

## Awareness and interpretation of the symbols and codes by housewives used in plastic packaging

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■ **ABSTRACT** : Food packaging has played an important role in the life of consumers .Packaging is best tool for transportation, protection and in preservation of food. Packaging phenomenon has grown from plant leaves to polymeric chemical compound plastic and thus continuously replacing its other counterparts, its various properties e.g. lightweight, strength, moisture resistance and durability has made it favorite for packaging industry so causing an increase in plastic production at a rate of about 5 per cent per year since 1973 (IWMB, 2003). The Indian polymer industry continues to show a growth rate of 15 per cent per annum. Studies have reported that plastics polymers pose potential hazards on human ecology, they have tendency of migrating the toxic chemicals as well as plastic's economical and environmental impact. Chemical additives used in plastics like phthalates or phthalic acid esters (PAE's), bisphenol A (BPA) could be transferred to human directly from plastics, via food and drink that is packaged in plastics. Plastics can be identified by the resin type code given from American Plastics Council. The picture and codes printed on plastics packaging can play an important role in spreading awareness regarding plastic produce toxicity for health and environment. Therefore, in this paper an attempt has been made to study the awareness and interpretation of symbols and codes printed on plastic packages among house wives. Data were collected by interview-cum-questionnaire method. It was found that awareness level was very less regarding plastic resin code though they knew about recycling symbols.

■ **KEY WORDS** : Food packaging, Plastic polymers, Additives, Toxicity, Awareness

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**A**dvances in food packaging had played an important role in the life of consumers. Packaging phenomenon has grown from plant leaves used to cover the food, afterward materials e.g. cloth ,metal, paper and glass were offered by the civilization though from few decades, a polymeric chemical compound plastic is continuously replacing its other counterparts. It is an established fact that packaging is best tool for transportation, protection and in preservation for food, its various properties e.g. lightweight, strength, moisture resistance and durability has made it favorite for packaging industry thus causing an increase in plastic production at a rate of about 5 per cent per year since 1973 (IWMB, 2003). The Indian polymer industry continues to show a growth rate of 15 per cent p.a.The per capita consumption of plastics is around 5 kg. today as compared to

the world average of 20 kg. This is all set to double to a figure around 10 kg. by 2012.

Plastics are derived from non-renewable source petroleum and natural gas by a chain reaction of polymerization on ethylene gas. Thermosets and thermoplastics (EPA, 2006) are its common categories. Thermosets are strong and durable, so tend to be used primarily in automobiles and construction applications . While thermoplastics are polymers that soften upon exposure to heat and return to their original condition at room temperature ,they could be moldable, finished into sheets, shapes, and structures, offering considerable design flexibility thus they are widely prevalent and used in food packaging industry ,additionally, all thermoplastics are recyclable (melted and reused as raw materials for production of new products),

although separation poses some limitations. The recycling process requires separation by resin type as identified by the American Plastics Council. Although in recent years, there has been a marked interest increased regarding biodegradable materials used in packaging, though the availability and commonly use of biodegradable plastic is a long term goal.

Studies have reported that plastics polymers pose potential hazards on human ecology, key problems identified with plastics includes migration of toxic chemicals as well as plastic's economical and environmental impact. There is concern that potentially harmful chemical additives including phthalates or phthalic acid esters (PAE's), bisphenol A (BPA) and polybrominated diphenyl ethers (PBDE) could be transferred to humans directly from plastics, for example from flexible toys mouthed by toddlers, or indirectly for example via food and drink that is packaged or transported via tubing in plastics containing these additives (e.g. Wagner and Oehlmann, 2009). Evidence relating to this is considered from three perspectives: human body burdens of chemicals used in plastic manufacture (Koch and Calafat, 2009); experimental studies on animals (Talsness *et al.*, 2009) and the effects of these chemicals on humans (Meeker *et al.*, 2009).

On the other hand nowadays due to changing consumers' lifestyle the interest in package as a tool of sales promotion and stimulator of impulsive buying behaviour is growing increasingly. Therefore, package performs an important role in marketing communications, it has both a logistical and a marketing function in both protecting the product throughout the distribution channel and as a medium for conveying attractive messages or images to draw consumers' attention (Prendergast and Pitt, 1996) therefore, it suggested that packaging is an important part of the product that not only serves a functional purpose, but also acts as a means of communicative information of the products and brand character (Meyers and Lubliner, 1998), and the one of the most important factors influencing consumer's purchase decision. Although life span of a package is very small though the information mentioned on it can be a boon for ecology and environment of human. Package is the face of a product and often it is only product exposure which consumers experience prior to purchase this process is fulfilled through labeling or pictorial or symbolic representations printed on packages. Labels and symbols inform consumers about various attributes relevant to the goods they are purchasing e.g. cooking instructions, brand identification, nutritional information, pricing and ecological side of package apart from its recycling codes can help us to understand the trend migration of toxin in food. Currently it is tough and a tedious job to sort and recycle all plastics additionally it is impossible for the consumers to strictly avoid plastic from their daily life except getting aware about plastics though it has been found from various studies that resin code 3, 6 and 7 can pose serious harmful effects, although it has also found that PETE or resin

code 1 (Schuler, 2005) which is very frequently used in as water bottles is designed for single use, extended use increase the bacterial growth.

So, coding of plastic is highly significant and easy approach for getting long term benefits in the view of ecological and health perspective, though in case of plastics this coding is in terms of picture and coding which interprets various meanings. Therefore, it can be clearly cited that labels, symbols or codes are an important aspect of advertising and marketing and as well as a awareness medium for sustainable environment.

Due to direct impact of plastics on human health through its useful and hidden attributes, it is necessary to understand the phenomenon of the risk perception and actual risk. For this purpose, environmental literacy or awareness is necessary step for the perception and avoiding the threat. Environmental literacy is a unique combination of knowing unbiased scientific facts and using them in a rational manner (Krupa, 2004). Although environmental literacy in the developing nations is directly correlated to lifestyles and lack of education which outweigh environmental concerns.

## ■ RESEARCH METHODS

This paper examines the awareness and interpretation inferred from urban house wives regarding the symbols printed on plastic packaged product available in Varanasi, the Indian market. It is important to know that consumers are aware about these symbols resulting for encouragement towards environmental literacy in favour of building the sustainable environment.

A closed-ended questionnaire was developed from relevant literature and chosen as a research instrument to study the awareness regarding the symbols used on plastic packages. The Statistical package for the social sciences program (SPSS) version 15.0 was used in this study. Results and documentation of data were based on empirical information obtained from the survey. The total sample size (n) was 400. Study was carried on housewives as they act as agents of change on the grassroots and family level, making decisions about resource consumption that impact global trends and produces a positive impact on the health of human and its ecology.

### Symbol overview :

Frequently used symbols printed on plastic packages and an analysis of their usage through history, including their current visual variants.

### Möbius loop or recycling code :

The möbius loop (Fig.B) is recycling symbol and internationally recognized symbol used for assign on recyclable materials. It is composed of three mutually chasing

twisted arrows in a triangle that form a Möbius strip (an unending single-sided looped surface). This universally recognized recycle logo was designed for raising awareness on environmental issues. As the recycling logo is not a trademark, it is available for use by anyone, many different logos exist today, some with different arrows, different colours, different sizes, and included symbols (Fig. A).

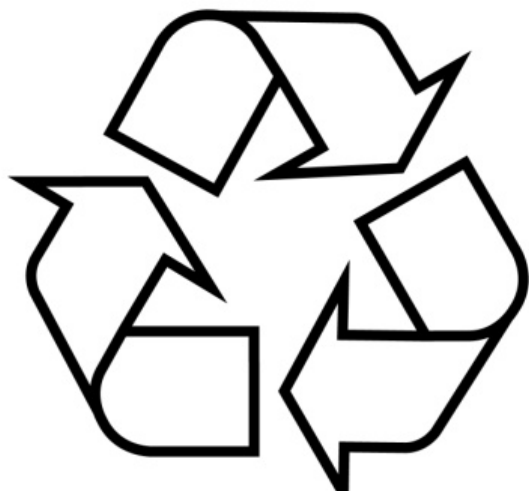


Fig. A : Möbius loop

Despite the fact that countless variants of Möbius loop exist worldwide, though major two variations of the original recycling symbol is seen frequently. The first symbol in white with an outline form is accepted as the traditional, while the second one was a modification which was in solid black. Although for recycled packaged, few other variants of Möbius loop were used first, Möbius loop inside a circle either white on black or black on white. Sometimes the recycling symbol may contain a percentage inside of the loop, this is commonly used to identify a recycled product, and what percentage of the product contains recycled materials.

#### Resin codes :

Plastic bottles, containers and packaging typically have a symbol or code (Fig. B) that indicate the type of plastic resin from which the item was made. The resin coding system was introduced by the Society of the Plastics Industry (SPI). They were intended to use for to indication of the predominant plastic material used in the manufacturing of the product or packaging. The purpose was to assist recyclers with sorting the collected materials. The SPI symbols are loosely based on the Möbius loop symbol, but feature simpler bent (rather than folded over) arrows that can be embossed on plastic surfaces without loss of detail. The arrows are formed into a flat, two-dimensional triangle rather than the pseudo-three-dimensional

triangle used in the original recycling logo. The symbols imprinted on plastic bottles, containers and packaging are a variation of the original three wide Möbius arrows that cycle clockwise although they have been modified to a simpler and thinner version. On bottles, the symbol can usually be found on the bottom, molded into the plastic itself as a raised impression and thus not always easily seen. The symbol includes a number within the möbius arrows, although presence of the symbol implies that the plastic item is recyclable, but the symbol is actually only intended to identify the plastic resin from which the item was made while often with an acronym representing the plastic below the triangle, for example, a Polyethylene terephthalate (PETE) bottle would be marked as PETE using same numbering. Broadly seven types of resin coding is commonly prevalent in plastic packaging industry and each has its own resin identification code.

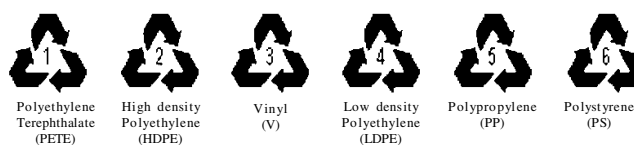


Fig. B : Resin codes

#### ■ RESEARCH FINDINGS AND DISCUSSION

This paper is based on the study of symbols appearing on plastic packaging of products available in the Indian market, for the purposes of analyzing the awareness and interpretation of symbols printed on packaged food items. The survey was conducted and it was observed that respondents have limited awareness. When showed the major seven kinds of plastic codes and recycling symbols, it was found that only 25.5 per cent have seen the PETE (1) code, while 2.8 per cent said that they had also seen LDPE (4) code (Table 1) though when asked where they have seen these codes it was found that they had seen them on bottles, containers, poly bags etc, 77.5 per cent respondents had seen the codes on containers (Table 2). It was seen that 68.2 per cent post graduates' or above degree holder respondents had mostly notice (Table.3). It was also found that association between educational qualification and PETE code was statistically significant (Table 2) though it was also observed that they do not know its meaning. In case of möbius loop only 36 per cent (Table 1) have seen it and responded that it was recycling symbol. At the same time as it was also observed that they made differences between various types of symbols according to semi logical characters, the icons or symbols presented in graphic representations were the signifier as perceived as resembling or imitating. The respondents, without prior knowledge or study, interpret the type of symbol

**Table 1 : Distribution of respondents according to the awareness about various type of codes printed on plastic package**

Codes on plastics	Awareness about codes					
	Yes		No		Total	
	Frequency	Per cent	Frequency	Per cent	Frequency	Per cent
PETE (1)	102	25.5	298	74.5	400	100.0
HDPE (2)	-	-	400	100.0	400	100.0
V (3)	-	-	400	100.0	400	100.0
LDPE (4)	11	2.8	389	97.3	400	100.0
PP (5)	-	-	400	100	400	100.0
PS (6)	-	-	400	100	400	100.0
OTHER (7)	-	-	400	100	400	100.0
Recycling code (Möbius loop)	144	36	256	64	400	100.0

**Table 2 : Distribution of respondents according to the materials on which the plastic codes PETE and LDPE**

Materials	Frequency	Per cent
Plastic films	12	11.8
Containers	79	77.5
Both	11	10.7
Total	102	100.0

**Table 3 : Distribution of respondents according to awareness about the PETE code and its association with education**

Educational qualification of respondents	Awareness about the PETE Code					
	Yes		No		Total	
	Frequency	Per cent	Frequency	Per cent	Frequency	Per cent
Up to 10+2	14	9.8	129	90.2	143	100.0
Under Graduates	0	0.0	115	100.0	115	100.0
Post Graduates or above	88	68.2	54	38.0	142	100.0

$\chi^2 = 157.36, df = 2, P < 0.001$

**Table 4 : Distribution of respondents according to awareness about harmful effects of plastic on soil, animal and human being**

Awareness about	Yes		No		Total	
	Frequency	Per cent	Frequency	Per cent	Frequency	Per cent
	Plastic decreases the fertility of soil	326	81.5	74	18.5	400
Harmful effect for animals	400	100	-	-	400	100
Plastic produced , disease and deformity in humans	325	81.2	75	18.8	400	100.0

because it resembles the character. Despite these facts, it was also found that house wives were aware about that plastic are harmful for environment and health (Table 4).

**Conclusion :**

Though many recycling programmes run across the nation, still billions of tons of plastic landfills is causing a strain on our resources as well as our environment, due to leaching or migration nevertheless there is currently no economically sound way to solve this problem, but by avoiding the use of plastic or alteration in material might help to lessen the overwhelming issue.

The present plastic menace scenario can be avoided by

interpretation of technical and scientific information, for public and political responses by communicating through various means of media. Regulatory guidelines can be established to minimize the plastic packaging waste by selecting appropriate and environment friendly material. While in the process of environmental literacy, it should be the first essential step to strengthen women as they act as agents of change on the grassroots and family level, by making decisions about resource consumption. Considerable attention is ought to focus on utilizing women’s skills and knowledge about environmental matters that impact global trends. The meaning of the symbol has to be learned in order to be read correctly. Although these symbols are related to recycling and waste

management though it should be considered that they can act as helpful agent in minimizing the use and toxic epidemic for human being , by creating the awareness regarding the evade use of resin code 3,6,and 7.

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