



Product Preservation Design of Vegetable and Animal Food Processing

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Abstract

The aims of the research is determine the Product Preservation Design of Vegetable and Animal Food Processing. Packaging designed to preserve food components in the hands of customers while preventing contamination by bacteria and fungus is the goal. As long as food is stored properly, the quality of the food will deteriorate. Packaging is necessary in order to deliver the following information: Package must convey an accurate representation of its contents; it should neither be copied from other parties' packaging designs, nor should it be too complex, making it prohibitively costly to produce.

Introduction

Because packing may assist prevent or lessen damage caused by external variables and the nature of the product, it is critical in the preservation of agricultural goods, which are notoriously susceptible to spoilage. In addition to damage caused by environmental factors such as mechanical damage, changes in the water content of foodstuffs, absorption and interaction with oxygen, loss and addition of undesirable flavors, damage caused by the nature of the packaged product, such as softening, browning, and emulsion breakdown, is also a concern. Packaging will not be able to totally avoid biochemical and chemical changes caused by microbes or by interactions between the different components of the product.

Almost from the beginning of civilization, people have been packaging goods. Packing has been around since 4000 BC, and at that time it was still done simply, with natural materials being used as the primary packing material. The advancement of science and technology has an influence on packaging as well, particularly in terms of the materials and shapes used in the packaging industry. In addition to natural packaging materials such as wood, leaves, animal skins, and other natural materials, such as aseptic packaging, low temperature transportation packaging, and so on, metal, glass, and paper are now being used in addition to natural packaging materials such as wood, leaves, animal skins, and so on.

Despite the fact that packaging has been around for a long time, it is a relatively new field of science. Packing started out as an art form in the nineteenth century, but has since evolved into a branch of science that is quite sophisticated and requires some basic knowledge as a supporter, including but not limited to engineering and technology, but also science and mathematics as well as art and economics.

In contrast to other processes, packaging is a component of the processing process, which includes activities such as the production or modification of food ingredients, the formation of containers for foodstuffs, the addition or injection of gas into the packaging, and the final closure. Packaging is not a stand-alone process, but rather is a component of the processing process. Because of this, it is vital to understand the principles of processing so that one may use the appropriate technique and packaging materials in line with the food product being packed.

As an endeavor to safeguard the product from all types of harm by using a container, packaging may be seen of as having the goal of protecting or preserving the product so that it arrives in the hands of customers in excellent shape. When units or many units are placed into a container for transportation reasons, packing is the term used to describe the activities that occur during this process.

Food packaging must take a number of factors into consideration. Here are some of them: Packaging is necessary in order to deliver the following information: Package must convey an accurate representation of its contents; it should neither be copied from other parties' packaging designs, nor should it be too complex, making it prohibitively costly to produce. The cost of packaging for foodstuffs is typically about 20 percent of the selling price, depending on the amount of convenience that customers get from the package design. The container must be tailored to the characteristics of the food that will be packed; consequently, one of the most essential considerations in the design of the container is a thorough understanding of the nature of the material that will be packaged. When it comes to package design, thorough information regarding marketing tactics and customer preferences is required. Examples include items that will be sold in shopping centers (supermarkets) and to high-income customer strata that must be packed in accordance with the requirements of these environments.

In order to arrive at a final design, a packaging model must first be evaluated in the market by being shown alongside other (competitive) products. Every effort should be taken to meet the needs of customers from both a practical and psychological standpoint, for example by describing how to use the product, its composition, expiry date, storage technique and other relevant information. Export packaging differs from domestic packaging in that it must be stronger and more protective, in addition to meeting other needs such as legal requirements, customs regulations, and the preferences and pleasures of various consumers.

Film/Plastic Packaging

Plastics are created by the process of polymerization, which involves organizing and constantly producing plastic foundation ingredients known as monomers (Delidovich et al., 2016). For example, PVC (Polyvinyl Chloride) is a form of plastic that is really a monomer of the chemical compound vinyl chloride (Carroll et al., 2017). Beyond the fundamental elements, which are in the form of monomers, plastics include non-plastic materials, which are known as additives, which are necessary in order to enhance the qualities of the plastic material. They are chemicals with a low molecular weight that may perform a variety of tasks such as dyeing, antioxidants, ultraviolet light absorbers, anti-stickiness, and a variety of other functions.

Plastic packaging first appeared on the market in the 1900s. Since then, it has progressed at an alarmingly rapid pace. Following World War II, several forms of plastic packaging, including flexible and rigid packaging, were brought into the marketplace. Polyethylene, polypropylene, polyester, nylon, and vinyl film are just a few of the plastic packaging materials that have been developed (Ebnesajjad, 2012; Asgher et al., 2020). The plastic packaging industry has captured a significant portion of the international market for food packaging, even within the previous two decades (Vanderroost et al., 2014).

What is the source of such widespread usage of plastic? Plastic has multiple benefits, including the fact that it is strong yet lightweight, that it does not rust, that it is thermoplastic, which means that it can be attached with heat, and that it can be branded or printed with different designs. Furthermore, plastic is a flexible material that can be easily molded.

Following World War II, a slew of new forms of flexible plastic packaging appeared with breakneck speed. Plastic may be used as a wrapping material in a single form, as a composite

material, or in the form of a multilayer covering with other materials, depending on the application (whether it is between plastic and plastic of different types, plastic with paper or otherwise). Amination is the term used to describe this combination. As a result, the combination of different kinds of plastic might result in hundreds of different forms of packaging.

Addition polymerization of ethylene gas, which is a by-product of the oil industry, results in the formation of polyester. Three types of polyethylene are available: low density polyethylene (LDPE), which is lightweight and inexpensive, medium density polyethylene (MDPE), which is stiffer and more resistant to heat than LDPE, and high density polyethylene (HDPE), which is the stiffest and most resistant to heat (temperature 120 °C). The general characteristics of PE are that it has a variable appearance and is transparent and oily; it is easy to shape, limp, and easy to pull; it has a high tensile strength without tearing; it is easy to heat hem; it is not suitable for fatty materials, greases, or oils; it is resistant to acids, bases, alcohol, and detergents; it is suitable for frozen storage (-50°C); and it is non-corrosive to metals. Gas transmission is quite high (especially for flavored foods), and water and vapor resistance are also quite high.

Polyester/Polyethylene Terephthalate (PET) is a type of plastic that is commonly used in the packaging of dried fruit, frozen food, and candy products (Brody et al., 2001). Its general properties include being transparent, clean, and clear; having excellent high temperature adaptation (300°C); having very low water vapor and gas permeability; being resistant to organic solvents; and not being resistant to strong acids, phenol, or benzyl alcohol. Its specific properties include being transparent, clean, and clear.

The primary requirements for Polypropylene (PP) are that it be light, easy to shape, transparent, and clear (in the case of non-transparent rigid packaging); that it be stronger than PE at low temperatures; that it be stiffer than PE; that it be resistant to high temperatures (150°C), especially for food sterilization; that it be resistant to strong acids, bases, and oils; that it be resistant to strong acids, bases, and oils at high temperatures; that it be resistant to strong acids, bases.

Polystyrene is a kind of plastic (PS) Among its most important characteristics are its high tensile strength and resistance to tear; a low melting point (80°C); acid and alkaline resistance; decomposition with alcohols, esters, ketones; chlorine; aromatic hydrocarbons; extremely high water vapor and gas permeability; ease of printing; smoothness, clarity, and gloss; cloudy when in contact with solvents; high affinity for dirt; and suitability for laminated base materials with metal (Haneefa et al., 2008).

Oriented film is one of three forms of polyvinyl chloride (PVC), the others being plasticized vinyl chloride, vinyl co polymer, and oriented film. Aspects of its general nature include transparency, low gas and water vapor permeability, resistance to oil, alcohol, and petroleum, high tensile strength, and resistance to tearing. It is also affected by aromatic hydrocarbons, ketones, aldehydes, and esters, among other things, and has a density of 1.35 to 1.4 grams per cubic centimeter.

A few of the general properties of PVDC suggestions include transparency, flexibility, clarity, and variety; resistance to chemicals, acids, bases, and oils; good barrier to ultraviolet rays; very low gas and water vapor permeability; resistance to dry or wet heating; and not suitable for freezing. PVDC suggestions are also available in a variety of colors. The general characteristics of cryovac PVDC are that it has low water vapor and gas permeability, shrinks when heated, has low temperature resistance (-40°C), can withstand high pressure (vacuum), is easy to print, is smooth and transparent, and is not easily burned. It is also easy to heat.

Cellophane has the following general characteristics: it is transparent and bright; it is not thermoplastic; it is not heat-bondable; it is insoluble in water and oil; it does not pass oxygen; it is easy to crack at low relative humidity and temperature; it is easy to laminate; it is easy to tear; and it shrinks when exposed to cold temperatures. Slippers are classified into several categories, including A/B (anchored); C (colored); D (du Pont); L (medium waterproof); M (water-proof); O (coated next to); P (uncoated); R (coated with vinyl); S (hot glued); T (see-through); V, X/K (coated with Saran polymer); WO (water-resistant) (White Opaque).

Some examples of plastic films include water-soluble and edible films, such as amylose in candy and sausage wrappers; cellulose acetate butyrate, cellulose acetate propionate, cellulose nitrate, and cellulose triacetate; chlorotrifluoroethylene (surgical equipment); ethylene butene (similar to HDPE); fluoro carbon (teflon, chemical resistant); ionomer (vacuum packaging); polyvinyl alcohol (for dry products)

Film Packaging for Food and Drink

LDPE and HDPE are the most suitable plastics for packaging dairy products. LDPE is used for filling and sealing the container, whereas HDPE is utilized for large-scale production. The use of nylon/PE for cheese products is preferable over the use of cellulose/PE, PET/PE, cello/suggestion/PE, PET/suggestion/PE, and nylon/PE.

Fresh meat is better packed with PVC/selopan to keep it looking bright, while frozen meat is better packed with LDPE to keep it looking frozen. Poultry items are packaged in polyethylene vinyl acetate/polyethylene terephthalate (PET). Packaging materials such as PE/PVDC/PA, metallized PE/PET, PE/aluminum foil/PET, PET/San/Pe, and Saran/nylon/PE are used for cooked meat products, bacon, and jams and jellies (especially for cured meats). HDPE and LDPE are also utilized in the production of frozen fish. To avoid musty odors in baked goods such as cakes and sponges, layered cellulose/OPP is employed. Biscuits are packaged in layered cellulose/polypropylene (PP), while potato chips are packaged in neutralized packaging. A variety of materials are used for dry food and cereal packaging, including paper-coated low density polyethylene (LDPE), LDPE/aluminum foil (LDPE), PET (polyethylene oxide), and paper/aluminum foil/PE. Foam polystyrene, low-density polyethylene (LDPE), EVA, and ionomer/PVC are used to package fresh fruits and vegetables. It is also feasible to manage the environment by using stretch and PE sheets, among other methods. Metallized foil or polyester and PE packaging are used for coffee. Other options include PET/suggestion/PE, nylon/suggestion/PE, OPP/suggestion/PE, and OPP/aluminum foil/PE packaging. Instant coffee may be packaged in PVDC container that has been coated with PVC. LDPE/PVC/LDPE packaging is used to protect tea from rancidity, loss of aroma, and CO₂ emissions. Other materials used in tea packaging include selopan and PET, paper and aluminum foil, and OPP/PVDC.

Metal Pack

In addition to excellent conductivity, malleability, metallic lustre, impermeability, high density, and solidity, metal packaging has a number of other features. Among the benefits of canned packaging are its high mechanical strength, strong barrier, which makes it hermetic, low toxicity, resistance to severe temperatures, and ability to provide an excellent surface for labeling.

The many varieties of cans are differentiated based on the coating components, coating procedures, and the major steel components, for example, there are tin plate cans, TFS cans, 3-layer cans, and double-layer cans, among others. The amount of Sn in the can should be between 1 and 1.25 percent of the total weight of the can. Immersion or electrolysis are two

methods of coating that may be used. Cans come in a variety of shapes and sizes, including N, which contains 0.02 percent nitrogen to enhance stiffness and is used for carbonated beverages; D, which has a coating of aluminum; and 2 CR, which contains cold reduction lighter and is used for beer and cider.

The enamel layer is a non-metallic layer applied to the can that coats the metal (preventing corrosion) and protects the product from direct contact with the enamel layer (Wood, 2007). When it comes to corrosion prevention, the inner enamel is used, whereas the outside enamel is used for both corrosion prevention and ornamental purposes.

In addition to being lighter than steel, aluminum has a low corrosive power, is easy to bend, can resist the entrance of gases, has no discernible smell or flavor, and is difficult to solder so that the connection does not become loose. Pure aluminum is less profitable for commercial use; it is necessary to add mixed components to improve its properties and increase corrosion resistance; alloys consist of 0.15 percent copper, magnesium, manganese, 0.1-0.3 percent chromium, iron, zinc, and titanium; other advantages of aluminum include can lids (flat lids, crown type covers, pull open system caps, ring open system caps), collapsible tubes, and other products.

Aluminum foil is a kind of aluminum foil (Alufo) Aluminum foil is used as a packaging material, and it is formed of thin and dense aluminum sheets with a thickness of around 0.15 m. Have varying degrees of hardness, with the letter O denoting extremely soft and the letter H denoting extremely hard (the higher the number, the harder). A coating or reinforcing material covered with plastic or paper, this packaging is hermetic, opaque, and flexible. It may be used as a coating or reinforcing material coated with plastic or paper.

The ability to withstand high sterilization temperatures Retort Pouch packaging has a long shelf life, is durable, is not readily ripped or punctured, and is simple to close (Kirwan & Strawbridge, 2003). For example, PP-Alufo-PET is a good example of this. Fruit goods, vegetables products, meat products, fish products, shellfish, dairy products, and drinks are among the foods that employ aluminum for packaging, as are a variety of other foods. It is composed of three major components: the liquid product, the liquid propellant, and the gas propellant, in that order.

The composition of the material (product, propellant, and gas) as well as the method of product dispensing are used to define the kind of aerosol packing that will be used. An equal amount of liquid and gaseous propellant components make up a single-phase aerosol in a single phase. Compression occurs as a result of the propellant gas compressing the product, which causes the product to leave via the dip pipe in the form of foam. An aerosol composed of two phases: a liquid propellant that is soluble in a product (propellant product emulsion) and a gaseous propellant or vapor An aerosol composed of three phases: a liquid propellant, a product (which is suspended on the propellant), and a gas or vapor. The ultimate form of the product (foam or mist) as well as the size of the particles are determined by the valve on the aerosol canister. Another combination to consider is the size of the valve mouth, dip pipe, and steam valve all taken together.

Propellant

Fluorocarbons Discovered in 1980, but first used in 1920; has low toxicity (1000 ppm); is slightly odorous; produces the desired pressure (1.02-8016 atm), which remains constant until the product is exhausted; is relatively expensive; for example, CCl₂F-CClF₂: pressure 1.29 atm, 21°C, does not attack most plastics and is suitable for foam products; for example, CCl₂F-CClF₂: pressure 1.29 atm, 21°C C₄H₈; pressure 1.7 atm, temperature 21°C; used in food.

Hydrocarbons Liquid phase at room temperature; for example, butane, isobutane, and propane; and highly flammable, with a maximum use of 12 percent (to avoid the danger of burning) to avoid the danger of burning.

Gas that has been compressed The combination of N₂O and CO₂ (15:85) is good for foodstuffs (the sweet flavor of N₂O is suitable and may counteract the sour taste of CO₂), and it can be coupled with fluorocarbons to form a fluorocarbon gas.

Aerosol packing depending on the materials used in the packaging

Aluminum, tin plate, and stainless steel are the metal aerosol packing materials that are often utilized. Dip pipes are often constructed of plastic. High-pressure resistance (packaging ruptures at pressures greater than 20 atmospheres). Pharmaceutical and perfume goods are packaged in aluminum aerosol cans for convenience. Tin plate aerosol packaging is susceptible to rusting, which is particularly true for goods containing strong acids and alkalis. enamel coated stainless steel aerosol cans used to package small (and expensive) products in aerosol form (vinyl, epoxy).

This glass aerosol packaging does not react with chemicals; it is suitable for products with high corrosive power; it can display products (promotions); there are many variations of models/shapes: the dip pipe is generally plastic, while the aerosol valve is plastic/rubber; underdeveloped, repaired with plastic coated glass aerosol packaging; unsuitable for food products; there are problems with alcohol; essential lubricants are not compatible with this glass aerosol packaging; this glass aerosol packaging does not react with chemicals

In 1841, soft metal tube (also known as collapsible tube) was known as lead metal tube (oil paint packaging). In 1895, it was used to package toothpaste (dominant). Typically used in the food industry for condiments such as ketchup, mayonnaise, and mustard; simple product filling; light; not easily broken; smooth surface for easy ornamentation; easy to close firmly so that contamination is kept to a minimum. Metals that can be bent at room temperature are used as raw materials, with tin, lead, and aluminum being the most common.

Cooking oil, kerosene, gasoline, and chemicals are stored in steel drums or metal alloys. On occasion, there are barrels filled with cardboard, plastic, and a variety of other packing materials, with a total capacity of around 250 liters. The drum is equipped with a simpay (rolling bracelet) for portability. Both a tiny hole for the vent and a big hole to accommodate an installed faucet are included in the closed portion.

Wooden Packaging

Timber is still utilized as packaging, particularly in nations with substantial forest resources. This is especially true for transportation packing. Transport packaging made of wood can take the form of full wooden crates, frame wooden crates, thin wooden crates, pallets, and other types of containers. In developed countries, used wood packaging is a problem that is extremely difficult to dispose of or destroy because of the nature of the material. Although not as common as it once was, wooden packing in the shape of skeleton boxes or crates made of thin and light timber planks is still used, particularly for fresh produce such as fruit, vegetables, fish, and other seafood.

Several developed countries require that the wood used in the packaging of goods shipped into the country be treated prior to use. Australia is a nation that is well-known for being quite stringent in this respect.

The reality is that wood is a durable packaging material that can be utilized at a low cost provided the proper production technique is used. As a result of the fact that in many

developing wood-producing countries, wooden crate packaging has been made and used for decades, scientifically correct manufacturing practices such as selecting or using the appropriate type of wood, prohibiting use of used wooden boards and controlling the moisture content in wood are not practiced. Additionally, scientifically correct manufacturing practices such as construction of a properly connected structure, selection of the proper nails, and nailing in the proper manner are not practiced.

It is frequently regarded as being too inconvenient, time-consuming, and expensive. This is largely due to the fact that they are unsure of the ramifications of the situation for the crates they use for export.

Selection of the type of wood used

In general, there are no additional requirements for selecting the sort of wood that will be used for packing reasons. To begin with, the strength of wood packing is affected by many factors, such as the kind of wood used, the thickness of the wood used, the method of preparation utilized, and the method of installation or nailing used. Softwood, which comes from needle-leaved plants, and hardwood, which comes from broadleaf plants, are the two main types of wood that may be found in plenty throughout the world. In reality, the specific gravity, kg/m³, bending strength, kg/cm², compressive strength, kg/cm², nail-holding strength, breaking resistance, ease of labor, and resistance to weathering are all characteristics that separate high-quality wood from low-quality lumber.

When it comes to packaging, it is preferable if not all of the components of the packaging are made of the same wood. To ensure that the wood packing is as cost-effective as possible, the kind of wood used for each component of the wood packaging is selected in accordance with the functions performed by each of these components. As a result, the density of wood is a significant consideration, as it may provide insight into some of the wood's most critical characteristics, such as its strength and ability to resist nail penetration, as well as the amount of shrinkage that the wood will experience as it dries.

A specific gravity of 400 to 750 kg/m³ is considered to be suitable for packing purposes. Wood with a specific gravity of 750 kg/m³ is very strong, but it is also quite hard, making it difficult to nail and, in some cases, even breaking during the nailing process. However, if the wood does not shatter when fastened, the endurance of the nails is extremely strong. Because of its weight, this high-density wood will increase the cost of shipping it significantly! A set of hardwoods with specific gravities ranging from 600 to 750 kg/m³ that are appropriate for usage as skirting boards for crates or connecting boards for pallets, as supporting parts for crates, as anvils for pallets, and as upright reinforcing parts for crates. framework. Specific gravity ranges between 400 and 600 kg/m³, making them acceptable for use in packing components that are not expected to bear weights such as side boards, intermediate boards, and other similar components.

Wood moisture

Living wood has a significant amount of water, and even freshly cut wood retains significant amounts of water. If the wood is to be used for packing, it must be allowed to cure completely, or it may be dried more quickly by using a drier designed specifically for this purpose (dry kiln). Strength of wood is determined by the amount of moisture present in it. However, it is only when the dryness of the wood reaches a level known as the fiber saturation point that the wood's strength begins to increase. The fiber saturation point is reached when the water content between the wood cells has been exhausted (Passarini et al., 2014). A further drying process, apart from increasing the strength of the wood, causes the wood to begin to shrink. The

moisture content of the wood and the humidity of the air outside will be in balance while drying in the open air; thus, when drying in the dry kiln, it is vital to pay attention to the nature of the wood.

Packaging that is made of damp wood that shrivels up causes the structure to alter, and it is even conceivable that certain components are destroyed, the nail handles become loose, or the packaging completely falls apart. Wet wood might cause the goods within to corrode if it comes into contact with it. It is also possible that wet wood may result in the development of mold on the packaging components, which would in turn cause harm to the wood packing components.

Dry wood, unless it is very sturdy and stable in size, is naturally lighter than wet wood, which may help to minimize transportation expenses. Packages produced with 80 percent wet wood, for example, weighing 9 kg, will only weigh 6 kg if they are made with 15 percent dry wood, and vice versa. Dry wood, on the other hand, is more easily broken and broken when fastened.

Wood defects

The use of prime grade wood with no flaws is not required, but some sorts of faults, such as transverse or deviated wood fibers, might have a negative impact on the strength of the wood when it is used to build packing. In most cases, the regular wood grain line runs parallel to the log's axis. When the direction of the fiber line does not run parallel to the axis of the log, the fiber is referred to as a twisted fiber. The percent angle of this variation is represented as a percentage of the original angle. Wood with deviating fibers of up to 10% may have its strength reduced by as much as 40%, according to certain studies. The use of wood with a variation of more than 5 percent should be avoided for packing reasons since it is readily distorted, causing the nails to fall loose.

In part, this is because the wood grain deviates around the knot, which significantly diminishes its structural strength. If the knots are removed from the wood, the strength of the wood will be reduced even more. The size of the knot should not be more than one-third the width of the piece of wood being worked. Other types of wood deterioration include: There is checking and uneven shrinking at the board's extremes. The nail may fall out as a result of the checking. It is possible to paint the ends of the boards in order to lessen the symptom of checking. Cupping is a term used to describe the shrinking of a board in the direction of the wood grain. This is owing to the fact that the two sides of the board dry at different rates.

Aside from the two issues mentioned above, there is still significant damage to the wood as a result of the incomplete drying process. Damage to wood caused by woodlice, whether while it is still in the form of tree trunks or after it has been transformed into wooden planks, is clearly unacceptable, not only because the strength of the wood has been reduced, but also because it is possible that the wood still contains woodlice seeds.

Construction and strengthening of wooden crates

Wooden crates, in contrast to corrugated cardboard boxes, do not conform to any internationally recognized standards. There are several standards that are national in nature, such as those from England (BS), the United States, France, Germany, and other countries, among others. Appendix III contains some drawings of various types of full crate construction that are in accordance with British Standard specifications.

The method used to nail a box together is one of the most essential variables that determines the strength and, therefore, the cost of the crate. It would be wasteful to construct a keamsan out of a high-quality piece of wood while neglecting to utilize the proper nails in the proper quantity. Nails are available in a variety of shapes and sizes on the market.

Use of the Neat

Containers are, without a doubt, a contemporary way of transportation, but they are not the only option! While it is true that women and gentlemen are sending things in containers, this does not imply that you should disregard the specific packing! Please keep in mind that the primary aim of employing containers at the port is to expedite the loading and unloading procedure.

In certain cases, the usage of containers may help to avoid pilferage, particularly in the case of businesses who offer "door-to-door" services. However, a considerable number of items are put into containers as part of a "port to port" service, particularly for shipments that are not big enough to fill a complete container. It is possible for looting to occur when goods are delivered from the producer's location to the sending port, as well as when goods are delivered from the receiving port to the destination address, when such services are provided by the traditional transportation system.

The pressures encountered by items carried in a conventional manner are likewise experienced by goods transported in containers, such as crashing, shaking, vibration, and even heavy rain. and even heavy rain As a result, container transportation is not the only option; we must also pay attention to the design of individual packing and loading solutions.

Items must be securely fastened to the ground so that they do not move or wiggle. However, it cannot be disputed that utilizing containers for transportation offers several benefits, including lower transportation costs for expensive items as compared to using conventional transportation, which is fraught with dangers of loss and damage during loading and unloading. Looting is less of a concern for individuals who utilize door-to-door services, which are particularly prevalent. Transporting products may be done under the full control of either the sending or receiving company. The placement of items in containers may be made more precise, for example, by placing the heavy and robust crates at the bottom and the lighter and weaker crates at the top. Objects may be fastened and held firmly to prevent them from slipping and crushing. Unless there is a leak in the roof, you should be able to repair the walls and doors of the container on your own. Even valuables may be protected to the fullest extent possible using plastic sheets. Items may be cushioned below to prevent them from "flooding."

Paper, Cardboard and Cardboard Packaging

In comparison to hardwood pulp, softwood pulp has a fiber length of 0.25 in, while hardwood pulp (fiber length 0.10 in) Paper made of kraft Made from soft wood and treated with a sulfate procedure, it is durable and commonly used in packaging. crepe paper is a kind of paper that is used for crepes. Wrinkled paper is created by passing the paper slowly through press rolls near the end of the manufacturing process, causing the paper to wrinkle. Papers such as glasin and oil-resistant paper are available. A smooth surface, grease and oil resistance, but not waterproof due to the wax coating; additional substances, such as plasticizers (for sticky items), antioxidants, and mold growth inhibitors; and glasin paper, which may be used for oil can be added. Paper made of wax, It is possible to coat almost every kind of paper with wax, depending on the technique used. Wax may be applied throughout the paper-making process, or it can be added at the end (finished sheet), in either wet wax or dry wax form. The foundation material is paraffin, which is combined with either PE, microcrystalline wax, or peetrolatum, depending on the application. Dry wax paper is a kind of paper that has been coated with wax and then run through a heating roller. Wax paper that is still wet hardens as the wax adheres to the paper's surface. Oil resistance, cheap manufacturing costs, and the ability to be hot hemmed are just a few of the benefits of wax coating on 1-2 surfaces. Daluang Linerboard (made from

softwood/pine), as well as corrugated cardboard (made from hardwood using a sulfate process), is a kind of packaging that is frequently used in the manufacturing sector as primary, secondary, and tertiary packing. Chipboard, It may be constructed of thin/light paper or thick/folded cardboard; it can be formed of newspaper or fried waste paper as a base material. Double paper, water-soluble paper; brand name Dissolvo (by Gilbreth Co., USA); eg Dissolvo A, which is soluble in 2-5 percent alkaline solution but insoluble when exposed to non-alkaline water; and is forbidden from being used in food packaging by the Food and Drug Administration (FDA). Paper plastic is a kind of plastic that is intended to look and feel like paper. Q-kote (double-sided polystyrene coating) and Q-per (uncoated, although the surface of the paper is smeared with a solution containing styrene) are two types of polystyrene-coated papers developed by the Japan Synthetic Paper Co. It is grease resistant, waterproof/moisture resistant, and does not get overrun with mold. It is also referred to as synthetic paper.

Folding cardboard is a common packaging material because of its widespread usage, low cost, compact storage footprint, ability to be manufactured in a variety of forms and sizes, ability to be printed, tiny size, cardboard thickness ranging from 0.014 to 0.032 in, and relative strength. Through the use of solid bleached sulfate board and sulfite board, the cardboard can be treated on one or both sides with bleach. The kind of packaging material and model are determined by the type of goods being packed. FC is the abbreviation for Foreign Currency (Folding Carton). Occasionally laminated with plastic; the outer layer is used for printing or promotion, and the inner layer is used to increase oil resistance and durability.

Composite paper is a kind of paper or cardboard that has been produced in conjunction with other packaging materials (plastic, metal, plastic and metal). The following are the advantages: low brittleness, low rigidity, and high material strength. Construction of a composite box. The shape of a spiral The joint is made up of numerous layers of various materials, with the corners of the joints overlapping each other. It is sewed (seam layer) into the form of the lobe. It is made of laminated material that has been cut according to the design and then spliced together. Rolls made out of numerous layers of coils are known as composite rolls. Citrus juice, fruit juice concentrate, spices, and dry soup are all made with it, and it is also used in non-food products such as chemicals and medicinal plants. When the composite packaging is finished, it is laminated with foil or other composite packaging materials that are capable of withstanding vacuum pressure at temperatures up to 50 degrees Celsius.

Wave Cardboard Packaging

Corrugated Carton Box (abbreviated as KKG) is a kind of contemporary packaging that is widely used. KKG may be used to replace wooden crates for a variety of purposes. The benefits of KKG versus wooden boxes include the fact that an empty KKG takes up much less room in storage. Empty KKG may be preserved for a long period of time (since they do not contain lice or fungus, they are not readily eaten by lice or mushrooms, and their size does not vary). It would be better if the size was more constant. Size tolerances might be more stringent in certain cases. It is possible to print with better results. It is possible to cover the paper with white in order to improve the print quality. Increased efficiency in the use of materials. Materials that have been left over are simple to recycle.

Glass Packaging

It is considered an ancient substance in terms of human usage, with estimates stating that it was first used in Egypt 6000 years ago. The first documented usage of the container was in 1870, and the first documented use as a container for fresh milk was in 1884. Production of glass bottles started on a significant scale in 1892, with a semi-automatic facility opening in 1896

and a fully automated factory opening in 1907, with a 20 percent share of the whole packaging market. Large plastic containers, such as gamma bottles, tall flexible containers, such as retort pouches, and advanced packaging techniques, such as aseptic packaging, are all available.

Types of Packaging Based on Violence

The hardness of the container determines the shape of the container, which is divided into three categories: rigid packaging, semi rigid packaging, and flexible packaging. Rigid packaging, that is, packaging material that is rigid and stiff, that cannot tolerate bending, and that breaks when bent by force, is defined as follows: Flexible packaging is much thicker than rigid packaging. For example, rigid plastic packaging in the form of bottles, crates, and other containers, corrugated cardboard packaging in the form of boxes and crates, cylindrical packaging, and composite packaging (compound). For example, rigid plastic packaging in the form of bottles, crates, and other containers, corrugated cardboard packaging in the form of containers. Semi-rigid or semi-flexible packaging refers to packaging materials that have attributes that fall between those of flexible packaging and those of rigid packaging (e.g., rigid packaging). When the contents of the package are not deformed, the packaging is not susceptible to being bent or crooked. Some examples of semi-flexible packaging include: aluminum packaging, upright cardboard box packaging, foldable cardboard packaging, bark packaging in a variety of forms, and other materials. If a packing material can be readily stretched without cracking or breaking, it is considered flexible packaging. Thin packaging materials are often used for flexible packaging. Wrappers, pouches, bags, boxes, and flexible tubes are just a few examples of flexible packaging.

Type of Packaging Based on Level of Readiness to Use

The following types of containers are classified according to their degree of preparedness for use: Containers that are ready to use, i.e., packing materials that are ready to be filled and have a form that has been ideal since leaving the factory, such as bottles, tin containers, and other similar containers; Prepared-to-assemble containers, also known as folded containers, are containers that must be assembled prior to filling, such as cans that come out of the factory in the form of flats or collapsible cylinders, or containers made of paper, foil, or plastic. Ready-to-assemble containers are also known as folded containers. The advantages of ready-to-assemble containers include the ability to save space during transportation and the ability to customize the size.

Packaging Types Based on Protective Properties

According to the nature of environmental protection, there are three types of packaging: hermetic closed packaging (steam and gas resistant), which refers to containers that are completely impermeable to gas, air, or water vapor; hermetic open packaging (steam and gas resistant); and hermetic open packaging (steam and gas resistant). As long as the container is hermetically sealed, bacteria, yeast, mold, and dust will not be able to enter or pass through it. Glass cans and bottles are the most widely used containers for hermetic packing, however faulty sealing or clogging can cause the container to no longer be hermetic. Flexible containers are not necessarily hermetic, since some of them are susceptible to moisture or gases. Flexible containers should be used with caution. Hermetic packaging, such as non-enameled cans, can still emit an odor that is derived from the container itself, despite being hermetically sealed.

Luminous-resistant packaging refers to a container that is not transparent to visible light. Examples include metal packaging, paper packaging, foil packaging, dark or foggy bottles, and glass packaging. Foods with a high concentration of fat and vitamins, as well as fermented foods, benefit greatly from light-resistant packaging (light can activate chemical reactions and

enzyme activities). These containers are used for commodities that need heating, sterilization, or pasteurization procedures because of their high temperature resistance. For items that are treated at high temperatures, metal and glass containers are often utilized, but flexible packaging is not heat resistant and so is not used for products that are processed at high temperatures. Things to keep in mind when using metal containers, including the fact that the temperature difference between the inside and outside should not exceed 45°C.

Conclusion

We came to the conclusion in our paper that the kind of food to be packed determines the type of packaging used. Packing is dictated by the materials that are used in the packaging, such as plastic, metal, wood, paper, cardboard, or other types of paper. Packaging designed to preserve food components in the hands of customers while preventing contamination by bacteria and fungus is the goal. As long as food is stored properly, the quality of the food will deteriorate. Packaging must be able to preserve the product and keep out outside influences. When determining how much of a decrease in food quality can be tolerated, it is important to consider the nature of the food. Estimates and predictions of the shelf life of food under normal conditions can be made using a calibration of the relationship between temperature and spoilage, which can be found here.

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