

REPLACING SINGLE USE PLASTIC BY PAPER FOR FOOD PACKAGING APPLICATIONS – DEVELOPMENTS BY WCPM



Anuj Kumar Tayal*
 Sr V.P (Technical)



Raghav Hegde*
 Sr Manager (Board M/cs)



P K JOSHI*
 Supdt -Project

* West Coast Paper Mill, Dandeli

Abstract:

This paper summarizes environmental impact of single use plastic packaging¹ from the take away food and alternatives that could potentially replace it.

From the last decade, High society Indian had focused into the use of alternative single use plastic food packing to the decomposable packaging, but it had got more focused during and after covid pandemic and use and throw decomposable packing.

We as WCPM team had given timely attention and developed recyclable & Biodegradable product for the food grade to minimize the single use plastic.

- Wesco Dura Print (Paper Bags) with different strength properties.
- WESCO Straw base & Straw Fold for paper Straw.
- PE coated Paper cups for hot & cold usages as well as Paper plates.
- Large capacity 350ml paper cups for cold drinks & beverages.

Further in this paper, we will try to evaluate the impact of plastic WCPM methodology for replacing single use plastic by paper.

Keywords: Single Use plastic, Recyclable, Biodegradable, Food Packaging

Introduction:

Due to non decomposable nature of plastic , its waste mainly used for Landfills & rest finer particles floats in the Ocean that adversely impact the living beings. Minimize single use plastic through paper is a good alternative which also improve hygienic condition.

The global plastic production is staggering and Production grew exponentially in the second half of 20th century. In 1950, just 1.5 million Metric Tons of Plastic were produced world wide, but this

has grown to 200 Million by 2002. Production continues to grow steadily year on year (Fig.1). By 2019 we were producing a massive 368 million metric tons.

Plastic Production Statistics⁴

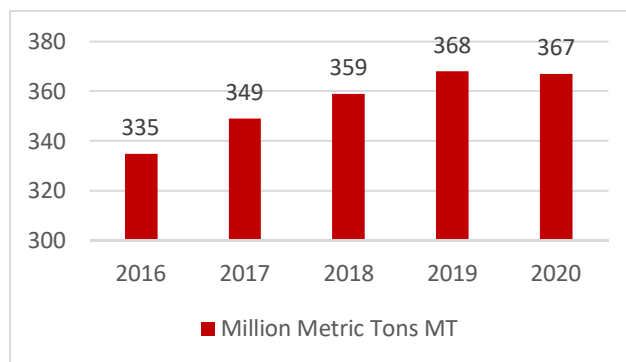


Figure 1

Distribution of Global Plastic Production⁵

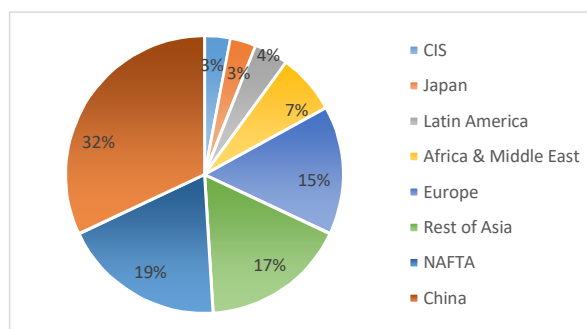


Figure 2 Distribution of global plastic production

The rate of increase stalled in 2020, largely due to reduced demand caused by the Covid Pandemic.

China is the world’s largest plastic producing country with a 32% share of global production (Fig. 2).

Let’s understand the primarily plastic waste generated by Industrial sector wise. Plastic waste generation is strongly influenced by primarily plastic use, but also the product life time. This comprises everyday items including containers such as bottles, pots, tubes & trays, or wrappings such as plastic shopping bags, bubble wrap and shrink wrap. Based on the study, approximate 46% of plastic waste comes from packaging.

ENVIRONMENTAL IMPACT OF PLASTIC WASTE:

The disposal of the plastic waste is one of the least recognised and most problematic area of plastic’s ecological impact due to resistance of decomposition. A very small amount of total plastic production (Less than 10%) is effectively recycled, the remaining plastic is sent to the landfills.

- Due to the chemical composition, plastic cannot biodegrade, but breaks down into smaller and smaller pieces. In the process, toxic chemicals from plastics drain out and seep into ground water,

flowing downstream into lakes and rivers and then to oceans.

- Environmentally harmful plastic pollution: Our rivers, streams, and even drinking water all contain single-use plastic. Along with endangering wildlife, this plastic can be hazardous to human health.
- Dioxins, furans, and heavy metals are released into the atmosphere when plastic garbage is burned. These contaminants can lead to cancer, respiratory issues, as well as other health issues.

HOW PAPER BEATS PLASTIC IN FOOD PACKAGING²

Paper is biodegradable, reusable and recyclable so, it is good for the environment keeping in view of the adverse environmental impact of the single use plastic in food packaging as well as society awareness, now focus is to minimize/eliminate its usage through other alternatives. Paper packaging with less plastic is one of the best alternative due to its lightweight & strong, making it an incredibly versatile material. So the eco-friendly food packaging made from the renewable sources is becoming more and more relevant.

Packaging is one aspect of how the food business needs to reassess its efficiency and environmental impact. Applying this kind of thinking across the food supply chain will go a long way to reduce emissions and

waste while saving money. Amid customer expectations that food brands reflects their Environmental issues, paper fulfils the three Ps of Successful food packaging as:

- **Protection • Preservation • Presentation**

ECONOMIC IMPACT OF PLASTIC WITH PAPER:

The average cost of recycling of paper is Rs.32/- per kg- Rs.20/- for the cost of collection and Rs.12/- is conversion cost. In comparison, the cost of collection of plastic waste id Rs.30/- to 36/- per kg. and recycling is Rs.22/- to Rs.35/- per kg that results total of Rs. 55/- to Rs.70/- per kg.

Also the single use plastic is thrown just after use whereas the Paper packaging is recyclable no of times.

Energy consumption for paper production is 0.59 to 1.19 Ton of oil equivalent per Ton as opposed to 1.48 to 2.58 a ton in plastic surely, 55 to 60% energy can be save if paper is used in place of plastic.

WCPM’s approach is always based on PDCA cycle (Fig.3) by knowing the customer needs, market requirements, developing prototype, feedback from the customer for better development, sustainability in quality and continual improvement.



Figure 3 PDCA cycle

ACTION TAKEN AND JOURNEY OF WCPM:

West Coast Paper Mills, one of the leading paper manufacturers in India have been contributing on sustainable basis to replace single use plastic with its variety of paper products. In the journey of developing alternate to single use plastic, we have been able to produce paper for the following innovative products.

| Sl.No. | WESCO Product | GSM Range | End Application |
|--------|---------------------------------|-----------|--|
| 1 | WESCO Prime | 135-230 | Wall & Base for all sizes of printed/unprinted paper cups suitable for Hot/Cold Beverages. |
| 2 | WESCO Base | 140-230 | |
| 3 | WESCO Liner | 150-230 | |
| 4 | WESCO ECO liner | 165-230 | |
| 5 | Wesco Dura Print | | Paper Bags. Based on customer feedback, BF improved from 26 to +30. |
| 6 | WESCO Straw base & Straw Fold | | Straw fold developed from 60 gsm to 110 gsm with better properties as Stretch, BF & TF. |
| 7 | PE coated Paper cups | | for hot & cold usages |
| 8 | Large capacity 350ml paper cups | | cold drinks & beverages |
| 9 | Paper Plates | | Under development |

Table 1: Different paper products of WCPM for food applications¹

As paper is eco-friendly, more biodegradable and easily recyclable than plastic, variety of paper products are being used to reduce plastic load on environment. More importantly average cost of recycling paper is cheaper than plastic (Including cost of collection, transportation, conversion charges).

PAPER CUPS

WCPM Started its focus since March 2009 for partial replacement of single use plastic with paper disposable cups. We have timely improved its quality with respect to strength properties and its surface properties (Table No - 2).

| Properties | Paper Cups 150GSM | | Paper Cups 165 GSM | |
|------------|-------------------|-----------|--------------------|-----------|
| Year | 2012 | 2023 | 2009 | 2023 |
| Stretch | 2.3/5.2 | 2.5/5.5 | 2.3/5.2 | 2.5/5.5 |
| Stiffness | 20/8 | 22/9 | 26/9 | 28/10 |
| Bulk | 1.15±0.05 | 1.18±0.05 | 1.15±0.05 | 1.18±0.05 |

Table 2: Improvement in properties of paper cups by WPCM

With improved stretch & stiffness, acceptability of the product in market is highly satisfactory. Now normal public is also encouraging the paper cups against plastic disposable cups.

CUP BOTTOM

As per market demand, WPCM introduced Cup bottom in April 2016 with optimised properties and low cost which added considerable volume of paper to replace single use plastic. WPCM produces the cup bottom in gsm range from 140 – 170.

PAPER BAGS:

WPCM introduced Paper bags with 90GSM in October 2016 with Burst Factor (BF)-27±1 and keeping in view of market competitiveness we have improved its functional quality (BF) to 32±1. Also the surface properties improved with wax pick 14A to 16A for high quality solid printing (Brand Image). The main market player (Brands) also encouraging paper bags against the plastic bag with much more clarity of printing (Table -3).

| Properties | Paper Bag 90 GSM | | Paper Bag 100 GSM | |
|--------------|------------------|------|-------------------|------|
| Year | 2016 | 2023 | 2016 | 2023 |
| Burst Factor | 27±1 | 32±1 | 28±1 | 31±1 |
| Wax No Pick | 14A | 16A | 14A | 16A |

Table 3: Improvement in properties of paper bags of WPCM

PAPER STRAW:

WPCM introduced new paper for making Paper Straw in 2018. Even though volume is less compared other products, definitely it will reduce no. of plastic straws used in markets (Table -4).

| Properties | Paper Straw 90 GSM | | Paper Straw 120 GSM | |
|------------|--------------------|----------|---------------------|----------|
| Year | 2018 | 2023 | 2018 | 2023 |
| Stretch | 2.1/6.0 | 2.3/6.3 | 2.0/5.8 | 2.2/6.1 |
| Stiffness | 5.2/2.5 | 5.5/2.6 | 11.0/5.5 | 12.0/6.0 |
| Bulk | 1.38±0.02 | 1.4±0.02 | 1.38±0.02 | 1.4±0.02 |

Table 4: Improvement in properties of paper straw of WPCM

With above quality improvement as well as focusing on minimising single use plastic WPCM has been able to produce around 65,000 TPA paper for such end use which accounts almost 20% of our total production. Successful production of new paper product for plate making will definitely contribute further to replace single use plastic (Table -5).

| Product | Quantity | Percentage |
|-----------------------|-----------|------------|
| Paper for Cup Wall | 40,000 MT | 61.5% |
| Paper for Cup Bottom | 20,000 MT | 30.8% |
| Paper for Paper Bag | 3,500 MT | 5.4% |
| Paper for Paper Straw | 1,500 MT | 2.3% |

Table 5: Production of paper for food applications by WCPM

FUTURE INNOVATIONS:

- Shortly planning to take commercial run of paper suitable for Paper Plate, which will definitely contribute further to replace single use plastic.
- Development of Barrier coated paper, so that WCPM will add in their product basket of 100% plastic free paper cups.
- Action towards major modification of our Multi-Layer machine will add more volume as well as improved quality parameters, which will further replace single use plastic.
- The major modification includes
 - Press part modification
 - Inclusion of first uniron
 - Size press
 - Soft nip calander

Conclusion:

Paper packaging is best solution to minimize/eliminate the single use plastic in food packaging regarding its nature of biodegradable & decomposable. It's our responsibility to accelerate the usage of Paper in packaging.

EDITOR’S INSIGHT:

Paper based packaging materials are becoming increasingly popular as food producers- including leading FMCG brands and they have set ambitious targets to reduce the single use plastic packaging and embrace Eco-friendly materials.

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