SUSTAINABLE PRINTING AND PACKAGING

AMBRISH PANDEY[1], VIKAS SINGH[2], SİNAN SÖNMEZ[3]

[1]Assistant Professor, Department of Printing Technology, Guru Jambheshwar University of Science and Technology, Hisar, Haryana, India,Pin-125001.
[2]GET, Huhtamaki-PPL , Thane, Maharashtra, India.
[3]Marmara University, Technical Education Faculty, Printing Education Department, Istanbul, Turkiye.

ambrishpandey12@yahoomail.co.in, vikas.gjust@gmail.com, ssonmez@marmara.edu.tr

ABSTRACT

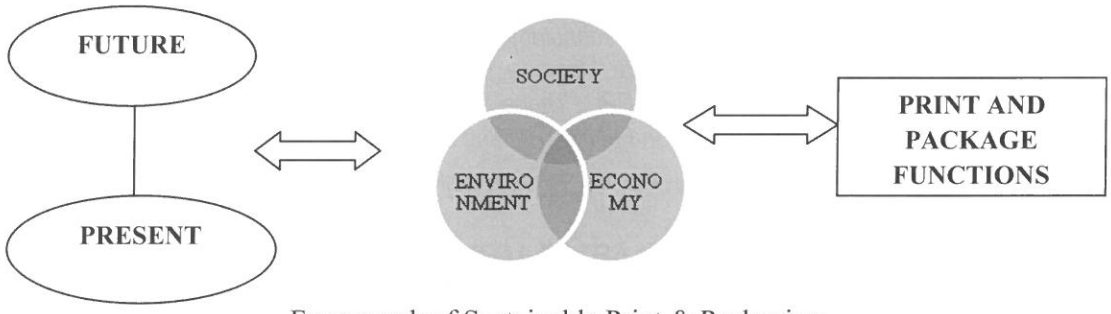
As sustainable development can only be achieved by implementing the norms, rules and regulations in all kind of industries but it can be only be possible if we all will start working for alternate options and implementation of Reduce, Reuse and Recycle formula. In this paper we have discussed about the quantum and role of printing and packaging industry for supporting the sustainable development approach. This can be possible by exploring the practical approach to adopt the bioplastics in the field of Printing and Packaging because there are lot of hazardous effects of petroleum based plastic and packages on the environment. So there is a need of rethinking for the use of this kind of materials which create threat to the society and environment through different kinds of packaging. Here an effort is made by collecting the available data from different open sources and same is compared for initiating positive approach to replace the conventional plastics with bioplastics, which are bio-degradable, compostable, energy efficient and proven suitable though studies and comparison for use in printing and packaging. The recent researches are making them more efficient in case of its use in printing and packaging with cost considerations. But certainly there is need of strong Laws for identifying the possible products and adoption of bioplastics in printing and packaging products.

1. INTRODUCTION

Sustainable development is the guiding principles for meeting the needs of the present without compromising the ability of future generations to meet their needs. Also we can say that it is a vision of progress that integrates immediate and long term needs, local and global needs, and regards social, economic and environmental needs as inseparable and interdependent components of human progress.

Today there is a growing interest from organizations, governments and companies around the world to give sustainable development useful and practical meaning. While the concept of sustainable development is important to virtually all the industries,

therefore being one of the major growing industry focus is required to be given on sustainable print and packaging.



Framework of Sustainable Print & Packaging

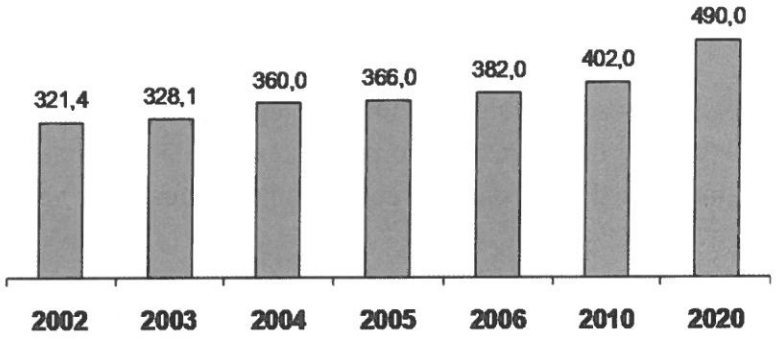
It requires a cradle to cradle flow of packaging materials in which the materials can be used repeatedly without depleting resources. It is also related to striking a health balance to meet the needs of the environment, society and economy- a printing or packaging system is not truly sustainable until all these are addressed in an equitable manner. A packaging system with the sole purpose of maximizing profit is irresponsible, if it fails to address the needs of the environment and society. Similarly a packaging system with the sole purpose of minimizing the negative impacts to the environment is unrealistic, if it fails to address the needs of the society and economy.

Sustaining global economic development will demand a substantial shift inthe role of industry by bringing innovation to drive sustainability and profit.India's rapid emergence as a global economic player is being propelled inlarge substance by its business and industry sector, which is increasinglycontributing innovative solutions for integration of development andenvironmental sustainability. One of the sectors which immensely need a sustainable policy development is of Printing & Packaging.

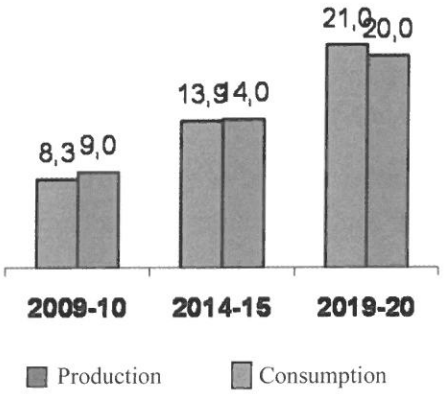
Paper & Paper Board

If we look at the printing and packaging substrates, the paper and plastics majorly appears in the front. We know that paper is biodegradable but its consumption and production is the main cause of the depletion of forests and unsustainable impact on the human life. Therefore in this situation 3R principle is the only option for sustainable development because if we look at the global need by 2020, it will be 490 million tonnes and in case of India its consumption is more than 7 million tonnes as on today.

Paper and Paperboard Production – Global Market, 2002-20
(figures in million tonnes)



Paper and Paperboard - Production and Consumption



Printing Inks

In relation to the printing if we discuss about the market size of the printing ink industry is estimated to be approximately Rs. 1800- 2000 crores and expected to grow at between 12-15% annually in volume terms. As we know that printing inks are mostly composed of hazardous chemicals which affect our environment very much. Therefore the sustainability approach in the printing and printing inks industry is very much needed.

Though the ink industry has reformulated all inks to exclude the known toxic metals like lead, cadmium, mercury and hexavalent chromium. While there is evidence that vegetable oils themselves are more biodegradable than petroleum oils and biodegradability of printed matter is a function of the biodegradability of the substrate, not of the dry ink film.

Most of all classes of raw materials are petroleum based products. These are highly refined and processed specialty chemical materials which deliver very unique properties to the various printing ink formulations.

There are some ink raw materials which do come from renewable resource feed stocks. There has been a long tradition of use of renewable raw materials in inks. There are a wide range of current renewable raw material components that are used in various printing inks formulations which includes: vegetable oils and esters, alkyd/rosin esters, cellulose esters/nitrocellulose, fatty acid amides, epoxy soy bean oil, vegetable waxes, and bio-ethanol. The use of renewable raw materials in various printing inks is influenced by technical considerations, customer requirements and pricing.

Ink companies are continuing to practice environmental stewardship on a global bases, fostering technical and regulatory groups to work to produce ink, coatings, pigments, fountain solutions and other products that are environment friendly like soy based process inks.

Ink manufacturers today are experimenting with many types of new vehicles and other non-petroleum products to produce the next generation ink systems that will continue to offer environmentally friendly "Green" inks.

If we consider the consumables for any printed product it major portion is covered by the substrates and then ink and plate and other chemicals occupy very less portion even than the green chemistry like Chem-free violet CtP, Chem-free Thermal CtP, Process-freeInkjet Metal CtP, Process-freeInkjet Polyester CtP solutions and FOGRA approved Alcohol-free & Alcohol reducing founts, Aromatic-free press washes, Low hazard cleaners & deglazers launched by the "Technova" and similar products by other manufacturers are the really appreciable efforts for achieving "Green" printing and packaging

Plastics

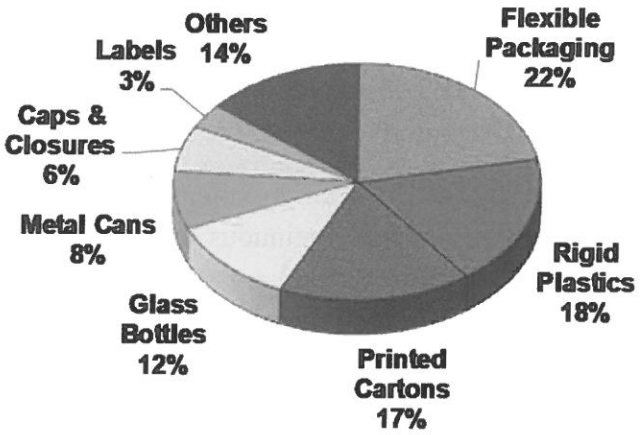
If the consumption of plastic in print and packaging is observed, it is found that, it has captured the packaging segment like packaged consumer goods, consumer and industrial packaging, consumer durable goods etc. Where flexible packaging is dominating, pet bottles are at high growth therefore paper, glass and metals have been shifted to low growth rate.

As a result rigid packaging, films and woven sacks are using 6.2 million tonnes by last year with the average growth rate of 16%.

If we look this activity in relation with the consumption of only Europe, North America and Latin America, it figures to 96,000 MT and in case of whole consumption throughout the globe is 1,54,000MT.

Packaging sector consumes 15% of the total plastic consumption in different sectors. Plastic itself is used as packaging materials by 32%, rest of the parts is with the glass, tin, composite, metals and jute.

This is clarified with the market share of packaging media in India by following pie chart,



As we know that these plastics have adverse effect on our environment, therefore Bioplastics are the one of the option to replace the poly based substrates in package printing other than paper because it is a form of plastic derived from renewable biomass source, such as vegetable oil, corn-starch, potato-starch or microbia, a number of fibers including those obtained from pineapple and henequen leaves and banana stems, rather than fossil-fuel plastics which are derived from petroleum.

Bioplastics can be made using bacterial micro-organisms or natural fibers such as jute, hemp & Kenaf. Generally bioplastics can be made with the help of 90 types of bacteria but bioplastic prepared by Rhizobium bacteria is fully environmental friendly, which has the capability to get degraded in 26 days. The popular bioplastics are Starch, PLA, PHB, PHBV, and PCL.

With the acceptable gas barrier, humidity, microbial growth, water-vapour transmittance, thermal and mechanical properties, bioplastics also has certain other advantages.

- Compost derived in part from bioplastics increases the soil organic content as well as water and nutrient retention.
- Starch-based bioplastics have been shown to degrade 10 to 20 times quicker than conventional plastics.
- Any biodegradable films are burned, there is little, if any, toxic chemicals or fumes released into the air.
- Safe Biodegradability.

- Bioplastics like PHBV, PHB are biodegradable in soil, river, water, sea-water aerobic and anaerobic sewer sludge and compost.
- Less energy in production.

SUSTAINABLE PRINT & PACKAGING DEVELOPMENT POLICY

The quantum of the printing and packaging industry is being studied thoroughly above and the needed drive for sustainability has been suggested but until and unless a policy is not being made, which further may be modified into a norm, till that no one can think of a better and sustainable environment to live in.

The whole system must be sustainable in environment, economic and social terms and should include processes to ensure the continuous improvement. The manufacturing units in all the printing and packaging industry should increase their efficiency in energy usage and should reduce emission by switching from the coal and fossil fuel to natural gas.

Some other useful guidelines for sustainable development are:

- Toxic constituents are to be avoided
- Energy efficient technologies wherever possible for manufacture and distribution of product are to be used.
- Avoid over packaging by using minimal but adequate amount of materials to meet quality, safety, consumer and market needs.
- Use packages made of renewable, environmental friendly materials like bioplastics.
- When developing packaging systems, it is important to strike a healthy balance to meet the needs of the environment, society and economy.
- Packaging waste management – Reduction, Reuse, Recycle
- Methodologies like life cycle assessment (LCA) need to be used to aid the development of sustainable packaging.
- Resource reduction can be done by selecting manufacturing processes which are environmental friendly and should be followed by all the print and packaging industry.

Life cycle assessment can be the best tool to analyze the adverse impact of printing and packaging materials on the environment. It should be made compulsory to provide a LCA report by each and every printing and packaging industry by the end of their financial year.

LCA is typically associated with evaluating the environmental impacts of a product or process on the environment, the evaluation must cover the stages from raw material through all stages in the supply chain until the product is finally disposed.

CONCLUSION

Biodegradable plastics are one of the most innovative materials being developed in the printing & packaging industry. How widespread bioplastics will be used all depends on how strong society embraces and believes in environmental preservation. It is important to recognize that although past and recent efforts have thus for yielded significant strides in the field of bioplastics. To establish themselves, these materials have to be well performing in order to be able to compete with highly developed and sophisticated materials/substrates used today in printing & packaging. Comparing the properties of biobased polymeric materials with the conventional synthetic petroleum derived polymers shows a major potential of these polymers for the production of well-performing packages. The biobased materials have an inherent potential of being compostable which may help the commercialization of these materials. As with any emerging technology, continued innovation and global support is essential in order for bioplastics to fully demonstrate its socio-economic benefits.

After a long period of latency biodegradable plastics are now credible. Many polymers manufacturers are entering the market, material costs are falling fast, performance and process ability is increasing significantly and satisfying the majority of requirements of plastic printing & packaging industries.

REFERENCES

[1] http://www.aipima.org/industrynews.html

[2] www.packagingknowledge.com\degradable&biodegradable bags.html

[3] TechnicalData Sheets. Novamont, www.novamont.com/ing/html/home.html

[4] http://www.plastictechnology.com/articles/200209fa3.html

[5] P. Halley. Biodegradable packaging for food industry. Package bottling int. vol 4, no4, pp 56-57

[6] Plastics in packaging by A. S. Athalye, pp 61-75, pp 183-210

[7] Handbook Of Package Engineering (2nd edition) by Joseph F. Hanlol, pp 8-1 8-83

[8] Paper and Paperboard Packaging Technology edited by Kirwan, J. Mark, pp 50-82

[9] CEPI (2002) Environmental Report 2002- Working Towards More Sustainability.

[10] Food Packaging Science and Technology by Lee, S. Dong, P., Luciano, Yam. L. Kit, pp-595-607

[11] Life Cycle Assessment: Principle and Practice, M A Curran, US environmental Protection Agency.