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Standards and regulatory frameworks in plastic and green packaging of consumer products in global and Indian scenario

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Abstract
Even though plastic packaging has become the hot topic and noticeable due to the pollution caused, it becomes an important source for protecting, handling, storing and transporting a product safely especially in consumer products. Social and economic changes are the causes for high use of packaging materials in consumer products. Henceforth many countries have worked on forming rules, regulations, specifications and standards regarding plastic packaging, use and disposal. India is still in infancy stage in the regulations. Secondary data has been collected in this regard as people are not aware on these regulatory aspects. This study articulates formulation of standards to be formulated to encourage the extensive benefits to the public and users of the standards. As part of their suppleness, standards must be appropriate for both internal and external substantiation. They should be methodically, scientifically and technically based. Beyond everything, they ought to be concrete, advantageous, beneficial useable and operational.

Keywords: green packaging, standards and regulations, packaging laws, plastic waste management

Introduction
Though the packaging history cringes from leaves, shells, hollow logs, dried gourds, baskets, pottery and tree bark in the first century, it steered to glass, paper, and paperboard, metals like tin and aluminium in impending centuries. Plastic films have revolutionized the packaging industry in the twentieth century due to its high moldability to the required product shape, sealability, and durability, low-cost and light weight. While sustainability without compromising the ability of future generations to meet their needs had been today's focus, plastics packaging has been brought under scrutiny as plastics became a serious threat to the environment.

4.3 kg per person per annum is the per capita consumption of packaging in India when compared with 42 kg and 20 kg of Germany and Taiwan according Dr D. Purandeswari, the then Indian Minister of State for Commerce and Industry, at Indiapack 2013. In her report, it was mentioned that the challenges faced by the industry is lack of regulatory clarity in packaging, deficient consumer awareness of sustainable packaging, and ambiguity about green packaging materials.

Though the international environmental regulations have not mirrored the indigenous environmental problems of developing countries formerly, the global eco-label program practices the concept and perceptions of twin recognition and correspondence to guarantee that manufacturers from developing countries obtain an internationally acknowledged eco-label imprints based on local environmental standards.

Materials and Methods
Secondary data collected from past studies, journals, newspapers, government gazettes, websites, seminar and conference papers and government officials.

Global Scenario Related to Standards and Regulations With Reference To Packaging
In order to reduce the amount of package waste which causes significant environmental concerns, EU regulations are made stronger now and then. Packaging and the packaging waste directive of the EU Directives (94/62/EEC, 2004/12/EC, 2005/12/EC) cover all packaging engaged in the market in the EU community. It is one of the limited environmentally associated guidelines comprising directly reckonable, measureable goals (http://europa.eu/legislationsummaries/ environment/waste management/ l21207 en.htm).

Each EU member state has diverse precise periods to meet assured standards conferring to the directives. Since introducing the UK packaging waste regulations, a huge percentage of the packaging is recycled within the industry.

To govern the package waste, the first "Solid Waste Control Law" (1991) was in force in Turkey by the Ministry of Environment and Forests in 1991. Consequently "Regulation on packaging and packaging waste control" order began into force in 2004 and got revised again in 2007 by Ministry of Environment and Forests, in 2007. This regulation required nationwide programs to lessen the piled up packaging waste, and encouraged in developing packaging recycle and reuse systems. The regulation gives certain goals for the rescuing, recovering and reconditioning of packaging wastes.

A first multi-material (four kinds of plastic, glass, three kinds of paper, steel and aluminium) gathering program having 30 percent recovery rate management of packaging waste in a differential waste collection scheme in Italy has been done by Marchetti (2003) [1].

The present environmental legislation and waste management policies and implication in Mexico can become well functional at other Latin-American and developing countries according to the study done by Han *et al*. (2010) [2].

Hage *et al*. (2007) discussed in their study regarding "Swedish producer responsibility scheme" and "tax/subsidy scheme" in fulfilling the cost effectiveness criteria for cardboard packaging producer's environmental responsibility. The same author in 2009 published their investigations on determinants of the collection of household packaging waste in Sweden.

The study lead by Grodzinska Jurczak *et al*. (2004) specifies and describes the new packaging waste management and first year assessment in Poland. They also recommended following EU legal system for sustainable package waste management system and structures and harmonise the same.

Environmental initiatives in the U.S., Canada, and Australia are depending on the national change agencies like ISO 14000 which focuses on recycling materials, preventing pollution, reducing wastages in the manufacturing plants (Schoenherr 2012) [3]. An active, dynamic and intelligent packaging poses general requirements under Regulation 1935/2004/EC and new Regulation 450/2009/EC regarding specific safety and marketing issues related to active and intelligent packaging according to Restuccia *et al*. (2010) [4].

The organization of biodegradable plastics by composting is categorized under substantial recovery, and a permitted recovery choice specified in the Producer Responsibility (Packaging Waste) Regulations as revised in 1997.

Biodegradable polymer (BDP) packaging was introduced into the local retail trade in Kassel, Germany, since March 2001, (Klauss 2001). The use of the scheme was to host biodegradable packaging and succeed its source separation by householders thus they could be collected with the organic waste stream to create compost. The scheme needed copious planning previous to the promotion, to confirm that the public had received adequate facts regarding biodegradable polymers, their labelling, classification, separation and collection. Considering biodegradable packaging materials as appropriate for single use throwaway packaging applications, Davis & Song (2006) [5] studied the regulations and standards applied to these materials. In their study, along with packaging waste directive, they considered Packaging (Essential Requirements) Regulations (2003) has got strengthened in order to decrease volumes of packaging waste in the Europe. The UK packaging waste regulations has made a large quantity of the packaging waste to get recycled with a rate of 42 percent by the obligated industries.

The current standard BS EN 13432 (1999) covers the requirements for packaging recoverable through composting and biodegradation and test scheme and evaluation criteria for the final acceptance of packaging. According to EN 13432, a plastic is considered to be disintegrable under compositing conditions if, following compositing, no more than 10% of its initial dry weight has a particle size equal or more than 2mm. Some hydrocarbon-based polymers marketed in the UK as compostable have been unsuccessful in reaching this standard. At the European Committee for Standardisation (CEN TC 261/SC4/WG2) meeting in February 2003, the view was presented that BS EN 13432 is not adequate for hydrocarbon-based compostable polymers and a new BS for the compostability of oxo-degradable plastics has been proposed (Davis & Song 2006) [5].

More and more waste is being recovered instead of essentially being inclined in landfills due to growing waste management legislations (Aarnio & Hamainen 2008) [6].

Marsh & Bugusu (2007) emphasizes that packaging and SWM is diverse in other nations compared to the United States (Raymond Communications 2006).

Container deposit legislation is implemented in several countries such as Australia, Canada, Denmark, Germany, Norway, and Sweden. Take-back programs necessitate companies gather, recover, reprocess and recycle a part of their secondary packaging, like shipping and distributing containers and external covering as slightly different attitude. Such kind of programs is in effect and effective in several European countries. Certain corporations perform the take-back by themselves, whereas some choose to join collection establishments (Marsh & Bugusu 2007).

According to Defra (2007 Annexe D) [7], Plastics is one of the seven key waste materials recognized in the UK's Waste Strategy 2007 with the total amount of arising plastic leftovers and wastes estimated as 5.9 million tonnes (mt) per annum which includes 2.3 mt household and other municipal wastes, 2.5 mt commercial waste (1.9 mt from packaging) and 0.8 mt from industrial and 0.1 mt from agricultural waste streams. UK policymaking fewer than two major EU directives affecting the plastics industry are also led by Defra (Shaxson 2009). Plastics policies should contribute to novelty and fiscal concert (Defra 2008a) [8], as learnt by research into upgraded resource efficacy and competence and indications emerging and developing out of social science research on understanding, accepting and prompting empathetic pro-environmental behaviour.

Compostable plastic bags that meet the Australian Standard AS 4736–2006 are barrier bags, boutique-style bags, paper bags and bags designed for multiple use such as 'green bags' and these bags are typically charged to the consumer (Sharp 2010) [9].

Packaging Laws in India

The Packaging Laws and Regulations in India for food products are mainly covered under:

a) The Standards of Weights and Measures Act, 1976 and the Standards of Weights and Measures (Packaged Commodities) Rules, 1977 (SWMA)
b) The Prevention of Food Adulteration Act, 1954 and the Prevention of Food Adulteration Rules, 1955 and its first amendment, 2003 (PFA)
c) The Fruit Products Order, 1955 (FPO)

d) The Meat Food Products Order, 1973 (MFPO)
e) The Edible Oil Packaging Order, 1998
f) The AGMARK Rules

Declaration on Packaged commodities for Interstate trade or commerce is as follows in India under the Standards of Weights and Measures (Packaged Commodities) Rules. Every commodity in packaged form has to bear upon it, on a label securely attached to it, a definite, plain and conspicuous declaration of:

i) Identity of commodity in the package
ii) Net quantity, in terms of the standard unit of weight or measure, of the commodity in the package
iii) Where the commodity is packaged or sold by number, the accurate number of commodity contained in the package
iv) The unit sale price of the commodity in the package
v) The sale price of the package

Plastic Waste Management Rules in India

In India, Central pollution control board administrates the implementation of plastic waste management. Environmental issues related to disposal of plastic wastes, indicative guidelines for plastic waste management, recommendations, submission of reports by state pollution control boards and pollution control committee are governed by Central pollution control board. As per salient features of the plastic waste management rules, 2011, every carry bags made from plastic shall bear a label or mark "recycled" as per IS:14534:1998. Each carry bag made from "Compostable Material" shall bear a label "Compostable" & shall conform to IS/ISO: 17088:2008. Similarly, so many specifications are drafted under PMW rules. The recommendations of Biodegradable Committee (under Director-General CIPET) may be examined by MOEF in the light of thickness and use of compostable plastic or material for food packagings.

The Earth Engineering Center (EEC) at Columbia University in the City of New York decided to team up with the National Environmental Engineering Research Institute (NEERI) to set-up Waste-to-Energy Research and Technology (WTERT) Council in India. This association between the above two prime research organizations in the world is established to address the rising interest, increasing investments, to create awareness and, to funnel important decisions related to municipal solid waste management (MSWM) in India in the right direction. WTERT- India would also be added to the WTERT's global charter where it would function as India's window to the world on the entire spectrum of solid waste management issues.

Standards for Application of Green Packaging

Environmental safety and security of packaging has been the matter of greater consideration and discussion in many countries outstanding the concerns over environmental sustainability. Adding biopolymers to the existing multi-layered co-extruded films and laminates aim to substantiate an increased presence of green packaging in the retail product segment depending on consumer perspectives. Understanding this, organisations partaking standards such as ASTM and ISO have published material testing methods for biodegradable plastics. Secondary data has been used to study the regulatory standards in green packaging.

Alvarez *et al*. (2009) [10] conducted a study on collection of light packaging waste materials in small cities using containers in Spain using maps for current collection points and proposed collection points. Such a set up on light weight packaging waste collection should be adopted in Indian scenario.

ISO 14000 provides guidance for the following aspects of environmental management standards as per Janhke (2000)

- Environmental Management Systems (EMS)
- Environmental Auditing & Related Investigations (EA&RI)
- Environmental Labels and Declarations (EL)
- Environmental Performance Evaluation (EPE)
- Life Cycle Assessment (LCA)
- Terms Political Analysis and Definitions (T&D).

ISO's voluntary eco-labeling standards address common global issues yet provide flexibility for national schemes to establish product criteria that are relevant to their own environmental priorities and economic development status. ISO lays out the following criteria for the establishment of voluntary eco-labeling programs: Standards should have a positive environmental influence; they should be appropriate to all countries. Henceforth, this study insists on forming rules, regulations, specifications and standards regarding plastic packaging, use and disposal in India.

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