

Modern Food Packaging Technologies: Regulatory Aspects and Global Trends

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Week – 01

Lecture – 03

Dear friends, let us continue with the previous lectures. In the previous classes we have seen that what is food and what is the importance of the food and how the food shelf life is affected and what is the major criteria for preservation of the that that what are the different changes takes place during the storage. Now, the food spoilage. The food spoilage refers to the deterioration in the food quality and safety of food products making them unsuitable for the consumption. It can occur due to various factors including microbial activity, chemical reactions and physical changes.

Food spoilage can lead to changes in taste, texture, odor, appearance and can sometimes pose health risks due to the growth of harmful microorganisms. The relationship between food spoilage and safe packaging of food is crucial for preserving the quality and safety of food products. Here is how safe packaging is related to preventing food spoilage. The first is barrier of oxygen, and moisture.

Packaging materials can act as barrier to oxygen and moisture both of which are essential for the growth of spoilage microorganisms and chemical reactions in food. Oxygen can lead to oxidative processes while moisture can encourage microbial growth and enzymatic reactions. Air tight packaging or vacuum sealed containers help prevent these issues. Another factor is protection from light. The exposure to light especially ultraviolet light can lead to the deterioration of certain nutrients and development of off flavor in the food.

The packaging that is opaque or UV resistant can help protect the contents from light induced spoilage. The next is protection from physical damage. The paper packaging helps protect food from physical damage during transportation and handling. Preventing spoilage due to breakage or puncture. The another is microbial control.

Some packaging materials have antimicrobial properties or can be designed to release antimicrobial agents which can inhibit the growth of spoilage causing microorganisms. This can extend the shelf life of the food. The another is vacuum packaging. Vacuum packaging removes air from the packaging which inhibits the growth of aerobic microorganisms which can spoil the food. It is commonly used for preserving meat, cheese and other perishable products.

The another is modified atmospheric packaging or MAP. MAP involves altering the atmosphere within the packaging to slow down the growth of spoilage microorganisms. This is done by adjusting the levels of oxygen, carbon dioxide and nitrogen inside the package to create an environment that extends the shelf life of the food. By using that appropriate packaging materials and techniques food producers can create an environment that minimizes the factors responsible for spoilage such as oxygen, moisture, light and physical damage. This in turn helps preserve the quality and safety of the food products making them suitable for consumption over an extended period.

Therefore, proper packaging is an essential component of food preservation and can significantly reduce food waste and economic losses due to spoilage. Now, the food packaging. Let us start with the history. The packaging industry is an ancient industry that has been around since the early days of man. Packaging in some form or another has always been around to assist man in transporting, storing and protecting a variety of items.

Early man would use crude packaging materials and designs to meet the needs of hunting and gathering to survive. As technology advanced packaging materials and processes advanced, as technology advanced packaging materials and processes advanced. The evolution of packaging can be traced back to the early days of the manufacturing. Packaging is not a new phenomena. Hence have always used in some form or another.

It is part of human being. We have always needed some form of packaging or to transport. It is part of being human. We have always needed some form of packaging to transport, store and protect items. In ancient times, humans used natural materials to package their goods.

These materials included animal skins, clothes and woven crates. As civilization progressed, people began to use more durable materials to package their products. This led to the development of packaging technologies such as paper, cardboard and plastics. The history of packaging begins with things that were easily accessible including leaves, guards, animal skins and hollowed out logs. However, as we have advanced though our packaging has become more and more sophisticated.

This is particularly the case since the industrial revolution. We have put together a time line with some major packaging materials including the elements that were developed to create them. The evolution of packaging can be traced back to the early days of manufacturing. Today, the packaging is a vital part of our economy and has played a major role in the development of our society. The need to contain store and transport materials has been around since the early days of humanity.

However, over time packaging has transformed from simply fulfilling a need to becoming integral to a brand's messaging as well as consumer experience. Let us take a moment to step back in time and observe the major technologies, the major technological advancements throughout history that shaped the packaging industry into what it is today. Early packaging materials, the packaging as a concept grew out of the basic need for early humanity to store and transport their food from place to place. While there is record of when the first packaging materials were used. Historians believe that during the nomadic hunter gatherer days materials such as leaves, animal skins, nuts or guards were used to store and transport items.

Natural materials in prehistoric times used leaves, animal hides and woven plants to wrap and protect food and other essentials nuts and guards. Early civilizations have well documented information about the use of both nuts and guards to store, contain and transport a variety of goods. And leaves large leaves from a variety of different trees or plants used with vines may have constructed the first packaging container product. Animal skins, nomadic people believed in using every part of an animal when killed. It is very possible a tanned hide was used to contain and transport products, foods and goods.

Wood, a hollowed-out piece of wood may have been used with leaves or animal skin to construct a container or storing device. Clays pots, a pottery and ceramics were developed they become some of the earliest containers for storing and transporting liquids and solids. Baskets, woven baskets made from reeds, grasses and other materials served as containers for various items. There are some of the examples of the early packaging materials such as from animal skin. The water carrier present in Australian museum, the water this is a water carrier made from the skin of wallaby.

On the left of the skin of the wallaby neck has been drawn together and on the right three knots, this is the left and this is right there are three knots are visible. It is brittle and cracked in appearance, it is 40 centimeter long, 16 centimeter wide and 10.5 centimeter deep. Skin carriers of this type were made by first nations people, nations skin carriers of this type were made by first nations people to carry substantial quantities of water through arid and semi-arid areas. This water carrier could have held approximately 6 litre of water making it a valuable resource in inland Australia.

Its base is permanently sealed with knotted twine and tanned with reagent to prevent water from escaping when the skin is carried upright. The neck is tied with twine which could have been untied for excess of the water. Medieval and Renaissance eras the rise of cities and trading brought about the exchange of goods and innovations. Supplies were made available to regions that had never been available before. The rise of cities and trading brought about the exchange of goods and innovations.

Supplies were made available to regions that had never been available before. The exchange of goods helped increase the quality of life, it also increase the sophistication of packaging materials and products. The Middle Ages saw a rise in popularity in using wooden barrels and wood boxes as storage and transportation devices. Barrels were typically used for travelling across oceans to store items such as rum, dried fruits and fresh water. Blown glass was one specific product that helped advance in human quality of the life as well as the packaging industry.

Blown glass enabled craftsmen to mold glass into a large variety of shapes. Many of the products produced were containers for transportation and storage. The blown glass containers are often made of thick durable glass that was heavy yet preferred because of the many benefits offered. During the same time period the invention of the wooden barrel came about. Many believe the techniques used to shape and bend the wooden barrel were derived from ship making.

Craftsmen would use stem to heat the wood and turn it with the wood in the proper mold. It can be slowly heated and bend to shape the barrel into appropriate form. Once the barrel is cured it was found to be one of the most effective forms of bulk packaging known at that time. The barrel enabled people the ability to store and transport liquids and dry goods in large quantities. After the fall of Rome inventions and innovation becomes stagnant within Europe.

Many new technologies and advancements came from other cultures around the globe. China began making the first reel form of paper during this time period. The invention and production of paper proved to be a valuable and common material used in the packaging industry for centuries. The kvevri invented in Georgia around 16000 BC.

This far back in history we can say with certainty that the ancient Georgians were using this large beeswax coated earthenware vessels as early as 6000 BC. So, what makes a kvevri so special? Aside from being the oldest storage vessels we have discovered to date they were used in every stage of wine production from grape crushing to aging. The amphora scaling an amphora was a challenge for all ancient people and the solutions varied over time. The amphora was originally scaled with a clay stopper, but these stoppers however, a good bit of oxygen to enter the vessel. The Egyptians used materials such as leaves and reeds as seals both covered in semi-permanent wet clay.

Later the Greeks and Romans experimented with rags, wax and today's favored stopper cork resin used as an adhesive was so important to the Romans that different plants were shot out and prized for the varied flavors they added to the wine. The ancient Egypt

packaging techniques the glass packaging first began to be used in 1500 BC in Egypt. Glass first seen used as a pot was being mixed with melted limestone, soda, sand, silicate and shaped into glass packaging and in ancient Egypt glass was costly and regarded as a precious stone typically reserved for royalty. However, it was this obsession with glass that eventually lead the Egyptians to discover glass blowing technology of which could mold glass into containers for food and water storage. This ancient glass was not transparent however, that would not be discovered for another 500 years.

Around 1200 BC pots and mugs started to be made from molded glass. After the invention of the blow pipe in 300 BC by the Phoenicians the production of complete transparent glass was during the times after AC during the 1000 years that followed glass production technique was improved and expanded. The development that affected glass packaging the most was the patenting of the automated rotary glass manufacturing machine in 1889. After the 1970s glass packaging began to be used in high value products production and has a wide range of uses today.

Ancient China is credited for inventing flexible packaging due to their innovations in developing paper that is the oldest example of flexible packaging. Paper is oldest reshapeable packaging material mulberry tree barks were used in China in the first and second centuries BC to wrap foods and paper making techniques have improved during the following 1500 years and transported to the Middle East. Historians believe that in the first or second centuries the Chinese began to use treated mulberry bark to wrap foods in later centuries. When the Chinese perfected their paper making techniques paper also began to be used for packaging items such as medicine and parcels of tea. Paper making techniques have reached Europe from Europe they reached England in 1310 and America in 1609.

The first commercial cardboard box was produced in England in 1817 200 years after China and corrugated cardboard was invented in 1850s replacing wooden boxes in trade. The 20th century was the brightest era for paper and cardboard. Let us stop for the time being and we will start next lecture with the Industrial Revolution.