PACKING A REVOLUTIONARY ACT

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ABSTRACT

Humans used to consume everything and then go, but when the need for preserving food for the next day's usage became apparent, the concept of storage emerged. This packaging notion led to the development of containers made of plant leaves and miniature tree stems, which may have been the birth of food packing. As civilization grew, the notion of packing evolved through antiquity, from leaves to boxes made of wood or cardboard, to the increasing importance of plastics. Aside from the fundamental applications of packing, such as protection, transportation, and handling, etc. Plastic packaging performs a variety of vital jobs in our modern lives, which are the primary reasons we rely on it. However, scientists from all over the world discovered that there are significant drawbacks to the use of plastics that not only harm nature by not degrading into the soil but also cause major health problems when the chemicals from the plastics leach toxicity into the food stream, soil, and marine bodies. Furthermore, according to the EPA, packaging accounts for around 77.9 tons of municipal solid rubbish each year, or almost 30% of total waste. As a result, the concept of environmentally friendly packaging, often known as Green Packaging, has emerged. The packaging is constructed entirely of recyclable materials. Packaging becomes recyclable, reusable, or biodegradable when these goods are used, resulting in a significant reduction in the amount of rubbish found in landfills and, ultimately, a reduction in the carbon footprint. In the meanwhile, the eco-friendly packaging functions as a marketing tool. Packaging is a significant aspect of the branding process because it communicates the image and identity of firms that rely on packaging as a promotional tool, such as Amazon and FedEx. Another critical factor is capital investment in environmentally friendly manufacturing firms to increase output for a revolutionary cause.

Keywords: Packaging notion, civilization growth, leach toxicity, Green Packaging, marketing tool, and revolutionary cause.

INTRODUCTION

What is packing?

A package is the container or box in which a product is packed. Packaging refers to the process of making or manufacturing this container or box. Packaging is defined as the use of a plastic container (package) to pack an assortment of embroidered handkerchiefs.

Packaging is a coordinated system composed of any materials of any kind that is used to prepare goods for containment, protection, transport, handling, distribution, delivery, and presentation. Several packaging authors and researchers have described and defined them in various ways. Protection, confinement, preservation, apportionment, unitization, convenience, and product communication are the seven primary functions of packaging for the product, according to Paine, Robertson, Livingstone, and Sparks.

The legal repercussions of government and authority activities can influence how actors interact with packaging functions. Some copyright, intellectual property, trademark, and patent laws are applicable to the protection of packaging designs and technology. Packaging logistics combines several packaging skills with logistics and supply chain management disciplines to complement and assist one another. Logistics is a management discipline that focuses on the "flow of goods."

As the packaging establishes customer sentiments regarding the brand, it is one of the primary factors for on-the-spot purchasing choices. It also depends on the customer's personality, lifestyle culture, and a variety of other elements including as:

The Spontaneous Urge to buy: A consumer, like a toddler who is captivated by colorful balls, may instinctively respond to advertising or a display and decide to purchase that product.

Compulsion: Customers are compelled to buy something because of the packaging.

Animation: A product emanated a strange allure.

Hedonic Elements: The choice to buy was motivated by some happy or negative emotion, such as satisfaction or remorse.

FUNCTIONS OF PACKAGING

The most common functions of packaging are:

Physical Protection: Many factors, including as vibration, mechanical shock, compressions, temperature, and so on, must be considered while designing the product. Packaging's purpose is to safeguard the product from all of these influences.

Transmit Information: Labels on packages instruct the product user on how to use, recycle, transport, or dispose of the product and packaging. The government also requires this information on the packaging of some items, such as medications, food, and chemical products. Some labels and containers can also be used to track and trace.

Marketing: For decades, marketers have relied on the physical and aesthetic appearance of a product's packaging to persuade purchasers to purchase their items.

Convenience: Certain package characteristics can make a product easier to use, distribute, handle, display, open, stack, re-close, reuse, dispensing, recycling, and disposing of. For example, if a straw is included with a ready-to-drink juice, it is simple to transport it in automobiles and use and discard the packaging.

Barriers Protection: Many items require protection or barriers against water, dust, oxygen, and vapor, among other things. Permeation is a significant component in packing. Products that require a lengthy shelf life are frequently packed with desiccants. A regulated or modified environment is maintained in some food

containers. In such instances, the primary goal of packaging is to maintain a clean, sanitary, fresh, and safe environment for the desired shelf life.

Security: Tampering can be discouraged by providing improved tamper resistance to packages. A package may also have a tamper-evident device to indicate whether or not it has been tampered with during transit or shipment. These packaging elements aid in the reduction of security threats and package pilferage.

Background

Packaging as a notion evolved from early humanity's basic requirement to preserve and transfer their food from place to place. While there is no record of when the first packing materials were employed, historians think that materials such as leaves, animal skins, nuts, or gourds were used to store and carry objects during the nomadic hunter/gatherer days.



Ancient Egyptian Packaging Techniques

Glass was considered a rare stone in Ancient Egypt and was normally kept for royalty. However, it was the Egyptians' preoccupation with glass that finally led to the discovery of glass blowing technology, which allowed them to form glass into containers for food and water storage. This old glass, however, was not transparent; this would not be found for another 500 years.

Ancient Chinese Packaging Techniques

Because of their achievements in producing paper – the oldest form of flexible packaging – Ancient China is credited with inventing flexible packaging.

Historians think that in the first or second century, the Chinese began to wrap meals in treated mulberry bark. When the Chinese developed their paper-making processes in subsequent centuries, paper began to be utilised for packing products such as medicine and tea bundles.



During the middle Ages, the use of wooden barrels and wood boxes as storage and transportation methods became increasingly common. Barrels were commonly used to transport commodities such as rum, dry food, and fresh water across oceans.

Here are some of the most important packaging advances that have occurred in recent years.

Napoleon's Food Preservation Prize (1795)

Napoleon offered a reward of 12,000 francs to anybody who could develop better ways of food preservation in 1795. Napoleon needed to find a means to feed his troops, which was in the midst of a battle, which prompted this push for invention.

However, it would be another 15 years until a guy called Nicolas Appert earned the award. Nicolas Appert, commonly known as the "Father of Canning," developed a method for preserving food for a long time by boiling it and then sealing it in airtight glass jars. With canned items, we still utilize this procedure today.

The Rise of Tin (1810)

An Englishman named Peter Durand patented the use of tin-coated iron cans instead of bottles to preserve food in 1810. Tin would become one of the most popular packaging materials for products like cookies and cigarettes during the following 20 years.

The First Cardboard Box (1817)

Sir Malcolm Thornhill invented the cardboard box in 1817, despite the fact that cardboard had been invented several hundred years before in China. Note that these boxes were not corrugated at the time; corrugated boxes would not be created until 1871. Silk makers used cardboard boxes to carry moths and eggs from Japan to Europe.

Packaging in the Late 1800s – Early 1900s

The First Machine for Making Paper Bags (1852)

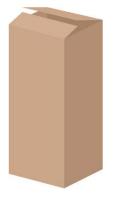
Francis Wolle built a machine capable of mass-producing paper bags some years after the first commercial paper bags were manufactured in 1844.

Note that the paper bags back then didn't precisely like the paper bags we know today — they looked more like giant postal envelopes.



The Initial Carton (1879)

By chance, a Brooklyn printer named Robert Gair created the first carton Gair was the proprietor of a paper bag business. One of Gair's machines malfunctioned one day, slicing through a stack of paper bags rather than creasing them. Gair recognized at that point that prefabricated cartons might be made by cutting and creasing cartons in one process.



The Original Cereal Box (1906)

In 1906, the Kellogg brothers, who invented Corn Flake cereal in 1877, began utilizing cardboard to distribute and sell their product. The cereal box was originally covered in a heat-sealed bag, with the cereal loose on the inside. However, to confine and protect the cereal, a plastic bag was eventually inserted inside the cereal box.



Most common types of packaging

1. <u>Rigid Plastic Packaging</u>

Plastics used in this form of packaging include polyethylene terephthalate (PET) and high-density polyethylene (HPDE). Plastic bottles, such as those used for soda, water, shampoo, and lotion, are examples of stiff packaging.

2. <u>Paper</u>

Paper is a common packaging material for a variety of items, such as the meat wrapping paper used by your butcher. There are paper bags, product labels, tissue paper, and other sorts of paper packaging to choose from.

3. <u>Paperboard</u>

Paperboard is a thicker, more durable alternative to paper packaging. This packaging method is commonly used as the principal package for items like cereal, TV dinners, crackers, and so on. Paperboard may be made in a variety of thicknesses, making it a viable choice for juice boxes, milk containers, and other applications.

4. <u>Cardboard/Fiberboard</u>

Secondary packing materials include cardboard and fiberboard. They are the most often utilized material for shipping items to merchants and customers. Some companies also utilize cardboard and fiberboard for primary packaging for vacuum cleaners, culinary utensils, pots and pans, appliances, HD TVs, and other items.

5. <u>Aluminum</u>

Aluminum is a widely utilized main packaging material, ranging from aluminum foil to aluminum cans.

6. <u>Glass</u>

Despite the fact that plastic packaging has grown increasingly popular, glass packaging is still used for a wide range of items. Glass containers are used for both food and personal care goods such as perfume and fragrance. Because glass is totally recyclable and can be reused an infinite number of times, it is gradually making a comeback as firms strive to be more eco-friendly.

7. Flexible Plastic Packaging

This is a different sort of plastic packaging that is utilized with a wide range of items. It is built of low-density polyethylene (LDPE) or linear low-density polyethylene (LLDPE) (LDPE). Shrink wrap, stretch wrap, and other thin plastic packaging types, such as the plastic wrap used around pallets or the green plastic bags found in grocery stores' vegetable sections, are all made of LLDPE.

LDPE comes in a variety of thicknesses and is commonly used for main packaging, although it may also be used for secondary packaging. LDPE is used in the packaging of pet food, pet treats, toilet paper, tools, components, and potato chip bags. The plastic wrapping over boxes of bottled water or canned products is an example of secondary LDPE packaging.

Emergence of plastics packaging:

The notion of packing has led to the invention of containers made of plant leaves and miniature tree stems ever since the requirement for keeping food for the next day's eating was felt. This notion of packing evolved throughout time as society advanced. As a result, the introduction of plastic had a significant impact on society.

We now understand the importance of reducing plastic in our lives—particularly singleuse plastics—but let us travel back in time to a time when plastic was a ground breaking scientific discovery and examine the history of plastic to learn how we ended up on the wrong track today. Plastic packaging fulfils a number of critical tasks in our modern life, which are the fundamental reasons we rely on it:

• **Protection:** safeguards sensitive items in transit from harm as well as contamination or damage caused by moisture, humidity, gases, bacteria, insects, and light

• **Preservation:** preserves items for a longer period of time, reducing waste by providing people more time to utilise or eat them before they are no longer acceptable.

• **Prevents waste:** products kept together and spillages avoided.

• **Transportation:** Allows for long-distance transportation, giving us access to a diverse range of non-local produce, which fosters commerce. It also saves space by stacking goods, making transportation more efficient.

• **Displays information:** On the box, vital information about the product, such as nutritional content or allergy warnings, is shown.

Plastic wrapping is one of the most essential factors in preventing food from rotting. Food waste has a substantially greater environmental impact than packaging waste, particularly in terms of carbon footprint. Plastic packaging helps food to travel farther distances, stay on shelves for longer periods of time, and prevents vast volumes of food from going to waste.

There are several forms of plastic, each with a unique set of functional features such as food safety, flexibility, transparency, opacity, chemical and heat resistance. As a result, plastics are the best packaging material for a wide range of current applications. Without plastic packaging to meet all of these criteria, transporting and utilising a large range of items that people rely on every day becomes extremely difficult (and frequently impossible).

Emergence of Aluminum packaging:

Aluminum Foil International Application Aluminum foil is widely used in food and beverage packaging, cigarette packaging, pharmaceutical packaging, cream product packaging, insulation materials, video cable, and other industries due to its light weight, good coating, non-toxic, moisture-proof, shading, heat conduction, high electrical conductivity, good corrosion resistance, and beautiful appearance.



The packaging industry accounts for the lion's share of the aluminum foil market. Because foil is almost impermeable to gases and water vapor, it is utilized in a variety of things ranging from meals to presents.

Foil has the ability to lengthen the shelf life of items, requires very little storage space, and creates less waste than its alternatives. It's easy to see why aluminum foil is so popular, given all of these advantages.

Direct & indirect effects of plastics packaging:

Plastic bags have the greatest environmental effect since they take many years to degrade. Furthermore, as plastic bags decompose in the sunshine, poisonous compounds are released into the soil, and when plastic bags are burned, a hazardous material is discharged into the air, generating ambient air pollution. Plastic bags are discarded indiscriminately into landfills across the world, occupying hundreds of hectares of land and emitting harmful methane and carbon dioxide emissions, as well as extremely toxic leachates, during the decomposition stage.

Marine plastic pollution has a cascade effect on global ecosystem function, changing the dynamics of the Earth's composition and Eco structure. Plastic in the ocean is already transforming the global carbon cycle, which lies at the heart of the Earth's biophysical foundation.

Marine plastic contamination is irreversible due to the overwhelming amount of microplastics already entering the food chain and the pervasive prevalence of plastic in the ocean generally.

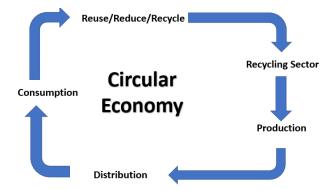
Toxic chemicals seep from plastic and end up in almost everyone's blood and tissue. Cancer, birth abnormalities, weakened immunity, endocrine disruption, and other illnesses have been related to their exposure.

Emergence of eco-friendly packaging:

The worst irony of all, when we look back at the history of plastic, is that it was created with noble intentions to protect nature. Scientists believed they could utilize plastic to preserve rare natural resources such as wood and stone while also protecting animals from being murdered for items such as ivory, tusk, horn, and tortoise shells. When we have seen, these advantages swiftly turned into disadvantages as plastics began to

pollute our seas, land, and air. As with many other environmental concerns, we must discover creative solutions to help preserve our ecosystem in balance.

There is a lot of packing in the world. Every day, companies like Amazon, USPS, FedEx, and UPS ship millions of packages. Amazon alone sends over 5 billion Prime deliveries every year, or more than 13 million parcels per day. And industrial exports contribute even more.



Packaging accounts for 77.9 tons of municipal solid garbage per year, or over 30% of total waste, according to the EPA. Packaging accounts for a whopping 65 percent of household waste. Fortunately, there is a simple step that businesses can take to protect the environment and offer environmentally conscious customers what they want: investing in green packaging. Green packaging is inexpensive and simple to deploy, and it provides several benefits to both customers and the environment.

Singular Economy



Switching to Eco- friendly packaging:

There are now a plethora of eco-friendly packaging materials available. Recycled tape, bamboo, boxes manufactured from post-consumer waste (i.e. recycled newspapers), Geami paper, and even mushroom stems are examples of such materials (to replace packing peanuts). By employing such items, packaging becomes recyclable, reusable, or biodegradable, considerably reducing the quantity of garbage found in landfills.

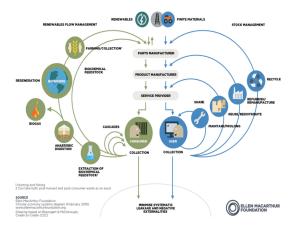


Sustainable packaging strives to lessen its carbon footprint over time. This can be accomplished in one of the following ways:

Use of environmentally acceptable raw resources that are either recycled or reused.

Reduce the manufacturing and supply chain processes.

Encourage a circular economy, which increases the shelf life and usability of packaging.



According to a 2019 Accenture poll, 72 percent of respondents are buying more ecofriendly items than they were 5 years ago, and 81 percent expect to buy more sustainable products in the future 5 years.

Sustainable packaging is quickly becoming the de facto solution for businesses looking to reduce their carbon footprints and improve the efficiency of their existing supply chain operations.

According to Moglix data, 60 percent of firms in the FMCG, car, and oil & gas industries are interested in transitioning to sustainable packaging. This should offer additional motivation for businesses to establish a balance between the criteria for profit, planet, and people.

SUGGESTIONS FOR SOLUTIONS.

Eco-friendly packaging has the potential to significantly contribute to long-term growth. Despite the fact that packaging has always been a social and political issue, there has been little study on eco-friendly packaging. Eco-friendly packaging has been addressed by researchers using a variety of words, including ecological packaging, eco-design,

green packaging, ecologically aware design, and environmentally friendly packaging. However, it is frequently referred to as "sustainable packaging." There are several biodegradable and recyclable packaging alternatives available under this category. Such environmentally friendly materials provide the least amount of harm to the environment. Here are some ideas for eco-friendly packaging.

RETURNABLE PACKAGING

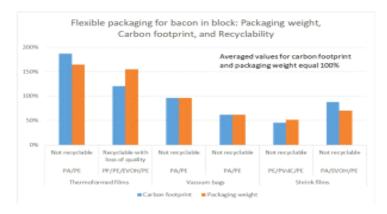
Returnable packaging, also known as reusable packaging, is made of long-lasting materials that are carefully developed for many uses and an extended life. Steel, wood, polypropylene sheets and other plastic materials are utilized to construct returnable packaging. The automobile industry has primarily employed large returnable racks to transport engines, dashboards, fenders, hoods, and other components from dealers to facilities. These racks are then reused for the next shipment cycle. Bulk foods, pharma products, and chemicals are often shipped in reusable containers. Reusable bottles for milk, soda, and beverages have been a part of closed-loop use-return-clean-refill--reuse cycles.



MONO-MATERIAL PACKAGING

The term 'circular economy' is becoming more widespread for firms all across the world, regardlessof industry. Mono materials may be the best option for the packaging industry. Because the commodities must be protected and maintained, they must be packaged in a certain manner. However, today's products are becoming more complex, necessitating more packaging characteristics where a single material may not enough. Coatings, laminations, product information labels, and material additives all complicate packaging. Recycling mixed materials is a difficult task. As a result, mono-materials may be easier to recycle.





PLANTABLE PACKAGING

Small boxes containing cosmetics, lightweight products, toppers, and product wraps are made from plantable materials. This is manufactured from recycled materials inserted in seeds. As a result, instead of being discarded, the packaging might be planted.



EDIBLE PACKAGING

A coating or film of edible substance put on or between the food components is referred to as edible packaging. Living beings may ingest this type of packaging as part of the whole food product. Protein-based materials such as gluten, soy, Collagen, Casein, Zein, Whey protein, and Polysaccharide-based materials such as Cellulose, Chitosan, Alginate, Starch, Pectin, Dextrin, and Lipid-based materials such as Waxes, Acylgycerols, and Fatty acids are used to manufacture edible films.



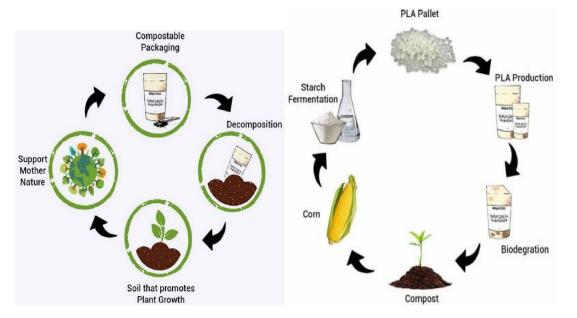
BIODEGRADABLE AND COMPOSTABLE PACKAGING SOLUTIONS

Biodegradable items are ones that can be digested by microbes such as bacteria or fungus over time, whereas compostable products can degrade into non-toxic, natural components over time. To produce a final compost product, the latter requires microbes, humidity, and heat. The following materials are biodegradable in general:

Cardboard, paper, and brown Kraft paper

Plant-based materials such as sugar starch, seaweed, maize, and mushrooms are used in packaging.

'Bio plastics' are materials manufactured from maize or sugar starch.



CREATION OF CAPITAL FOR ECO-FRIENDLY PRODUCING COMPANIES THROUGH IMPOSING REGULATORY CREDITS SYSTEM.

Every product's packaging is a significant part of its marketing. Because a product

must be warehoused, transported, sold, and utilized, packaging improves essentials such as handling, protection, and conservation. A revolutionary concept known as 'regulatory credits' came into play to enhance packaging processes, specifically assuring their efficacy, efficiency, safety, and environmental impact. Regulatory credits are state and federal government incentives for controlling elements that contribute to environmental pollution, such as zero-gas emissions, greenhouse gas emissions, clean fuel, and carbon emissions.

Regulatory credits may be available for certain activities.

Development of novel materials to fulfil eco-friendly environmental criteria.

New technologies, materials, and methods are being developed.

Design and prototype enhancements.

Improving procedures in order to reduce the amount of pollutants and greenhouse gas emissions.

During the manufacturing process, lowering the quantity of waste for raw resources.

Increase the use of natural plant life as a source of packaging.

Product packaging efficiency is being improved.

Increasing automation of conventional packaging operations.

Many firms must grasp the wide range of challenges that may arise. Climate change, resource depletion, and so forth are examples. That is why a framework may be utilized to comprehend a wide range of seemingly unconnected topics.

The 'Five Capital Model' provides a foundation for understanding economic sustainability in terms of capital. It is critical for any firm to employ this approach to supply its products or services. This approach contributes to a better understanding of environmental and social concerns that impact long-term earnings. The five capitals to be examined are natural capital, human capital, social capital, manufactured capital, and financial capital. To some extent, all organisations rely on natural capital and have an environmental effect since they use energy and create trash.

NATURAL CAPITAL

Environmental or ecological capitalization refers to the use of natural resources or processes to manufacture products. It encompasses, for example, woods, oceans, lumber, fish, and so on. An organization can improve its natural capital in a variety of ways. Some of them include replacing naturally scarce materials with abundant materials, eliminating waste, reusing or recycling, using renewable sources only from restorative ecosystems, eliminating the accumulation of man-made, unnatural substances, and using substances that can be easily broken down by natural systems.

THE RESEARCH AND DEVELOPMENT TAX CREDITS FOR THE PHARMACEUTICAL PACKAGING INDUSTRY AND FOOD INDUSTRY.

In 1981, the R&D Tax Credits were introduced, allowing for a credit of up to 13% of expenditures on innovative and improved goods and processes. Patent development costs, testing costs, supplier costs, and staff compensation are all eligible expenses.

On December 18, 2015, a law was enacted to make the R&D Tax Credit permanent. R&D Tax Credits can be used to offset alternative minimum tax, and startups can utilise the credits to offset up to \$250,000 in payroll taxes each year.

The federal R&D tax credits, which are based on eligible research costs, can assist food and beverage firms in immediately offsetting their tax due (QREs). In general, the credit is equal to 5-10% of QREs in a given year. R&D Tax Credits can be claimed by enterprises or the three preceding years by revising the field tax filings, and they can be carried forward for up to 20 years straight.

SOME QUALIFIED RESEARCH ACTIVITIES IN PACKAGING.

Experimenting with chemicals or container design in order to extend the product's life.

Creating automated or improved processing and packaging processes.

CONCLUSION

This is an investigation of the topic of how packaging evolved over time. The concept of packing arose from the necessity to store food and resources. It began with leaves and wood and has progressed to plastics today. Plastic packaging has a short lifespan, has a huge environmental and health effect, and is more likely to contain high quantities of BPA. Eco-friendly packaging is appropriate for reducing the negative impacts on the environment. The term "eco-friendly" or "earth-friendly" refers to items that promote green living and assist save resources. The study's major findings show that the packaging industry is increasingly concerned about environmental preservation, with a strong confidence that green marketing can be utilized as a strategy for long-term success. In an effort to limit carbon emissions, governments all over the globe have enacted legislation that grants credits to enterprises who adhere to the regulatory credit system. Converting these credits into money for the construction of capital contributes to the desire to create an environmentally pleasant atmosphere.

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