FST 510: NIGERIA'S FOOD AND INDUSTRIAL RAW MATERIALS
COURSE OUTLINE

1. Classification of Nigeria's food and agro-industrial raw materials.
2. Constraints to local raw material utilisation.
3. Local sourcing of raw materials: problems and prospects; processing characteristics and requirements; quality evaluation and specifications for household/industry use.
4. Resource utilisation.
5. Nutritive value of Nigeria's food raw materials.

Classification of Nigeria's Food and Agro-Industrial Raw Materials

Introduction

The Food and agriculture industry produce a large range of primary agricultural products and processed foods contributing to feeding most of the world population.

It encompasses the entire agricultural supply chain, from producing raw materials to processing and distributing food products, with a focus on efficiency, sustainability, and food security. Agro-industry comprises all postharvest activities involved in the transformation, preservation and preparation of agricultural production for intermediary or final consumption. Agro-industry plays a fundamental role in the creation of income and employment opportunities in developing countries.

Classification of Foods

The basic five groups

Group One - Milk and Milk Products: This group is made up of all dairy products, including fresh milk, skim milk, buttermilk, condensed milk, powdered milk, local and foreign cheeses, butter, yoghurt, and ice cream. This group is valued particularly for its calcium, magnesium, riboflavin, cobalamin, and high-quality protein but is notably low in iron and ascorbic acid.

Group two - Meats, Fish, Nuts, and Beans: This group includes meats, poultry, fish, snails, shrimp, eggs, legumes (pulses), seeds, and nuts. They are good sources of energy, protein, iron, and B-complex vitamins.

Group three - Cereals and grains: The separation of cereals and grains from the tubers, roots, and starchy fruits is based on the differences in their ease of storage and protein content. Despite being of plant origin, the group-three foods contribute not only carbohydrates but also the B-complex vitamins, iron, magnesium, and generous amounts of protein and energy to the diet. Examples of foods belonging to this group are bread and other wheat products such as Semovita, rice, maize, guinea corn, and millet. As a group, cereals constitute the most important food for peoples all over the world. However, cereals are deficient in lysine and the sulphur-containing amino acid.

Group four - Roots, starchy fruits, and tubers: Examples of foods in this group are yams, sweet potatoes, cassava, plantains, and breadfruit. They are readily perishable and cannot be

stored for long periods of time. They are mainly starchy foods and major sources of readily available energy, with high caloric densities.

Group five - Fruits and vegetables: This group provides nutritionally important quantities of the water-soluble vitamins, especially folic and ascorbic acids, carotene, and minerals, as well as contributing dietry fibre to the diet. Fruits have low protein content, while the protein content of vegetables, often ignored, may be significant. The common fruits include mangoes, pawpaws, guavas, coconuts, oranges, grapefruits, tangerines, bananas, pineapples, etc. The common vegetables include spinach, mushrooms, pumpkins, onions, okra, collard greens, bitter leaf, water leaf, carrots, tomatoes, cabbage, and lettuce. However, many of these are still regarded only as optional supplementary foods due to their seasonality and relatively high cost.

In general, the group-three foods (cereals and grains) and group-four foods (roots, starchy fruits, and tubers) constitute the largest portion of the typical Nigerian diet.

Limitations to the basic five groups' classification system include:

i) Foods like alcohol, sugar, cooking oils, soft drinks, margarine, and several components of African soup, which are either high in fats and oils or sugar but low in other nutrients, have not been included.

ii) The nutritional needs of every individual in the population cannot be met by the classification.

iii) It is not all food items available in a complex, multinational country like Nigeria are encompassed by this classification system since these usually do not follow the nutrient pattern of any one food group.

iv) The foods of certain ethnic groups within the society may not meet any reasonably simple classification, and these have to be left out.

III. Others

In view of the above limitations, other food classification systems are in existence. One of such is the classification of foods into 13 groups:

i) Cereals and their products
ii) Starchy roots, tubers, and their products
iii) Legumes and their products
iv) Vegetables and their products
v) Fruits and their products
vi) Nuts, seeds and their products
vii) Meat, poultry and their products
viii) Eggs and their products
ix) Fish and their products
x) Milk and their products
xi) Fat and oils
xii) Beverages
xiii) Miscellaneous

Agro-industrial Raw Materials

Agro-industrial raw materials are the agricultural products used as inputs in industries that process them, such as food processing, textiles, and pharmaceuticals, examples include grains, fruits, vegetables, and livestock. Agriculture and industry occupy very strategic positions in the development process of the Nigerian economy. Agriculture which is the dominant sector of a developing economy employs two third of the poor located in the rural sector. It therefore needs a boost towards rapid development and productivity in a linkage with the industry.

According to Raw Materials Research and Development Council (RMRDC, 2009), the agricultural raw materials could be grouped as:

(i) Cereals: maize, sorghum, rice, millet, wheat, barley

(ii) Legumes: beans, soybeans, groundnut, bambara nut, melon

(iii) Roots and Tubers: cassava, potato (sweet, orange, irish), yam, cocoyam

(iv) Horticultural crops: citrus, plantain, banana, mulberry, soursop

(v) Tree crops: cocoa, kolanut, coffee, coconut, oil palm, cashew

(vi) Industrial crops: sugar cane, walnut, tea, sunflower, benne seed, sesame seed, ginger, shear nut, locust bean, castor bean.

(vii) Livestock and fisheries: terrestrial, fresh and marine resources such as rabbit, poultry, cattle, sheep, goat, fish, shrimp, etc.

Raw materials can be divided into four (4) major classes:

- Unprocessed agricultural products: which are usually in their natural state e.g. cassava, yam, grains, fruits, vegetables etc.
- Semi-processed agricultural products: in form of dry-cocoa beans, dry sugar, pasteurized milk, grain flour, cocoa mass, malted grains etc.
- Finished products:- of a particular industry can serve as material or ingredient for another industry e.g. refined granulated sugar, starch, ascorbic acid, flavour etc.
- Bye-product or effluent of an industry can serve as input for another industry e.g. molasses can be used for the production of alcohol and yeast, while biscuit dust can be used for the production of animal feed.

Nigerian Food Industries

In Nigeria, the food processing sector is dominated by small and medium enterprises, as well as multinational food companies. The food and beverage industry is virtually the largest of all the sectors of Manufacturers' Association of Nigeria (MAN).

Food and beverage industries constitutes various sub-sectors such as brewery, soft drink, flour-mill, cereal and bakery products, dairy products, animal feeds (livestock and fishery), meat and meat products, tea and coffee, sugar and sugar confectioneries, margarine, edible oils, root and tubers, fruits and vegetables, spices and flavours. The Nigerian food industries can be divided into two major categories:

- Milling industries: flour mills, rice mills, edible oil mills etc.
- Processing industries: beverages, cereal products, dairy products, confectionery, fruit and vegetable products, meat and poultry products etc.

The milling industries require mainly agricultural products and the outputs are generally finished products offered for sale as domestic food items after suitable food packaging.

The food processing industries require derivative secondary produce, in some cases, require tertiary forms of agricultural and synthetic raw materials.

There are three (3) broad categories of raw materials namely: Primary agricultural produce, Secondary and Tertiary raw materials.

Primary agricultural produce: A primary agricultural product is a crop or commodity that comes directly from the land and is sold or consumed as it is found in nature.

Examples of primary agricultural products:

- Cereals, such as wheat, maize, and rice
- Roots and tubers, such as cassava, yam, and potatoes
- Oil crops, such as cotton and soybeans
- Fruits, such as oranges
- Vegetables, such as tomatoes
- Sugar crops
- Nuts

Characteristics of primary agricultural products

- They are harvested directly from the land
- They have not undergone much processing, apart from cleaning
- They retain all their biological qualities from when they were still on the plant

Secondary Raw Materials: Secondary agricultural goods are treated products from primary agricultural goods. They are semi-processed raw materials that have just received minimal or sufficient value-addition e.g. leave powders, grain flour.

3. Tertiary Raw Materials: these are somewhat finished products at a particular level of production which may find other uses in different industries as starting materials or ordinary ingredients e.g. processed natural extracts such as biological sweeteners, flavors, beta-

carotene. Tertiary raw materials involves materials for enhancement and nourishments in the form of additives and preservatives.

KEY RAW MATERIALS USED IN FOOD INDUSTRIES

S/N	SECTOR	PRIMARY	SECONDARY	TERTIARY
1.	Beer/Brewery Industry	Barley, sorghum, maize, rice	Sugar, enzymes	Hops and additives
2.	Soft drinks	-	Sugar	Concentrates
3.	Cereals and Bakery products	Wheat, maize sorghum, cassava flour, starch, other cereal flour.	Sugar, enzyme	Salt, flavour additives, vitamins
4.	Dairy products	Fresh milk/milk powders	Milk fat or vegetable fat, butter oil, enzyme, dextrose	Flavours, vitamins
5.	Cocoa and Chocolate products	Cocoa powdered, milk, sugar glucose, corn starch	Egg powder	-
6.	Wine and Distillers	Grape fruits, molasses, palm wine, concentrate, flavouring	Other fruits	Preservatives
7.	Animal feed	Maize, soybean, cassava, oil seed, cake, spent grains	Other cereals, offals, additives	Supplements (vitamins and minerals)
8.	Tea and Coffee	Tea leaves, coffee beans, lemon grass	Chicory	-
9.	Sugar and sugar confectionery	Sugar cane, glucose, cassava starch	Gum arabic, enzyme	Colouring, flavourings, essential oils.
10.	Fruits and vegetable products	Fruits, vegetables, fruit concentrates	Essential oils, sugars	Flavourings preservatives
11.	Spices anf flavouring	Hydrolysed vegetables, nitrates, locust bean, pepper, ginger	-	Flavours, extract of spices from leaves
12.	Meat and fish products	Cattle, beef fish, pork, poultry, shrimps	Snail, osyster, games	Nitrates, extenders, additives, vegetable oil, preservatives.
13.	Margarine and edible oils	Oil seeds (g/nut, soybean, sun flower, oil palm etc)		
14.	Root and Tubers products	Yam, cassava, Irish potato etc.	-	Preservatives
15.	Flour millers	Wheat, maize ,sorghum etc.	-	Preservatives
16.	Miscellenaous	Plantain, banana, sweet corn, other staple food.	-	Preservatives.

SUBSTITUTES OR ALTERNATIVES FOR IMPORTED RAW MATERIALS IN NIGERIA

S/N	IMPORTED RAW MATERIAL	LOCAL SUBSTITUTE
1.	Malted barley	Maize, sorghum, rice
2.	Hops	Bitter leaf
3.	Egg powder	-
4.	Enzymes	Malted grains for production of specific enzymes
5.	Additives	-
6.	Wheat/wheat flour	Local wheat production but inadequate
7.	Milk/milk powder	Local fresh milk (inadequate), soy milk
8.	Fat and butter oil	-
9.	Flavouring	Local flavours for specific flavours.
10.	Corn starch	Modified cassava flour
11.	Gum base	Gum Arabic (need to be processed into well acceptable form)
12.	Fish, meat and poultry	Local production (inadequate)
13.	Tea leave	Use of other leaves such as lemon grass (inadequate)
14.	Dextrose, glucose	Local sources available. Hydrolysed cassava starch but inadequate
15.	Hydrolysed veg. oil	Soybeans, groundnut, locust beans.

Constraints to Local Raw Material Utilisation

The performance of the manufacturing sector is dismally low. Currently, capacity utilisation of factories is about 40%, compared to a desired 70% (AfDB, 2023). The manufacturing industries in Nigeria are faced with myriads of problems which include:

- Inconsistent and insufficient supply of raw material: The locally source materials are not readily availability in term of production. There are no large-scale agricultural projects that can competitively produce enough for food manufacturing industries. Chi Company imports orange for production. FrieslandCampina WAMCO sources some of its raw milk from herders in Oyo State, South-West Nigeria, only a small percentage of raw milk is sourced from the company's five milking plants in Oyo State.
- Cost challenges: high operational costs that make cost manufacturing at 45 % higher than the world averages, causing a 'dead on arrival' position of made-in-Nigeria goods.
- High cost of infrastructure: About 90% of passenger and freight movements in Nigeria rely on roads but only 18% of the roads are paved.
- Multiple taxation.
- Social challenges: certain social factors that are peculiar to Nigeria and which negatively affect the utilisation of local raw materials include:
  i. Attitudes towards imported and made-in-Nigeria products.
  ii. Insecurity to life and property as a result of activities of hoodlums and robbers, religious crisis, insurgencies, militant activities, kidnapping etc.
- Poor policy articulation: Improper policy articulation encompasses poor support, policy uncertainties/inconsistencies or failure of agricultural policy.
- Lack of appropriate technology: use of inappropriate technology (too sophisticated or obsolete) will impede optimum utilisation of raw materials and other resources.
- Climate change: Most of the agricultural activities are in the hands of local farmers who depend on rains for their crops. Climate change has resulted into unpredictable weather, plant diseases and insects, among others. Climate change also has adverse effects on animal husbandry.
- Seasonality of crops.
- Poor quality of raw material supply and high losses during transport from farm to factory.
- Inappropriate or obsolete processing and ancillary equipment.
- Poor and inconsistent quality of processed products.
- Poorly trained personnel and a lack of qualified food technologists/handlers.
- Lack of proper hygiene and sanitation practices.
- Inappropriate packaging materials and high packaging cost.
- Weak or non-existent market development.
- Lack of technical support for the agro-industrial sector.
- Absence of good management of the processing facility once commercialized.

Local sourcing of raw materials

Raw materials can be sourced from various sources - primary producers, intermediate suppliers, anonymous commodity markets etc. Approaches popularly employed by the Nigerian industries include:

i). Direct sourcing

ii). Indirect sourcing,

iii). Combination of (i & ii)

Direct sourcing

This is a process of sourcing industrial input directly from the local producers, i.e. a farmer, farmer's organization and other primary industries, etc.

Primary industries – create the basic materials for use in other industries. They may be involved in major businesses such as:

i). Agricultural farming: – cultivation, growing and harvesting of crops (e.g. food crops, medicinal plants etc), as well as animal rearing.

ii). Wild-crafting: – sourcing of raw materials input from the bushes, forests or an uncultivated fields) and

iii). Others: - horticulture, aquaculture, fishing, mining, agribusiness etc.

Direct sourcing: Basic Requirements for Industries in direct sourcing of raw materials

1. Industries must have established raw materials purchasing department (in line with quality system organization").
2. Must have adequate structure for monitoring the specifications of raw materials to ensure consistency.
3. Robust record keeping and mechanism for self-auditing / self-assessment.
4. Qualified personnel who are knowledgeable about natural resource management and conservation of nature.
5. Adequate level of manpower. Good provision for regular training.

Indirect sourcing

This is method of sourcing of raw materials through an agent. Supplier's code is always required – to provide the specific terms and conditions for raw materials specification / standard. Raw materials supply could be outsourced to an agent through the various means stipulated below:

1. Contractual appointments (with farmers or corporate bodies).
2. Use of cooperative societies.
3. Individual suppliers.

Qualities of good sourcing agent

1. Should be a qualified (trained) person and knowledgeable about the job.
2. Should have the basic information about quality system / industrial manufacturing.
3. Should possess good level of experience in raw materials processing, handling and harvesting practices.
4. Should be compliant and able to adhere to the basic guidance, ethics and rules in good agricultural / natural conservation practices, etc.
5. Ability to assess quality of raw materials, ensuring that right specifications are supplied.

Role of Government in Promoting Local Raw Materials

Government has a great influence on the utilisation of local raw materials by industries. It is desirable that Government encourages industrial utilisation of local raw materials (especially those ones where Nigeria has comparative advantage) by stabilising the policy environments to the benefits of industries. It is especially important that Government gives duty and tariff concession for those items that industries have to inevitably import, and that multiple taxation are avoided.

The Federal Government of Nigeria in her quest to promote utilisation of indigenous raw materials is involved in a number of things/activities. Some of them are:

1. The establishment of Agencies and Research Institutes:

- Raw Materials Research & Development Council
- Forestry Research Institute of Nigeria
- National Institute for Oil Palm Research
- National Horticultural Research Institute
- National Cereals Research Institute
- Nepal Agricultural Research Council
- National Sugar Development Council
- National Agricultural Land Development Authority
- Cocoa Research Institute of Nigeria
- National Root Crops Research Institute
- National Stored Products Research Institute
- Rubber Research Institute of Nigeria
- National Animal Production Research Institute
- National Institute for Freshwater Fisheries Research
- National Institute of Marine Research

2. Formulation of appropriate policies: Policies are statements of the Government which serve as guides to present and future actions. Government, has in recent years, formulated a number of policies to boost indigenous raw material utilisatation in the country. These policies include:

- Executive orders: These are Presidential statements aimed at giving directives on the type of actions to be taken by people or establishments. A relevant example is the Executive Order No. 5 for development of local content in Science, Engineering and Technology by which all Ministries, Departments and Agencies of Government were directed to engage indigenous professionals in the planning, design and execution of national security projects and maximise in-country capacity in all contracts and transactions with science, engineering and technology.
- Statements from the Central Bank of Nigeria (CBN): CBN often makes statements aimed at boosting the country's economy. These statements become binding on the relevant individuals or organisations. For example, the Trade and Exchange Department of CBN had once directed that some goods and services (such as rice, margarine, vegetable oils, meat and processed meat products, poultry, etc) be excluded from the list of items valid for foreign exchange in the Nigerian Foreign Exchange Markets. This was done in a bid to encourage the local production of the items.

3.Taxation: The Federal Government of Nigeria has drawn certain fiscal measures to provide for deductions and allowances in the determination of taxable income of manufacturing enterprises. A few of such fiscal policies are:

- Pioneer status: a concession to pioneer companies located in economically disadvantaged areas. Such companies, which must be beneficial to the country's economy and in the interest Nigerians, are given a tax holiday period of 5 to 7 years. Companies that are involved in local raw material development; local value added; labour intensive processing; export oriented activities; in-plant training; are also qualified for additional concessions.
- Tax relief for research and development (R&D): Up to 120% of expenses on R&D are tax deductible provided that such R&D activities are carried out in Nigeria and are connected with businesses to which allowances are granted. The result of such research could be patented and protected in accordance with internationally accepted industrial property rights.
- Local raw materials utilisation: 30% tax concession for five years is given to industries that attain minimum local raw materials utilisation as follows: agro 80%, agro allied 70%, engineering 65%, chemical 60%, petro-chemical 70%.
- Labour intensive mode of production: Up to 15% tax concession for five years. The rate is graduated in such a way that an industry employing one thousand persons or more will enjoy 15% tax concession while an industry employing one hundred will enjoy only 6%, while those employing two hundred will enjoy 7%, etc.
- Local value added: Up to 10% tax concession for five years. This applies essentially to engineering industries, while some finished imported products serve as inputs. This is aimed at encouraging local fabrication rather than the mere assembly of completely knocked down parts.
- Interests on agricultural loans: Nigerian banks have been directed to charge low interests (usually less than 10%) on loans taken for agricultural and manufacturing purpose. Even then, the Government has Specialised Banks, such Nigerian Industrial Development Bank, which gives loans to manufacturing and agricultural establishments.

4. Provision of infrastructural facilities: Government is expected to provide enabling infrastructural facilities for effective utilisation of local raw materials. These facilities include:
(i) adequate and reliable public electricity from the national grid
(ii) good roads and road network
(iii) railway infrastructure
(iv) developed water ways
(v) good communication service.

Resource Utilisation

The way and manner the resources required by an enterprise are handled goes a long way in determining the success of that enterprise. The cost of input, supply and utilisation of input should be managed so as to maximise production and profit, while minimising cost of production.

Resource and raw material utilization refers to the efficient and effective use of natural resources and raw materials in various economic activities, with a focus on minimizing waste and maximizing productivity. This involves not only using resources wisely to produce goods and services, but also considering the environmental and social impacts of resource extraction and consumption.

Resources or materials refer to all commodities that are consumed in the process of manufacture. They are things that can be stored, stacked or stockpiled.

Materials could be divided into two;

- Direct materials
- Indirect materials.

Direct materials are those materials whose consumption may be traced to, or identified with specific production units and which usually become a part of the finished product, e.g. raw materials such as wheat flour and sugar for bread, product components such as colouring in juice, primary packaging material such as PET bottle for soft drinks.

Indirect materials are those materials which cannot be conveniently traced or identified with individual units, e.g. fuel used in powering the generators, and detergent used in cleaning the machines.

Some terms associated with resources

(i) **Inventory**: In raw material utilization, inventory refers to the raw materials a company has on hand that haven't been transformed into finished products. These materials are the basic components used in the production process,orange for the production of fruit juice. Effective raw material inventory management ensures smooth production, prevents shortages, and minimizes carrying costs. This term refers to:

(a) Raw materials: primary inputs purchased in either raw or processed forms.

(b) Bulk materials: aggregate of units of materials.

(c) Work-in-progress inventories: semi-manufactured products, which have to be further worked upon to become fit for sale.

(d) Finished parts: are items or sub-assemblies, put into store awaiting final assembly or sale as spares.

(e) Finished goods: are completed products awaiting sale or dispatch.

(f) Supplies: include office and plant cleaning materials, oil, fuel, light bulbs, etc. These materials do not directly enter production, but are necessary for production process.

Inventory serves as a link between the production and consumption of goods. This is because stock of raw materials facilitates production while stock of finished goods is required for smooth marketing operations. Proper management of inventory is essential to the success of an enterprise.

(ii) **Material losses:** can occur during handling, processing or storage. Such losses or wastages are classified into two; normal loss and abnormal loss. Normal loss is the type of

loss which is inevitable, e.g. loss due to evaporation, loading and off-loading, breaking the bulk (when materials are purchased in large quantity and issued to production in small lots. Normal losses of material though cannot be completely eliminated, can be controlled/reduced to a large extent. Abnormal loss is that loss which arises due to inefficiency in operations, mischief, carelessness, etc. Examples of causes of abnormal loss are theft or pilferage, breakage, fire/accident/flood, use of inaccurate weighing instruments, improper storage resulting in deteriorating of materials.

Material losses may result in the following:

(a) Waste: This is the portion of a basic raw material lost in processing, having no recovery value. It may be visible or invisible. Visible waste is that waste which could be seen, while invisible waste is the disappearance of basic raw material in the form of evaporation, smoke, etc. Waste, has the effect of reducing the quantity of output, and should therefore, be reduced to the minimum. Allowance for normal waste should be made on the basis of past experience, technical factors, and any special features of the material, product, and process. Workers should be held responsible for wastes above a specified maximum level. A waste report should therefore be prepared periodically to compare the actual waste, with the predetermined waste.

(b) Scrap: It is the incidental residue from certain types of manufacture, usually of small amount and low value, e.g. peels during cassava/yam peels, bread crumbs. Scraps do not need further processing in order to realize its saleable value, cannot be used as a material for its original purpose. Unlike waste, scrap is always physically present. Due to the facts that scrap forms part of production cost, measures should be taken to minimise its occurrence. Such measures include setting standard or limit, determining responsibility, and keeping proper records/reports at regular periods.

(c) Spoilage: Materials damaged during manufacturing operations in such a way that they cannot be rectified and brought back to normal specifications. Spoilage occurs due to some avoidable abnormalities in materials/items used in production, while scrap unavoidably arises from manufacturing operations. Spoiled work may have realizable value. Spoilage could be normal or abnormal.

(d) Defective work: is that production which is below standard specifications or quality, and can be rectified by incurring additional expenditure (of materials, labour, etc) known as rectification costs. While spoilage cannot be rectified and sold as good units, defective work can be rectified by incurring additional costs and brought back to the level of standard product.

(e) Slow moving materials: are the materials with a low turnover ratio, i.e., their rate of consumption or sale is low, when compared to their stockholding. Stocks of such material should be maintained at the lowest levels.

(f) Dormant or non-moving materials: are materials which at present have no demand due to seasonal variation. However, there is possibility that in future, such materials may be required.

(g) Obsolete materials: are those materials which have become useless with the passage of time, due to, for example, change in the design of the product or methods of production. These materials are no longer in vogue due to a better substitute or the products that the materials are needed are no longer in the market. Obsolete materials should be scrapped or discarded (if it has no scrap value).

Factors affecting the selection of equipment, plants or other machines

Proper selection of equipment, plants or other machines is an important aspect of economic production, some factors which should be considered in their selection are:

(i) Suitability of job conditions
(ii) Size of equipment/machine/plant
(iii) Standardisation
(iv) Availability of equipment in the market
(v) Availability of spare parts
(vi) Availability of know-how
(vii) Economy of production
(viii) Reliability
(ix) Service support
(x) Ease of operation and acceptability to the operators
(xi) Ease of maintenance
(xii) Past performance, experience, and reputation of manufacturer
(xiii) Use of standard components and assemblies in the equipment/machine/plant.

Equipment replacement policy analysis in entrepreneurship

The three types of equipment replacement decisions that an entrepreneur may need to make are:

(i) The replacement of capital equipment as it wears out
(ii) The capital equipment required for expansion
(iii) The replacement of old technology by the new.

The three main reasons for the replacement of equipment are:

- Deterioration
- Obsolescence
- and inadequacy.

The following are the guidelines for replacing equipment:

(i) Financial consideration: It is important that for equipment that is in use, an entrepreneur considers the operating cost, downtime cost, rebuilding cost, repair and maintenance cost, salvage value. It is also imperative that the entrepreneur does not consider original cost, unrealistic book value and money already spent on repair and maintenance for equipment in use. For new equipment, the following factors are essential to be considered: initial cost, salvage value at the end of useful life, labour savings, and interest on capital invested.

(ii) Technical consideration: it is important to consider the following:

- status of present equipment, i.e. whether or not it is worn out completely.
- whether or not the present equipment has become obsolete.
- whether or not the present equipment is inadequate in meeting the production rate.
- whether or not the new equipment is easier to handle and safe in operation.
- whether or not the new equipment is better from working condition point of view (noise pollution, air pollution, vibration, etc).
- whether or not the new equipment require less maintenance.

Factors influencing decision to buy:

(i) Volume of production
(ii) Cost analysis
(iii) Utilisation of production capacity
(iv) Integration of production system
(v) Availability of manpower
(vi) Secrecy or protection of patent right
(vii) Fixed cost
(viii) Availability of competent suppliers or vendors
(ix) Quality and reliability of vendors

Spare parts issue

A spare part is the part identical to the part of a machine which needs to be replaced, may be due to wear and tear during the operating life of equipment. It is important that spare part replacement is well managed, as it goes a long way in determining the existence of an enterprise. Issues such as right time, right price, right contract, right source, right quality, and right procedure should be paramount when procuring spare parts. Good spare part management aims to provide the right parts of right quality, at the right time and cost; and also to obtain optimum results (maximum availability with minimum total cost).

Factors that affect spare parts planning and management include:

(i) Usage rate and equipment life
(ii) Service level
(iii) Type of maintenance system adopted
(iv) Lead time for procurement
(v) Category of spare parts (moving or non-moving spare parts; overhaul spares i.e. spares used to carry out regular overhauls of the equipment in order to give a new lease of life; regularity of use of spare parts e.g. belt, bearings, oil seal; insurance spares i.e. vital parts which are not normally required to be changed and has life equal or more than that of the equipment/machine itself; etc)
(vi) After-sale service of equipment by its manufacturer
(vii) Location of project
(viii) Cost

In buying the spare parts, decisions to use original equipment manufacturer's (OEM) component/parts or the generic (which are often less expensive) may need to be made. This decision is affected by a number of factors, including:

(i) Installing a generic replacement part probably will void the equipment warranty.
(ii) The use of generic replacement may modify the original design just enough to increase its fire risk when appliances have thermostats or electric elements.
(iii) A generic part may not perform the same way as an OEM part. For critical tasks such as holding foods at certain temperatures, this could be a problem.
(iv) The durability of the appliance may be compromised with the addition of a component that was not specified by the manufacturer, causing other parts to fail sooner than expected.
(v) A generic part may require the equipment to use more energy.

In view of the foregoing, the rule of the thumb is a compromise, i.e., purchase items that do not affect the inner workings of a piece of equipment (e.g. fryer basket, oven racks, gaskets, springs, cast-iron grates) as generics, but purchase anything that is used in a motor, cooling, or heating device from an OEM source.

Financing Resources Acquirement

The issue of finance is always crucial at every stage of an enterprise. Finance could be in form (i) in-fixed capital for fixed or block assets, which usually requires long-term investment and (ii) in-working capital for working assets or operational expenditure, which requires investment on medium- or short-term basis.

Finance requirement (nature and source) will depend on the size, nature (manufacturing, trading or service) and stage of a business. In order to ascertain finance requirement, an entrepreneur must draw up a capital budget (which must be as accurate as possible), analyse the relative merits and demerits of the available fund, and choose the best that suits him/her.

Capital structure (type and ratio of funding from different sources that a business uses) may be influenced by such factors as:

(i) Funds required for both fixed and working assets.
(ii) Ability to raise funds from both internal and external sources.
(iii) Other probable means of project financing.
(iv) Cost of raising funds from different sources, especially external.
(v) Procedural formalities and paper work involved in securing finance from different sources.
(vi) Funds expected from different sources.
(vii). Form of ownership (of new firm) in view.

The five main means of financing a new venture, including equipment purchase, are:

(i) Equity finance or own capital: This is the investment contributed singly by owner (sole ownership) or jointly by co-owners (partnership, including stockholders or shareholders), and which is owned by and retained permanently in a business. Equity finance could be:

(a) Personal resources (residence, vehicle, furniture, telephone, post office box, national savings certificate, life insurance policies, certificate of occupancy, etc)

(b) Private borrowings from close relatives, friends and business associates. Some of these people may want to become partners;

(c) Informal capital in which some individuals lend their surplus idle cash for higher returns. Here, such lenders are often enticed by the huge returns on their investment without considering the risks involved, and without requesting that they become partners or co-owners

(d) Corporate securities in which large companies raise capital from institutional as well as individual investors through corporate securities.

Corporate securities are divided into two groups, viz,

(1) Ownership securities, or equity shares and preference shares.

(2) Creditorship securities or debentures and bonds. In the corporate sector, a private limited company can raise its own capital privately (from among its limited constituent shareholders) while a public limited company may raise its own capital through issues of ownership securities made publicly, debt financing (also known as loan capital) against medium/short-term borrowings from various external sources including banks, financial institutions and

non-banking finance companies or against long-term creditorship securities like debenture and bonds.

(ii) Internal financing: This is when a company uses its reserves and surplus for its sustainable growth and wealth creation. This is done by not distributing all its profits and retaining a part of its earning (ploughing back of profits) or by creating depreciation funds at higher rates than what may be normally necessary; the surplus amount available from depreciation funds usually adds to a firm's own capital. Newly established enterprises benefit greatly from internal financing since they often find it difficult to raise fund from external sources.

In big companies, reserves and surplus funds which have been accumulated over time are distributed among equity shareholders as bonus shares. Bonus shares help increase the net capital (total assets less current liabilities) of business, enhance the market values of shares, make better investors' confidence and improve business goodwill. Issue of bonus does not bring any fresh capital from investors, but enables a company to restructure and strengthen its equity, i.e. own capital base.

(iii) Debt or loan finance, or borrowed capital: comes into play in situations where the capital required is not of ownership or permanent nature. It is obtained as loan at a pre-determined rate of interest, and it could be in form of debt (long-term), loan (medium-term) and borrowed funds (short-term), which are generally obtained by means of creditorship securities, borrowings from institutional sources and/or non-institutional arrangements. Other sources of loans available to big companies include sale of commercial papers, inter-corporate deposits, loans from commercial institutions, commercial banks and non-banking finance companies, public deposits, etc.

(iv) Delayed settlement of credit: a mutual agreement in which a company delays settlement of a supplier for a specified period. It may be difficult for a new business to acquire this grace. Defaulting may lead a damage of market reputation, apart from a legal action that could be instituted by the supplier.

(v) Venture capital: is the money obtained from private investments or public investment funds directed to high-risk and high-potential enterprises. This means that venture capital refers to the money needed or available for investment in a risky but profit-making or speculative business, with the expectation of above-average returns. Venture capital schemes are mainly aimed at providing;

(a) seed capital to help entrepreneurial take-off;

(b) developmental finance needed to maintain and accelerate early growth;

and (c) requisite funds to facilitate faster expansion of growing ventures.

(vi) Government grants: Government has introduced incentives in form of loans, free access to advice, incubation centres in order to facilitate rapid growth and development of small and medium enterprises.

Food Raw Materials and Their Nutritive Value

Nigeria's food system is rich in diversity, with various staple foods and vegetables contributing significantly to the nutritional well-being of its population. Understanding the nutritional value of these raw materials is crucial for promoting healthy eating habits and addressing potential nutritional deficiencies.

Staple Foods:

- Cereals: Maize, rice, and sorghum are excellent sources of carbohydrates and provide energy.
- Roots and Tubers: Cassava, yam, and sweet potato are also rich in carbohydrates, but lower in protein and micronutrients.
- Legumes: Beans, groundnuts, and cowpeas are valuable sources of protein and essential amino acids.
- Vegetables: Leafy Vegetables: Spinach, amaranth, and bitter leaf are good sources of vitamins, minerals, and fiber. Other Vegetables: Okra, tomatoes, and peppers contribute to the intake of vitamins and antioxidants.
- Fruits: Tropical Fruits: Mangoes, oranges, and pineapples are rich in vitamins and antioxidants. Other Fruits: Plantain, pawpaw, and watermelon provide carbohydrates and essential nutrients.
- Animal Products: Meat and poultry: provide high-quality protein and essential amino acids.
  Fish is a good source of protein, omega-3 fatty acids, and other nutrients.
  Eggs: Contain high-quality protein and various vitamins and minerals.
- Oils and Fats:
  Palm Oil: A common source of fat in Nigerian cuisine, providing energy and some vitamins.
  Vegetable Oils: Groundnut oil and other vegetable oils are also used for cooking and provide energy.
- Condiments and Spices:
  Spices: Ginger, pepper, and other spices add flavor and contribute to the nutritional value of dishes.
  Condiments: Palm oil and other condiments are used to enhance the taste and nutritional value of food.

Nutritional Significance

- Macronutrients:

Nigerian food raw materials provide essential macronutrients like carbohydrates, proteins, and fats, which are vital for energy production and body functions.

Micronutrients:

These raw materials also contribute to the intake of essential micronutrients such as vitamins and minerals, which are crucial for maintaining good health and preventing deficiencies.

Fiber: Many Nigerian foods, especially vegetables and fruits, are good sources of fiber, which is important for digestive health and preventing chronic diseases.

Antioxidants: Certain fruits and vegetables contain antioxidants that help protect the body against damage caused by free radicals.