

## **Modern Food Packaging Technologies: Regulatory Aspects and Global Trends**

**Prof Prem Prakash Srivastav**

**Department of Agricultural and Food Engineering**

**Indian Institute of Technology Kharagpur**

**Week – 11**

**Lecture – 52**

Welcome to the NPTEL online certification course on Modern Food Packaging Technologies: Regulatory Aspects and Global Trends. In the last lecture we have seen the overview to modern food packaging. In the present lecture we will be seeing the challenges and variations in packaging industries and we will be covering introduction, market trends and opportunities, challenges in industrial packaging, challenges of product packaging, packaging challenges in beverages industries. Introduction Packaging affects every operation throughout the supply chain, it can significantly impact a brand sale, operating performance, environmental impact and cost, but can also create significant value. Packaging protects, contains, utilizes and sell products at the first moment of truth on the store shelf. It can provide the consumer with convenience and enables more efficient and cost effective transportation, warehousing and picking.

Packaging is also an important part of brand building, a moving billboard for brands whose goods are contained inside each package. Quality containers entice consumer to make purchases. Conversely poor packaging choices can lead to lower sales, reduced product quality and higher cost. However, there are numerous challenges that the industry faces when it comes to managing the path to market in an efficient way including a host of economic, operational, legal and environmental requirements that need to be fulfilled in an already complex industry.

One can overcome challenges in the packaging process by practicing thoughtful packaging design, changing materials and tracking and managing expenses. Ideally you want to strike a balance between quality and efficacy while keeping your mind on the consumer experience as you design your packaging. Marketing trends and opportunities In the industrial packaging market, there is a noticeable trend towards embracing sustainable and eco friendly solutions. A significant number of companies have already begun adopting environmentally friendly practices by utilizing recycled materials and products with lower emissions. This shift can be attributed to the growing awareness and

concerns surrounding the environmental effects associated with conventional packaging materials like plastic and metal.

Consequently there is now an increased demand for packaging alternatives that are biodegradable and compostable. Besides sustainability technological advancements have also had an impact on industrial packaging sector. For instance the adoption of automation in packaging operations has enhanced efficiency while reducing expenses. Moreover, the integration of technology like sensors and RFID tags has greatly improved supply chain management and product tracking. Manufacturers and distributors who incorporated RFID technology into their supply chains witnessed an 80 percent enhancement in shipping and picking accuracy.

This figure shows the global food packaging market and we can see that in 2022 the total food packaging market was about 361.48 billion US dollars which is expected to rise in 2030 to 567.19 billion US dollars with a compounded annual growth rate of 5.8 percent. Now, challenges in industrial packaging One of the hurdles in industrial packaging is the issue of cost.

As business aim to reduce expenses and enhance efficiency they frequently search for methods to decrease their packaging expenditures. However, this approach can potentially jeopardize the protection of products, raise the likelihood of damage during transportation and storage. Designing packaging that fulfills both aesthetic needs poses another challenges. On one hand the package must be durable and offer protection, on the other hand it should also be visually attractive and represent the brand effectively. Achieving this balance can prove to be time consuming task. Regulations also pose challenge in the field of industrial packaging. Each country has its sets of regulation pertaining to packaging materials, labeling obligations and environmental impact. Companies must navigate these regulations to ensure compliance while also striving to achieve their businesses objectives. A challenges in product packaging, the first is sustainability, the second is protecting product followed by minimize wastage, then delivery cost, then unclear branding, then bad unboxing experience, then cost of packaging and then quality of material. The first sustainability, developing eco friendly and recyclable packaging.

Sustainability is one of the top priority for consumers. According to the central pollution control board report out of 6,60,787 tons of plastic waste produced in 2019, 43 percent is packaging waste and most of them are single use plastics. Today brands act upon this and many have clear KPIs that is key performance indicators to switch to sustainable packaging material. Sustainable reusing and recycling packaging requires extensive research testing and money. In contrast some packaging is easy to recycle, but is not as durable as others.

On the other hand one might not easily recycle the durable packaging material. Here are some issues with the sustainable packaging being mixed with non recyclable products. The sustainable packaging is expensive, adding stamps and laminations to packaging reduces its recycling capacity. In short obtaining the proper packaging quality, durability and sustainability is hard without adequate research. Now, the protecting goods, while sustainable packaging helps protect the planet the packaging must protect the goods inside.

Another challenge in the packaging process is keeping the products protected. Depending on the nature of the product one may require most rigid containers than other items. Dedicare products like baked bread many require sturdy exterior packaging to prevent crushing the products inside. Layer cushions and multiple packaging layers commonly used with potato chips packaging are two options to consider the protecting the goods from damage. Packaging goods for safe transit is vital and some inventory may require special material that is challenging to open.

Examine how one can best balance keeping the product safe while providing a pleasant customer experience. Now, the waste minimization when consumers order something online the product arrives in a giant box with unnecessary plastic wastage. There are a time when consumers would accept that, but today consumers are more environmentally conscious than before. Unnecessary and excess packaging is a big turn off for a lot of consumers. The challenge for brands is to design packaging that minimizes wastage and ensures protection.

Ideally the box should be slightly larger than the item in the right size box. Brands can invest in designing and developing an attractive, but minimalistic packaging design that does not use much space. It improves the end user experience and custom size packaging

can reduce transit cost through more efficient use of space. The cost of transportation, transportation cost is based on either the size or weight of the packaging material. So, reducing the size and weight is saving the bag pocket. Less weight means more delivery savings and small size means more products on the shelves. For example, one can use a mailing bag for textiles and dry goods instead of a thick corrugated box. Often brands pack smaller products in large boxes unnecessarily increasing space and shipping costs. Here are a few tips to minimize cost. Use right dimensional package, use custom packaging materials for different products, pack for safety to eliminate returns that might add up the shipping costs, custom corrugated boxes that offer more protection and security. Shipping comes with unavoidable costs and some changes in the packaging details can significantly reduce shipping expenses. Now the recognition or the unclear branding. Customers must know the product and product category from the packaging alone. Making the package design or graphics too similar to another product could create packaging process issues and cause confusion. That simply means packaging should communicate the brand story that is clear, relevant and understandable.

Graphics that are unclear and do not match the brand can be detrimental to sales and customers might notice the brand product. The color, photos, images and words on the packaging can communicate with the customers. In contrast a lack of clear photos for the product name and the main description can cost money in lost sales and returns. Bad unboxing experience. In recent years unboxing has gone from a seasonal pleasure to a powerful e-commerce marketing tool.

Research from Google shows that 62 percent customers watch unboxing videos when they want to purchase. Here are a few tips to enhance the unboxing experience. Choose unique packaging materials. Present the products appropriately. Use branded packaging. Provide freebies like handwritten personalized notes. New and inspiring way to create an unboxing experience are essential to improve the sales and branding. Packaging cost. The rise in online shipping pushed corrugated demand. On the other hand the supply of packaging material is rising.

This complex scenario of higher demand capacity and supply chain issues together with transportation cost is boosting the uncertainty in the market. Here are few reasons that

might affect the cost. The increased prices of packaging materials, exceptional demand, cost of transportation, inefficient use of packaging, lack of investment, increase the cost of labor or shortage or minimum wage increase. Here are some of the ways to address the rising price of packaging. Use single cell packaging design for multiple sales channels.

Redesign packaging to reduce extra cost on unnecessary printings. Using reusable and recyclable packaging. The prices might continue to increase. Planning and following guidelines are more effortless ways to know how to address them. The packaging material quality. The quality of a product's packaging is often seen as an after bought. However, this mistake can cost companies dearly especially regarding food and beverage products. Often e-commerce sellers take the most cost effective approach and buy packaging material in bulk. These materials are often low quality and can be proved a costly mistake in the long run. Low quality packaging material is not only damaging to the environment, but it can also be dangerous to the products.

Moreover, the quality of supplementary packaging items such as tape, foam, rollers and others can result in inadequate protection of the products. The consequences of low quality material can help to save money and gain more profound profit for a short time, but it can hurt the brand's name and customer experience. Therefore, brands need to use high quality packaging material to reduce the risk of returning a damaged product, reducing customer experience and lowering the brand image. The packaging challenges in beverages industries. Beverages are so popular that there is an entire industry dedicated to creating and distributing them across the world.

It is a large industry that generates billions of dollars each year and touches nearly every person's life each day. Every can of soda ends up on store shelves to ultimately make their way into the consumers homes thanks to the work of the beverage industry. However, one of the main challenges that the industry faces is problem with soft drink packaging. Transporting liquids is not an easy feat which makes the distribution process tricky. Let us check out the main packaging challenges in the beverage industry and learn about some of the solutions.

The product damage during the regular transport. Product damage during regular transport is one of the leading challenges the beverage industry faces. Most beverage

companies transport their goods via freight shipments. This typically requires the beverages to be case packed and then palletized for extra protection during shipment. One of the most common issues that occur is when trucks have to make a sudden stop or an extremely sharp turn.

These sudden movements can cause poorly packed cases to fall and in some cases breach the trucks walls is spilling on to the road hitting other cars are ending up in ditches. This not only ruins the product and cost of the beverage company greatly, but it puts the lives of innocent drivers at risk. To avoid products becoming damaged during regular transport which includes emergencies stops and sharp turns beverage companies can wrap their products in more secure secondary packaging. By utilizing case packer machines that adequately wrap the beverage product tightly, but not so tight that they burst or breach during travel is key to ensuring the safe transport to the destination. It strategically lashes the film to allow it to cover exactly where it will have the most impact on the loads stability and containment. It ensures the correct containment force is applied to the products to ensure they do not move during shipment. The packaging breaking during transport other common issue that affects the beverage industry is the secondary packaging breaking or tearing during the transportation process. Secondary packaging is meant to protect products during the transportation process and if it breaks the products can move about the shipment vehicle become damaged and thus not viable for sale. This issue cost the beverage industry a lot of money each year. Secondary packaging breaks due to wrapping the product with a stretch film too tightly or with improper containment force. The containment force on the pack needs to be just right to properly contain the shipment. Stretch film should be applied tightly, but not so tight it burst open at the first sign of bumpy road. To accomplish this beverage distribution centers and manufacturers need to invest in stretch film makers and case packers that utilize superior technology to help them wrap their products with the perfect amount of containment force. It utilizes multi level variable pre stretch to ensure the highest containment force and best film economy is used for every single load regardless of the stretch film used. Thank you very much.