

Eradication of Plastic Carry Bags : The Shop Owners' Perception

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Abstract

Polythene bags, popularly referred to as plastic carry bags, are one of the most hazardous substances in the world, causing a lot of damage to the earth and its sustainability. Since the main source of supply of the plastic carry bags to the public are the shop owners, that is, super markets, vegetable & fruit vendors, and bakery and grocery stores, an empirical study was undertaken to assess the awareness of the shop owners about the hazards of plastic carry bags and their perceptions on how to eradicate them. Statistical tools like chi square test, weighted arithmetic mean, and K means cluster analysis were used to analyze the data collected from 400 shop owners belonging to various types of businesses. Three clusters of shop owners were identified - namely Defaulters, Ignorant Defaulters, and Partial Compliers. Bakery and grocery stores were found to be the major defaulters. The study found that strict implementation of the Plastic Waste Management and Handling Rules is the need of the hour.

Keywords : hazardous substances, eradication, awareness, waste management, plastic bags

Paper Submission Date : January 1, 2014; **Paper sent back for Revision :** April 25, 2014 ; **Paper Acceptance Date :** August 17, 2014

Polythene bags, popularly referred as plastic carry bags, are one of the most hazardous substances in the world, causing a lot of damage to the earth and its sustainability. Plastic bags litter the landscape. They find their way into waterways, parks, beaches, and streets. If they are burnt, they infuse the air with toxic fumes. Plastic bags are non-biodegradable. The decomposition of plastic bags takes about 1000 years. Many animals die because of ingesting plastic bags, mistaking them for food (Rita, n.d.) . The ingested plastic bag remains intact even after the death and decomposition of the animal. Due to its non degradable nature, plastic carry bags have emerged as one of the most critical environmental hazards. The modern culture of use and throw coupled with the free distribution of plastic carry bags by the shop owners has led to careless disposal of plastic bags by users, causing environmental hazards (Rajat, n.d.) . Since the main source of supply of the plastic carry bags to the public are the shop owners, that is, shop owners in super markets, vegetable & fruit vendors, shop owners of bakery and grocery stores, an empirical study was undertaken to assess the awareness of the shop owners about the hazards of plastic carry bags and their perceptions on how to eradicate them, and to also know their perceptions about the substitutes for plastic carry bags.

Objectives of the Study

- ✎ To assess the awareness of the shop owners about the hazards of plastic carry bags,
- ✎ To find out the reasons for wide spread distribution of plastic carry bags to customers by shop owners,
- ✎ To analyze the perception of shop owners about eradication of polythene bags.

Note : This paper is published based on the project sanctioned by AICTE under Research Promotion Scheme (RPS) 8023/BOR/RID/RPS - 158.

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The findings of the study will help the policy makers regarding the steps to be taken to reduce the hazards of plastic carry bags.

Review of Literature

Mangizvo (2012) pointed out that plastic carry bags, which have become a part of life for many people, have become an environmental nuisance in Alice in South Africa. This is despite the legislation by the government in 2003 banning production and use of thin plastics. Their preponderance in the environment needs to be reduced through awareness campaigns, recycling, and reuse. Ramasamy and Sharma (2011) analyzed the impact of usage of plastic bags on the environment and cattle health. The study recommended that awareness needs to be created regarding careless disposal of plastic bags and use of reusable bags made of cotton, jute, and other natural fibres needs to be encouraged.

Adane and Muleta (2011) indicated that the trend of utilization of plastic bags is increasing from time to time in spite of a good deal of awareness among the residents about the adverse effects of these products. The study also recommended educating the public not to use plastic bags and to use eco friendly alternative bags made from cloth, natural fibres, and paper. Clapp and Swanston (2009) examined the pattern of international adoption of an anti plastic bag norm and explained how and why its interpretation into legislation to curb plastic shopping bag use has differed in different parts of the world.

Though a lot of programs have been implemented in many parts of the world to reduce or eradicate the use of plastic carry bags, only few research studies have been conducted on the impact of plastic carry bags on the environment, and they invariably recommend educating the public regarding the adverse effects and use of eco friendly alternative bags. Hence, the present study was undertaken to study the awareness and perception of shop owners on the measures to be taken to eradicate the use of plastic carry bags.

Hypotheses

The following hypotheses were framed and tested :

- ➔ **H1:** There is no significant relationship between age of shop owners and awareness of hazards of plastic carry bags.
- ➔ **H2:** There is no significant relationship between educational qualifications of shop owners and awareness of hazards of plastic carry bags.

Methodology

A sample of 400 shop owners – 100 each engaged in various businesses like running super markets, grocery stores (*kirana* stores), vegetable and fruits selling, and bakeries in Chennai city were selected by using the non random quota sampling method. A structured interview schedule was designed and was administered with the help of enumerators. The responses were analyzed with the help of percentage analysis, weighted average method, and chi square test. K means cluster analysis was used to group the shop owners into distinct clusters based on type of plastic carry bags used ; microns of plastic bags used ; charging customers for plastic carry bags ; awareness of the hazards of littering plastic carry bags ; and perceptions on measures to eradicate the use of the same. The study was undertaken during the academic year 2012-13.

Analysis and Results

📌 **Profile of the Respondents:** On the basis of age, the respondents were classified into four categories as – age

Table 1. Profile of the Respondents

Attribute	Nature of Business				Total
	Super market	Grocery store	Bakery	Fruits and vegetables	
Age in years					
Below 30	18	6	19	15	58
30-40	35	38	39	37	149
40-50	34	36	30	36	136
Above 50	13	20	12	12	57
Total	100	100	100	100	400
Educational Qualifications					
Primary	12	36	28	37	113
High School	21	35	29	32	117
HSc	27	16	20	20	83
Graduates & Above	40	13	23	11	87
Total	100	100	100	100	400

Table 2. Types of Plastic Carry Bags Used

Type of carry bags	Nature of Business				Total
	Super market	Grocery store	Bakery	Fruits and vegetable	
Printed with shop name	78 (55.3%)	10 (7.1%)	41 (29.1%)	12 (8.5%)	141 (100%)
Plain carry bags	22 (8.5%)	90 (34.7%)	59 (22.8%)	88 (34%)	259 (100%)
Total	100	100	100	100	400

below 30 years, between 30 - 40 years, between 40 – 50 years, and above 50 years. On the basis of educational qualifications, the respondents were grouped under four heads as to those having education up to primary level, high school level, higher secondary level, and graduate & above level. The Table 1 describes the profile of the respondents.

👉 **Types of Plastic Carry Bags Used :** Two types of plastic carry bags are widely used by the shop owners – (a) carry bags printed with shop name and other details (b) plain bags without printing. Shop owners who could afford to spend for printing their shop name, logo, and other details chose the first option, and the shop owners who could not afford to spend on printing used plain carry bags. The Table 2 reveals that most of the super markets used carry bags printed with shop name, while grocery stores (*kirana* stores) and fruits & vegetable vendors mostly used plain carry bags. On the whole, 141 shop owners out of the 400 (i.e. 35%) used printed carry bags.

👉 **Microns of Plastic Carry Bags :** As per the recent Indian Enactment –Plastic Waste Management and Handling Rules, 2011, the minimum thickness of plastic carry bags should be of 40 microns instead of 20 microns as specified in the Plastic Manufacture, Sales and Usage Rules 1999 (Sohail, n.d.). The strength of the bag to break into smaller pieces depends on the thickness of the bag. The thinner is the bag, the greater is the possibility of the bag breaking and mixing with the soil and deteriorating the soil fertility. Hence, the government regulates the microns of the plastic carry bags. The Table 3 highlights the microns of carry bags used by the shop owners in Chennai. About 35.5% of the shop owners, that is, 142 shop owners out of 400 were not aware of the microns of plastic bags they were using. In spite of government regulations to use only 40 microns, 23% of the respondents, that is, 93 out of 400 shop owners were using 20 microns plastic carry bags. This shows the ineffective implementation of government rules.

➤ **Charging Customers for Plastic Carry Bags :** As per Plastic Waste (Management and Handling) Rules, 2011, plastic carry bags shall not be made available free of cost to customers by the retailers. The retailers are to charge customers for plastic carry bags (Sohail, n.d). However, the rules specifically say that the prices are to be fixed by the Central Government, and different prices are charged in different places and different shops. In Chennai, the price charged varies from ₹ 1 to ₹ 5 depending on the size of the plastic carry bags. As per the Table 4, inspite of govt. rules, only 7.25% (29 out of 400 shop owners) of the shops owners were charging the customers for plastic carry bags. The Table 5 indicates that 49% (13 out of 29) of shop owners who charged customers for plastic carry bags reported that charging the consumers for the plastic bags resulted in a reduction in consumption of plastic carry bags.

➤ **Awareness Regarding Hazards of Plastic Carry Bags:** It is worthwhile to assess the awareness as it will highlight the need for creating awareness to reduce the hazards of plastic carry bags. Hazards of plastic carry bags are studied under five classifications as given below:

- Littering of plastic carry bags blocks sewage lines,
- Littering of plastic carry bags reduces rain water percolation,
- Littering of plastic carry bags deteriorates soil fertility,
- Littering of plastic carry bags affects mortality of animals,
- Burning of plastic carry bags can release dioxins, which are known carcinogens.

Table 3. Microns of Plastic Bags Used

Microns of plastic carry bags used	Nature of Business				Total
	Super market	Grocery store	Bakery	Fruits and vegetable	
Not Aware	34(23.9%)	40(28.2%)	39(27.5%)	29(20.4%)	142(100%)
20 microns	11(11.8%)	37(39.8%)	18(19.4%)	27(29%)	93(100%)
40 microns	23(23%)	17(17%)	27(27%)	33(33%)	100(100%)
Above 40 microns	32(49.2%)	6(9.2%)	16(24.6%)	11(16.9%)	65(100%)
Total	100	100	100	100	400

Table 4. Charging Customers for Plastic Carry Bags

Charging customers for Plastic carry bags	Nature of Business				Total
	Super market	Grocery store	Bakery	Fruits and vegetables	
Charge	16(55.2%)	3(10.3%)	5(17.2%)	5(17.2%)	29(100%)
No Charge	84(22.6%)	97(26.1%)	95(25.6%)	95(25.6%)	371(100%)
Total	100	100	100	100	400

Table 5. Reduction in Consumption of Plastic Carry Bags After Charging Money

Consumption of Plastic carry bags	Nature of Business				Total
	Super market	Grocery store	Bakery	Fruits and vegetables	
Reduced after charging customers	5(38.5%)	2(15.4%)	4(30.8%)	2(5.4%)	13(100%)
Not Reduced	11(68.8%)	1(6.3%)	1(6.3%)	3(18.8%)	16(100%)
Total	16	3	5	5	29

Table 6. Awareness of Different Hazards of Plastic Carry Bags

Awareness	Nature of Business				Total
	Super Market	Grocery Store	Bakery	Fruits and Vegetables	
Littering of plastic carry bags blocks sewage lines					
Aware	96	91	91	99	377(94.25%)
Not Aware	4	9	9	1	23(5.75%)
Total	100	100	100	100	400(100%)
Littering of plastic carry bags reduces rain water percolation					
Aware	93	99	90	94	376(94%)
Not Aware	7	1	10	6	24(6%)
Total	100	100	100	100	400(100%)
Littering of plastic carry bags deteriorates soil fertility					
Aware	95	95	92	92	374(93.5%)
Not Aware	5	5	8	8	26(6.5%)
Total	100	100	100	100	400(100%)
Littering of plastic carry bags affects mortality of animals					
Aware	74	72	70	69	285(71.25%)
Not Aware	26	28	30	31	115(28.75%)
Total	100	100	100	100	400(100%)
Burning of plastic carry bags releases carcinogens in the air					
Aware	47	50	44	41	182(45.5%)
Not Aware	53	50	56	59	218(54.5%)
Total	100	100	100	100	400(100%)

As per the Table 6, the awareness level was very high among the respondents regarding the blocking of sewage pipes, reduction of rain water percolation, and deterioration of soil fertility. Awareness was low in respect of plastic carry bags affecting mortality of animals (71.25%) and burning of plastic carry bags causing cancer (45.5%). The profile of the respondents (the shop owners) in Table 1 clearly indicates that the respondents were from various age groups and with different educational qualifications. It shows that in spite of differences in age and qualifications and the nature of business they were engaged in, all shop owners were aware of the hazards of plastic carry bags. However, in spite of the awareness, all shop owners were using plastic carry bags as a packaging and sales promotion material in their shops. The government can focus on increasing awareness on how disposal of plastic carry bags poses a problem for animals and marine life and burning the same causes cancer so as to make the shop owners realize the need for reducing the usage of plastic carry bags.

The chi square test was applied with the help of SPSS package to find out the significant relationship between age and awareness with respect to each of the classifications of the hazards of plastic carry bags. The test revealed that there is no significant relationship between age and awareness regarding hazards of plastic carry bags. All shop owners, irrespective of their age, were aware of the hazards of plastic carry bags. In the same way, the chi-square test also revealed that there is no significant relationship between educational qualifications and awareness regarding hazards of plastic carry bags. Hence, both the hypotheses - H1 and H2 - are accepted.

➤ **Measures to Eradicate the Use of Plastic Carry Bags :** Production of plastic shopping bags dates back to the early 1950s. The plastic carry bags of those days were thick with handles fixed to the bag. The modern lightweight shopping bag was invented by Swedish engineer Sten Gustaf Thulin. In the early 1960s, Thulin developed a method of forming a simple one-piece bag by folding, welding, and die-cutting a flat tube of plastic for the

Table 7. Perception of Shop Owners on the Measures to Eradicate the use of Plastic Carry Bags

Measure	Nature of Business			
	Super Market	Grocery Store	Bakery	Fruits and Vegetables
Create awareness	4.72	4.76	4.69	4.75
Customers need to bring their own cloth/paper bags	4.34	4.47	4.34	4.25
Reuse plastic carry bags	4.14	4.20	4.05	4.05
Collection of plastic carry bags by local bodies	4.14	4.29	4.06	4.09
Segregation of waste at home	4.14	4.10	4.17	4.04
Setting up recycling plants	4.12	4.14	4.18	3.93
Charging the customers at shops	3.81	3.78	3.52	3.76
Levy the traders	3.68	3.56	3.43	3.78
Tax plastic carry bag manufacturers	3.87	3.53	3.66	3.79
Ban the use of plastic carry bags	4.39	4.41	4.37	4.50

packaging company Celloplast of Norrköping, Sweden. Thulin's design produced a simple, strong bag with a high load-carrying capacity, and was patented worldwide by Celloplast in 1965 (Plastic Shopping Bag, n.d.). From then onwards, the use of plastic carry bags spread very widely among people of all countries that the healthy practice of carrying our own cloth / jute bags expired. Though it is claimed that being cheap, hygienic, light, and load carrying capacity are the reasons for the success of the plastic carry bags ; in fact, the reasons as to why they should be banned is because the cost of plastic carry bags is very high in terms of cost of cleaning land spaces, water bodies, and drainage systems ; cost of loss of bio diversity ; health costs of having more plastics in the food chain, and the like. All these costs are borne by the society, and not by the producers . As claimed, plastic bags are neither economic nor eco friendly. The international plastic bags free day is celebrated on July 3 every year starting from 2010 (Zerowaste Europe, n.d.). There has been overwhelming support for this day from all parts of the world. Various measures are to be taken to reduce the use of plastic carry bags and contain the environmental hazards caused by it. A brief discussion on the measures is given below:

✎ **Reduce :** Reduction in the use of plastic carry bags could be achieved by creating awareness about the hazards of plastic bags among the shop owners and consumers. Plastic carry bags, if reused again & again, reduce the volume of consumption of plastic carry bags. But reuse of plastic carry bags is not recommended due to the health hazards of food being contaminated by colourants and pigments used to manufacture them. The public has to be encouraged to bring their own paper or cloth/jute bags for shopping.

✎ **Recycle :** The major drawback of plastic carry bags is ineffective waste management leading to landfills reducing rain water percolation, deterioration of soil fertility, and mortality of cows, goats, and marine animals, and so forth. Effective waste management by segregating the plastic carry bags at home itself and recycling the same by local bodies or the private sector will go a long way in reducing hazards of plastic carry bags.

✎ **Levy :** By charging customers at shops for plastic carry bags or by levying the traders using plastic carry bags for packaging, they become a costly product, and the increased cost acts as a deterrent towards their usage. Alternatively, the plastic carry bags manufacturer could be heavily taxed so that the prices of plastic bags are increased.

✎ **Ban :** The effectiveness of the ban on plastic carry bags to get rid of its menace depends on the implementation of the ban.

Table 8. Final Cluster Centres

	Cluster		
	1	2	3
Type of plastic carry bags used	2	2	2
Microns of the plastic carry bags used	1	0	2
Charging the customers for plastic carry bags	2	2	2
Littering of plastic carry bags blocks sewage lines	1	1	1
Littering of plastic carry bags reduces rain water percolation	1	1	1
Littering of plastic carry bags deteriorates soil fertility	1	1	1
Littering of plastic carry bags affects mortality of animals	1	1	1
Create awareness	5	5	5
Customers need to bring their own cloth/paper bags	4	4	4
Reuse plastic carry bags	4	4	4
Collection of plastic carry bags by local bodies	4	4	4
Segregation of waste at home	4	4	4
Setting up recycling plants	4	4	4
Charging the customers at shops	3	4	4
Levy the traders	2	4	4
Tax plastic carry bag manufacturers	2	4	4
Ban the use of plastic carry bags	4	4	5

The Table 7 gives the perception of the shop owners on the measures to eradicate the use of plastic carry bags. The Table 7 clearly indicates that the shop owners did not favour the option of charging the customers, levying the traders, and taxing the manufacturers out of the fear of losing their customers or revenue. In turn, they supported creating awareness regarding the hazards of plastic carry bags followed by encouraging the customers to bring their own bags. Banning of plastic carry bags was also welcomed by shop owners. This gives rise to the need for further study on the awareness of the public on the hazards of plastic carry bags and their willingness to carry their own bags for shopping.

Clustering of Shop Owners

Shop owners were clustered into three groups on the basis of five variables / attributes using K means clustering :

- ✍ Type of plastic carry bags used by them,
- ✍ Microns of the bags used,
- ✍ Charging customers for plastic carry bags,
- ✍ Awareness of the hazards of littering plastic carry bags,
- ✍ Perception on measures to eradicate the use of plastic carry bags.

The final cluster centres given below give the mean value of each variable for each of the three clusters. A brief description of each of the three clusters (based on Tables 8 and 9) is given below:

- ✍ **Cluster 1 (Defaulters)** : Retailers using 20 microns plain carry bags with no printing; not charging the customers for plastic carry bags ; fully aware of the hazards of plastic carry bags agreed that customers have to bring their own bags, and reuse them as much as possible ; plastic waste is to be segregated at home ; local bodies

Table 9. Distance Between Final Cluster Centres

Cluster	1	2	3
1		3.159	3.355
2	3.159		1.959
3	3.355	1.959	

need to collect plastic carry bags and set up recycling plants ; they did not agree to levy the traders or tax the manufacturers, but favoured a total ban of plastic carry bags - these shop owners fall under Cluster 1 ; 82 retailers fall under this cluster. They can be appropriately referred to as Defaulters, since they defaulted in fulfilling the Plastic Waste Management and Handling Rules, 2011 regarding the microns of plastic bags to be used and did not charge the customers for plastic carry bags.

✎ **Cluster 2 (Ignorant Defaulters) :** Retailers using plain carry bags with no printing, but who were unaware of the microns of the bags they were distributing ; not charging the customers for plastic carry bags ; fully aware of the hazards of plastic carry bags agreed that awareness needs to be created about the hazards of plastic bags among the customers, and they are to be encouraged to bring their own bags, and reuse the same as much as possible ; plastic waste is to be segregated at home ; local bodies need to collect plastic carry bags and setup recycling plants ; they also agreed to levy the traders and tax the manufacturers , and favoured a total ban of plastic carry bags - these shop owners fall under Cluster 2 ; 114 retailers fall under this cluster. They are rightly referred to as the Ignorant Defaulters since they were unaware of the microns of the bags they were using apart from defaulting in charging customers for plastic carry bags. This clearly indicates their ignorance of the Plastic Waste Management and Handling Rules, 2011.

✎ **Cluster 3 (Partial Compliers):** Retailers using 40 microns plain carry bags with no printing ; not charging customers for plastic carry bags ; fully aware of the hazards of plastic carry bags agreed that awareness needs to be created about the hazards of plastic bags among the customers, and they are to be encouraged to bring their own bags, reuse the same as much as possible ; plastic waste is to be segregated at home ; local bodies need to collect plastic carry bags and set up recycling plants ; they also agreed to levy the traders, tax the manufacturers, and strongly favoured a total ban of plastic carry bags - these shop owners fall under Cluster 3. The strength of this cluster is 204 retailers. This cluster is named as Partial Compliers since they fulfilled a part of the Plastic Waste Management and Handling Rules, 2011, that is, they used carry bags of 40 microns as prescribed by the rules, but did not charge customers for plastic carry bags.

In spite of significant differences between the shop owners in these clusters in terms of complying with Plastic Waste Management and Handling Rules, 2011, they are similar in terms of awareness of the hazards of plastic carry bags, and they agreed with the measures to reduce and recycle the plastic carry bags. They differed among themselves with regards to the measures of charging the customers, levying the traders, and taxing the manufacturers of plastic carry bags.

Defaulters did not agree with the measures relating to levying the traders ; whereas, the Ignorant Defaulters and Compliers agreed with the measures of levying, that is, charging the customers, levying the traders, and taxing the manufacturers to make the plastic carry bags costlier. This indicates that only because of ignorance, the respondent shop owners did not comply with the rules. They were inclined to reduce the hazards of plastic carry bags. That is why they agreed for even levying the retailers using plastic carry bags. Partial Compliers fulfilled the rule relating to microns of the carry bags, but defaulted in charging the customers. The fear of loss of customers might be the reason since 92.75% (371 / 400) of the retailers were not charging customers while giving away the plastic carry bags (refer to Table 4). Once the government strictly enforces the rules, these retailers might fully comply with the same.

Table 10. Inclusion of Retailers in Different Clusters

Nature of Business	Defaulters	Ignorant Defaulters	Partial Compliers	Total
Super markets	16(19.5%)	24(21.1%)	60(29.4%)	100
Grocery stores	25(30.5%)	32(28.1%)	43(21.1%)	100
Bakery	27(32.9%)	30(26.3%)	43(21.1%)	100
Fruits & Veg. vendors	14(17.1%)	28(24.6%)	58(28.4%)	100
Total	82(100%)	114(100%)	204(100%)	400

The Table 10 shows the participation of different shop owners – super markets, grocery stores, bakeries, and fruits & vegetable vendors in the various clusters. Bakery and grocery stores were the highest defaulters as well as ignorant defaulters either by using plastic carry bags of less than 40 microns or the shop owners were unaware of the microns of the bags they were using. Owners of super markets followed by fruits & vegetable vendors were the highest partial compliers. As already discussed, the partial compliers will start complying with the Plastic Waste Management Rules 2011 fully once there is a strict enforcement of the rules. The government has to focus more on bakery and grocery stores where most of the owners are unaware of the rules or knowingly default by using plastic carry bags of less than 40 microns.

Conclusion and Implications

The Plastic Waste Management Rules 2011 have clearly spelled out not to use plastic carry bags of less than 40 microns and to charge the customers for plastic carry bags (Sohail, n.d.) ; 35.5% of the retailers were not aware of the microns of the bags they were using ; and 23.5% of the shop owners were using carry bags of less than 40 microns ; 93% of the retailers were not charging the customers for carry bags. Bakery and Grocery stores were the major defaulters. Hence, the government has to focus more on them and ensure strict implementation of the rules to contain the hazards of plastic carry bags.

The proposed research project will enhance the knowledge base with respect to management practices to be followed in framing policy measures to eradicate or to reduce the menace caused by plastic carry bags. The study has pinpointed the defaulters responsible for the poor state of affairs based on which the government can design appropriate policy decisions for eradication of polythene bags.

Limitations of the Study and Scope for Further Research

The study is limited to Chennai city and the shop owners in Chennai alone were surveyed. Though plastic carry bags are used invariably by all the shops, only super markets, grocery stores, bakeries, fruits and vegetable vendors were covered by the study.

The results of this study indicate that the major defaulters responsible for free supply of plastic carry bags were bakery and grocery stores. Similar research could be undertaken to study the perception of the public and assess who is responsible for littering of the landscape with plastic carry bags so that an integrated approach could be taken to reduce the hazards of plastic carry bags. Research on the alternatives for plastic carry bags will also facilitate eradication of plastic carry bags.

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