lakh MTs. Out of the of total Cashew Kernel production approximately 40% of Kernels are exported earning Rupees 5200 Crores every year. In addition to export earnings, it also provides lively hood & employment to the rural woman to the tune of more than 3 lakhs. Hence, Govt. Of India giving much stress for cashew cultivation and processing. In India Maharasta, Goa, Karnataka, Kerala in the West Coast and Tamilnadu, Andhra Pradesh, Odisha, West Bengal in the East Coast are major cashew producing and processing states.

Our state Orissa as per Govt, records stands third. But, as per my recent studies we stand second after Maharasta state. At present in our state approximately 1.68 Lakh Hectares of land under cashew cultivation and we produce around 1,00,000 Metric Tons of Raw Cashew Nuts ( RCN ) every year. At present 350 Cashew Processing Units are functioning in our state processing around 1,25,000 MTs of Raw Cashew Nuts per year. Cashew Processing is an Agro Based, Labour & Export Oriented Industry providing approximately 35,000 employments every day, mostly to the rural women throughout the year in our state.
1. USES OF CASHEW:

The cashew tree has been cultivated for food and medicine for 400 years. Cashews have served nutritional, medicinal and wartime needs. More recently, they have been used in the manufacture of adhesives, resins and natural insecticides. During World War II, the cashew tree became highly prized as the source of valuable oil drawn from the shell. Each and every part of Cashew is having good economic value.

Cashew Nut is a peculiar Nut where it remains at the bottom of the fruit. To know better a diagram of cross section of a Fruit with Nut is given below. The cashew kernel is a rich source of fat (46 percent) and protein (18 percent) and is a good source of calcium, phosphorus and iron. It has a high percentage of polyunsaturated fatty acids, in particular, the essential fatty acid Linoleic acid. The tart apple is a source of vitamin C, calcium and iron. The bark, leaves, gum and shell are all used in medicinal applications. The leaves and bark are commonly used to relieve toothache and sore gums, and the boiled water extract of the leaf or bark is used as a mouth wash. A paste of bark ground in water is used in topical applications for the cure of ringworm; in this form it can however act as an irritant and should not be applied to sensitive skin or to children. The root has been used as a purgative. Fibres from the leaves can be used to strengthen fishing lines and nets, and as folk remedies for calcium deficiency and intestinal colic, as well as a vitamin supplement. The water-resistant wood is used for boats and ferries, while the resin, in addition to having industrial uses, is used as an expectorant, cough remedy and insect repellent.

Figure-1

(CUT SECTION OF CASHEW NUT WITH APPLE)
2. Uses & Commercial Value of cashew Kernel:

The cashew nut is constituted of three different portions - the shell, the kernel and the adhering testa (Figure 1). The primary product of cashew nuts is the kernel, which is the edible portion of the nut and is consumed in three ways:

- Directly by the consumer;
- As Roasted and Salted nuts;
- In confectionery and bakery products, for example, finely chopped kernels are used in the production of sweets, ice creams, cakes and chocolates, both at home and industrially, and as paste to spread on bread.

The relative importance of these uses varies from year to year and country to country, but it is estimated that at least 60 percent of cashew kernels are consumed as salted nuts. Separately packed cashew nuts are a good selling line, mainly as an appetiser to cocktail drinks. Salted cashews are part of the snack food market. They compete mainly with other nuts, although chips, salted popcorn and other savoury snacks can impinge on the nut market. The price of cashew nuts is much higher than the price of peanuts or other snacks so that sales must be based on a strong taste preference by the consumer. Cashew nuts are generally considered a luxury product, and an element of their appeal may lie in this status.
3. Uses of cashew nut shell liquid (CNSL):

The cashew nut shell contains a viscous and dark liquid, known as cashew nut shell liquid (CNSL), which is extremely caustic. It is contained in the thin honeycomb structure between the soft outer skin of the nut and the harder inner shell. The CSNL content of the raw nut varies between 20 and 25 percent.

Cashew nut shell liquid (CNSL) is an important and versatile industrial raw material. There are more than 200 patents for its industrial application, in particular, its use as raw material for phenolic resins and friction powder for the automotive industry (brake linings and clutch disks). In drum-brake lining compounds, cashew resins are used as fillers, and may also be used as binders. In disc pads, the role of cashew resin is restricted to the use of friction dust as a filler. The advantage of the cashew resins compared with synthetic phenolic resins is that they are more economical and produce a softer material, which gives a quieter braking action (CTCS, 1993). CNSL is also used in mouldings, acid-resistant paints, foundry resins, varnishes, enamels and black lacquers for decorating vases, and as insecticides and fungicides. In tropical medicine, CNSL has been used in treating leprosy, elephantiasis, psoriasis, ringworm, warts and corns.

Like cashew nuts, CNSL also has an excellent international market and its imports have reached almost US$10 million annually, corresponding to the sale of the raw liquid. However, the exporting country would earn much more foreign currency if manufactured products were exported.

After extracting the CNSL, the cashew nut shells can be burned to provide heat for the decorticating operation or can be used in the manufacture of agglomerates. Together with the testa, it may be used either in the manufacture of dyestuff or to provide durability to hammocks and fishing lines.

4. Uses of cashew apple:

In cashew-producing countries, the nut is only one of the products enjoyed by the local populations. The cashew "apple" or false fruit is an edible food rich in vitamin C. It can be dried, canned as a preserve, or eaten fresh from the tree. It can also be squeezed for fresh juice, which can then be fermented into cashew wine which is a very popular drink in West Africa. In parts of India, it is used to distill a cashew liquor referred to as feni. In some parts of South America, local inhabitants regard the apple, rather than the nut kernel, as a delicacy. In Brazil, the apple is used to manufacture jams, and soft and alcoholic drinks.
5. **Cashew Nut - A versatile health food:**

Cashew nuts pack proteins, fats and vitamins to a high degree. Proteins, the tissue builders in our system, steal a large dividend of cashew contents. Cashew kernels contain 21% of vegetable proteins. Nutritionally they stand at par with milk, eggs and meat. It also contains a high concentration of much needed amino acids in right proportions which is very rare in nuts.

Indian cashews are nature’s proven finest diet. It’s an all time all place snack. It is a storehouse of nutrients. It contains protein 21%, fat 47%, moisture 5.9 %, carbohydrates 22%, phosphorus 0.45%, calcium 0.05%, iron 5% for every 100 gm and other mineral elements. Eating nuts can be very beneficial as long as they replace other foods and are not just added to the diet.

Cashew nut kernel contains 47% fat, but 82% of this fat is unsaturated fatty acids. This is important because no dietician will prescribe a saturated fat packet to any one due to its high cholesterol content. Unsaturated fat eliminates the possibility of, and actually lowers, the cholesterol level in blood.

The most prominent vitamins in cashew are Vitamin A, D and E. These vitamins help assimilate the fats and increase the immunity level. Cashew comprises a surprising spectrum of vitamins and Amino acids in the right proportions.

Cashew kernel is a rich source of minerals like calcium, phosphorus and iron. They protect the human nervous system.

Cashew kernel has a very low content of carbohydrates, almost as low as 1% of soluble sugar which means that you are privileged to a sweet taste without worrying about excess calories. Cashew keeps your waist trim and mouth busy. Cashew nuts do not add to obesity and help control diabetes. It is a good appetizer, an excellent nerve tonic, a steady stimulant and a body builder. All this in addition to an exotic taste.

6. **RAW CASHEWNUT HARVESTING, HANDLING AND STORAGE:**

Cashew nut is handpicked and manually handled in various stages of Operation-right from picking at farm level to processing at factory level and to storage and transportation. To preserve the quality of harvested nuts, it is imperative that proper safeguards are observed against natural and man-made contaminations. Improper post-harvest handling and storage of nuts, such as high moisture, temperature and insect or mechanical damage can influence the incidence of the fungus that produces toxins like aflatoxin. By following proper method of drying fungal infection can be avoided. After drying (to about 8 to 10 per cent
moisture) the nut must be freed from any adhering plant material. Shrivelled and spoiled nuts should be removed which are potential source of fungal infection. Only healthy and matured Nuts should be kept for storage. Quality of Raw nut in harvesting, handling and storage can be ensured by:

1. **Proper Harvesting techniques** - Only matured nuts from fully grown Apple must be harvested.

2. **Proper Drying methods** – Nut should be sun dried immediately after Harvesting / collection. Drying should be on hard ground, preferably, concrete / slate drying yards. Quantity of nuts dried shall not exceed 20kg per sq.mt. Uniform drying can be achieved by constantly turning nuts over to prevent partial / non-uniform heating / drying. Freshly harvested nuts normally require three days of sun drying.

3. **Proper storing methods** – Dried nuts should be stored in jute / sisal bags [80kg nut per bag] and not heaped or stored in silos to avoid warm humid Condition in storage room. Storing in woven HDPE bags are not recommended for storage of raw nuts. While storing it is necessary to provide proper wooden Dunn age to prevent damage to the cashew nut in bags by avoiding direct contact of bags to the Warehouse floor. This can be economically achieved by keeping bamboos, criss-crossed and tied and placed on the warehouse floor. Dried nuts should be stored in well-ventilated, fly-proof place with low Humidity, free of stored product pests and well insulated to prevent water Seepage during rains.

### 7. CASHEW PROCESSING:

There are two types of Cashew Processing 1. Drum Roasting Process & 2. Boiling or Steaming Process. The Drum Roasting process is Polluting yields more Broken Kernels and obsolete. The second process is the Latest Advanced, Economical, Pollution free, yields more wholes and Profitable. The Drum Roasting Process is banned in some states by Govt. hence discouraged and discarded. This Unit had started with Drum Roasting Process since 200. Hence Mr. Subudhi felt the need of the day and the future of his existing unit and decided to set up the latest Technology, Process & maximum possible Automation to his Unit. As day by day new Technologies and New Machines are developed for better Quality & smooth production to meet the demand of both Export & Domestic Market. However a brief idea of latest Boiling Process is given bellow for better understanding of the process.
1. **Steam Cooking**

2. **Shelling**

3. **Borma Treatment**

4. **Humidification**

5. **Peeling**

6. **Grading**

7. **Conditioning**

8. **Filling & Packing**

**1. STEAM COOKING:**
The raw cashew nuts suns dried and stored in the warehouse are steamed in boiler [without steam pressurizing the cooker vessel] for about 20 minutes. The cooking time is varied depending upon the conditions of cashew nut and atmospheric conditions. The steaming
expands the shell, softens the nuts due to penetration of steam into the shell. After steaming, the nuts are air-cured by spreading out on the floor in the shade. These ultimately harden the shell and make it fit enough for de-shelling in the manually operated cutting machine. The steam processing preserves the original colour of the cashew kernel inside the Nut. The cut shells of steam roasting process yield quality Cashew Nut Shell Liquid [C.N.S.L.].

2. SELLING:
The Steam cooked and air-cured Cashew nuts are de-shelled by hand and leg operated cutters. Two workers work on one cutter, one de-shells the nut and the other worker retrieves the kernels from the cut opened shell. The nuts are fed one by one manually between the two sets of blades to fit the Contour of the fixed blade. The pressing of the pedal pierces the Cashew nut on the convex side by means of two blades. The two blades are used to split the nut by operating the handle of the cutter. After de-shelling the nut falls freely due to gravity and is collected beneath the cutter. The operator’s assistant works upon each de-shelled nut and takes out the cashew kernel embedded inside the shell. A pair of skilled worker normally de-shells about 80kg of cashew nuts in 8 hrs, which yields approximately 25 kg. Of Cashew kernel. De-shelling in the mechanical cutter soils the hands of operator, causing corrosion due to C.N.S.L oozing out from the shells due to impact of blades. It is a general practice to rinse the hands with suitable oil, mostly castor oil, to protect the hands from corrosive shell oil. Alternatively, suitable water soluble and washable protective chemical coating like “Kerodex” cream can be applied to the hands for the purpose. In some places workers use wood ash or white cement for the purpose. Even in some places Hand Gloves are used for protection.

3. HEAT TREATMENT OF UNPEELED KERNELS [BORMA TREATMENT]:
The kernels after they are removed from the shells have to be dried in order to loosen the red skin adhering to the kernel for easy peeling. A few processors adopt conventional tray drier commonly known as “Borma”. The borma chamber outer sides are heated by means of flue gas generated by burning oil-extracted shell-cake at the bottom. The inner chamber heats up by radiation of heat. The above system is becoming obsolete due to poor heat transfer efficiency. In the absence of air-circulation inside the chamber, heating is non-uniform. This results in over heating of kernels causing scorching of kernels in spite changing of trays and turning the kernels in the trays periodically. The conventional “Borma” is presently replaced by more efficient Cashew Shell waste operated tray driers. This system ensures uniform heating of kernels for a pre-set temperature [80°C] and time [6 to 7 hours] by means of reliable electronic controller and timer. This system reduces the heating time considerably and does not requires periodic changing of trays during
heating, as uniform heat is maintained throughout the drier by forced air circulation. This system preserves the original colour of the Cashew Kernel and quality consistency is achieved within a batch and in every batch treated.

4. HUMIDIFICATION OF UNPEELED CASHEW KERNELS:
The Borma treated Cashew kernels are humidified [Moisturized by water-mist] by means of electrical humidifier]. The Cashew kernels in trays are kept in trolleys are humidified in a closed room for a period depending on the atmospheric conditions and moisture level of Cashew kernels. The treatment time varies anywhere between 15 mts to 20 mts. Depending on the condition of the Cashew kernels under treatment and climatic conditions. The brown skin [Testa] of the humidified kernels undergoes shrinkage due to sudden cooling. This helps to dislodge the hold [Adhesion] of skin to the kernel.

5. PEELING OF CONDITIONED CASHEW KERNELS:
The Cashew kernels conditioned as above is now ready for peeling. Peeling of the Testa is done manually; usage of sharp edges of knife is discouraged as it causes scraping of kernels. Scrapping marks [spoils] the look of the Cashew kernel and is more pronounced after oil roasting. However knives are very selectively used on a very small quantity of Cashew kernel, whose skin does not peel off easily in manual peeling. Major classification / grading of kernels into wholes, broken and rejections are done at this stage. A skilled labourer can peel approximately 6 to 8 kg. in a day.

6. GRADING OF CASHEW KERNELS:
The peeled kernels are manually graded in natural light by skilled labour. The Cashew kernels are graded on the basis of shape, size and color. International specification and standard for grading are widely followed in the industry. The colour grade chart officially issued by the Cashew Export Promotion Council of India serves as a guide for colour grading. Normally a skilled laborer can grade anywhere between 20 to 25kg. Of Cashew kernel per day depending upon grader’s skill and the size of the kernel being graded. For grading broken into LWP, SWP, SSP and BB graded mechanized wire-mesh sieves are used.

7. CONDITIONING OF GRADED CASHEW KERNEL:
The moisture percentage permitted in the graded Cashew kernel is 5% max. By weight at the port of importation. While a moisture level above 4% at the time of final packing is not preferred as the same may cause fungi and aid infestation, low moisture level below 2% is undesirable as it causes breakage of kernel during processing and shipment. Processors by and large control the final moisture level up to 3%. Cashew kernel are humidified to increase moisture percentage to the required level, heat treated to reduce the excess moisture before final packing.
8. FILLING AND PACKING:
The graded and moisture conditioned cashew kernel are filled in 18Lt/square tins, 25lbs (11.34kg) or 10 kg to a tin as per requirement. The Cashew kernel is fed into the vibratory filling machine. 4 or 8 Tins (Leak tested and Tar weighed) are filled at a time. Filled tins are then weighed for a net weighed of 11.34 kg or 10 Kgs plus or minus Maximum 10 gms using electronic weighing scale. The weighed tins are “Vita Packed”. Vita packing is the process of vacuumising and injecting an inert gas viz. Carbon-Di-oxide or Nitrogen into the cashew kernel filled tins. The gas infused tins is hand-soldered hermetically using lead free solder. Two tins are packed in a unit carton and strapped and stencil marked for sale. The consignment is shipped after per-shipment inspection formalities if sold in Export Market.

9. Modern Packaging:
Cashew Kernels are being packed in Multilayer Flexible Pouches; Gas Flushed and Sealed – 25 pounds net per pouch. All importers in USA and Europe prefer this system of packing. Recently Consumer Poly Packs of different weight like 250 gram, 500 gram are packed for value addition and attraction. For which Sophisticated Automatic Pouch Packing Machines are now available. But for the time being we are here going for simple Hand Operated Pouch Packing. Recently CFTRI Mysore have developed some techniques of Processing & Packing for Value Additions in different way.

10. Hygiene & Quality Maintenance:
Because Cashew Processing is Labour Intensive, hence proper care should be taken during every step of processing sanitation point of view. In our country Mangalore stands first for their quality maintenance and for hygiene. The workers are supplied with Caps, Aprons & Gloves etc during processing. Instead of working in sitting on ground floor, Peeling & Grading are done on Stainless Steel [304 S.S. Sheet] Top Tables and sitting in chairs. By which the quality is maintained and the colour of Kernels remains full white. Always the colour plays a major role in determining the price of Cashew Kernels.

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