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## **A STUDY ON SUSTAINABLE CLOTHING MARKET WITH REFERENCE TO PUNE CITY**

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### **Abstract:**

*The purpose of this study is to understand the buying behavior towards sustainable and eco-clothing. This paper presents the facts, figures and general awareness about eco fashion and eco clothing. It also elaborates the environmental impacts about the raw material and manufacturing process used for clothing and suggests Sustainable Raw Material be preferred for sustainable clothing's in India, The purpose of this paper is also to examine the relationship between eco fashion and their willingness to pay a premium for eco-clothing's with the focus on gender and age group. This paper classifies the consumer into 7 types with respect to specific attitude to sustainable and eco-clothing within the sample of 119 in Pune region. The findings will help fast fashion retailers, marketers, environmental activists, ecological researchers, charity institutions and public policy makers.*

**Keywords:** Eco-Clothing; Consumer Behavior; Eco-Fashion; Sustainable; Eco Friendly Fabrics; Environmental Impact.

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### **1. Introduction**

"Sustainability is a megatrend in fashion," says Peder Michael Pruzan-Jorgensen, a VP at BSR, a San Francisco-based firm that helps businesses create sustainable strategies. "There are few brands not considering it. That was not the case 10 years ago." It certainly was not: According to the not-for-profit Textile Exchange, the global organic cotton market grew from \$240 million in 2002 to \$5.16 billion in 2010. **The U.S. and India cumulatively accounted for more than 40% of the global eco fiber market in terms of value in 2014.** The global eco fibers market size, in terms of value, is projected to reach USD 74.65 Billion by 2020, and is projected to record a CAGR of 11.46% between 2015 and 2020.

Eco-fashion can be defined as clothing that is designed for long lifetime use; it is produced in an ethical production system, perhaps even locally; it causes little or no environmental impact and it makes use of eco-labelled or recycled materials (see, e.g., Joergens, 2006; Fletcher, 2008). Sustainable issues in clothing production are very complex because the supply chain in the clothing industry is fragmented, complicated and global. The manufacturing processes are less transparent than in food production, for example. Hence sustainability and ethicality in eco-clothing are

evaluated only through a limited and very narrow lens, for example the use of an environmentally friendly material or production method (Fletcher, 2008; Beard, 2008).

In a country like netherland for the Clothing Care four functions have been formulated

- Eternally yours, limited wardrobes of high quality unique made to measure clothes; maintenance and laundry is serviced;
- Clothing Pool, shared stocks and shared maintenance of children's clothing at e.g. neighborhood level;
- Outsourcing, clothing is leased, borrowed or rented from various service providers who also do the laundry and maintenance, see also the example DOS below, and
- Chains of Users, clothing is bought new or second hand via e-commerce; the laundry's done at home.

The environmental aspects of consumer behaviour have been studied for quite a long time now, with the scope of research gradually extending also to social and ethical issues (Anderson and Cunningham, 1972; Anderson, Henion and Cox, 1974; Brooker, 1976; Mayer, 1976; Balderjahn, 1988). However, work in the realm of socially conscious consumption experienced a surge of research only in the last few years (Cotte et al., 2009), with a particular increase in academic output on ethical consumer behavior being observed from 2006 (Papaoikonomou et al., 2011)

In Indian Context for future of sustainable fashion the change in Designer's Perspective to promote Ethical Fashion among Textile Entrepreneurs, organizations such as National Association of Sustainable Fashion Designers provide designers tools for Sustainability through various Training and Development activities.

To address the triple bottom line of Eco-Friendly fashion designers have to consider

- Sustainability and Renew-ability of the fibre,
- The environmentally conscious index of the process of turning raw fibre into textile,
- The working condition of the Human resources and
- The Carbon Footprint of the material in its Whole Life cycle.

## **2. Environmental Impacts of Different Materials used for Clothing**

### **Nylon and Polyester**

Made from petrochemicals, these synthetics are non-biodegradable as well, so they are inherently unsustainable on two counts. Nylon manufacture creates nitrous oxide, a greenhouse gas 310 times more potent than carbon dioxide. Making polyester uses large amounts of water for cooling, along with lubricants which can become a source of contamination. Both processes are also very energy-hungry.

### **Rayon (viscose)**

This is another artificial fibre, made from wood pulp, which on the face of it seems more sustainable. However, old growth forest is often cleared and/or subsistence farmers are displaced to make way for pulpwood plantations. Often the tree planted is eucalyptus, which draws up phenomenal amounts of water, causing problems in sensitive regions. To make rayon, the wood pulp is treated with hazardous chemicals such as caustic soda and sulphuric acid.

### **Cotton**

Natural fibres have their problems, too. Cotton is the most pesticide intensive crop in the world: these pesticides injure and kill many people every year. It also takes up a large proportion of agricultural land, much of which is needed by local people to grow their own food. Herbicides, and also the chemical defoliant which are sometimes used to aid mechanical cotton harvesting, add to the toll on both the environment and human health. These chemicals typically remain in the fabric after finishing, and are released during the lifetime of the garments. The development of genetically modified cotton adds environmental problems at another level. Organic cotton is quite another matter.

### **Wool**

Both agricultural and craft workers in the UK suffer from exposure to organophosphate sheep dip.

### **Manufacturing Processes**

Getting from fibre to cloth – bleaching, dyeing, and finishing – uses yet more energy and water, and causes yet more pollution.

Dyeing alone can account for most of the water used in producing a garment; unfixed dye then often washes out of garments, and can end up colouring the rivers, as treatment plants fail to remove them from the water.

Dye fixatives – often heavy metals – also end up in sewers and then rivers.

Cloth is often bleached using dioxin-producing chlorine compounds.

And virtually all polycotton (especially bedlinen), plus all ‘easy care’, ‘crease resistant’, ‘permanent press’ cotton, are treated with toxic formaldehyde (also used for flameproofing nylon).

### **Other Materials used in Clothing and SHOES INCLUDE**

Leather (with polluting tanning and dyeing processes, as well as intensive farming impacts and animal rights issues).

PVC – a notoriously toxic material.

Harmful solvents – used e.g. in glues and to stick plastic coatings to some waterproof fabrics.

Sustainable Raw Material for fabrics

While there are serious environmental impacts associated with many fabrics there are some whose impact is much less.

**Organic cotton:** Wear is a campaign run by the Pesticide Action Network UK (PAN UK). It aims to reduce the problems caused by pesticides used particularly in cotton and promotes organic and fair trade alternatives. It provides information for consumers on the environmental impacts of fabric production. Organic cotton garments are likely to be free from chlorine bleaches and synthetic dyes.

**Hemp** is a thoroughly ecological crop: highly productive, easy to cultivate and pest tolerant, so needing few or no agrochemicals whilst at the same time binding and enriching the soil with its deep roots. It is a traditional fibre that went out of favour in the 1930s for political reasons, rather than practical ones. It is now at long last undergoing something of a revival:

Hemp clothing specialists include The Hemp Store, and The Hemp Trading Company, which offers ‘skatewear, boardwear, streetwear, clubwear’. Hemp yarn is available from the House of

Hemp whose website contains a lot of useful information on hemp generally. Note: agricultural hemp, though versatile and productive as a fibre, oil and food plant, is useless as a narcotic!

**Bamboo** is the latest plant material to hit the eco-friendly fabrics market. It is described as hypoallergenic, absorbent, fast-drying and naturally anti-bacterial and comes from a very fast-growing plant. It's not all good though, there are some concerns over the chemicals used in its processing, however less pesticides and fertilisers are used, and it is still a sustainable choice compared to most other fabrics. Bam Bamboo Clothing is a UK manufacturer specialising in bamboo clothing but increasingly other clothing suppliers are stocking bamboo fabric goods.

**Linen** is made from flax, another traditional fibre crop which needs few chemical fertilisers, and less pesticide than cotton.

**Organic wool** is increasingly becoming available: it is produced using sustainable farming practises and without toxic sheep dips. Cornish Organic Wool source organic wool from local farmers who are Soil Association accredited or certified with Organic Farmers & Growers Ltd (OF&G). They supply knitting kits and spun wool.

**Recycled polyester** Look out for full-on, hi-tech fleece jackets made from recycled drinks bottles, e.g. some outdoor fleece products by Patagonia. (Patagonia also offer a recycling service for their Capilene base layers, via their Common Threads garment recycling scheme.) Outdoor gear company VauDe's Ecolog range is both recycled and fully recyclable – everything, down to the zips and buttons, is 100% polyester. VauDe established the Ecolog Recycling Network for complete recycling of pure polyester materials in 1996.

Even some **hi-tech waterproofs** can potentially be recycled – if facilities exist. These include water-based coatings (applied without harmful solvents) and membranes such as Sympatex, which is 100% polyester. Avoid PVC, laminates and polyurethane.

### 3. Research Gap

Very less information is available about the consumer's preference and distinction for sustainable clothing's in India, where cheap alternatives are available. It is also evident that there are some factors which consumer takes in account while making purchasing decision in apparel and clothing. In an attempt to reduce this information gap, this study set out to determine how general apparel selection criteria applied by consumers (fashion, comfort, quality, wear ability, price, etc.) and their buying habits, on the one hand, and environmental and social apparel selection criteria, on the other, influence their behavior towards sustainable textiles and clothing. It also sought to find out how important the latter criteria are for different groups of consumers formed in the course of research, as well as the relationship between someone's belonging to one of the distinguished groups and their behaviors in the market for sustainable and Eco-clothing. The direct or indirect sources of many ecological and social concerns that beset the clothing industry are related to surging consumption and fast fashion that comes with it (Sluiter, 2009; Koszewska, 2011b).

#### 4. Demographic Details

From a sample of approximately 180, 119 best and complete response were selected which comprises 65.5 % of male and 34.5 % were female. The maximum samples population has age group between 21 to 30 and have maximum of student comprising 63 % of total sample whereas around 20% of sample is within the age group of 41-50 which gives a good mix of age group. Approximately 89 % of sample is graduate and post graduate. 50% of the samples have income greater than 30000.

<b>Gender</b>		<b>Frequency</b>	<b>Percent</b>	<b>Valid Percent</b>	<b>Cumulative Percent</b>
Valid	Male	78	65.5	65.5	65.5
	Female	41	34.5	34.5	100.0
	Total	119	100.0	100.0	
<b>Highest Qualification</b>		<b>Frequency</b>	<b>Percent</b>	<b>Valid Percent</b>	<b>Cumulative Percent</b>
Valid	Graduate	47	39.5	39.5	39.5
	Post graduate	56	47.1	47.1	86.6
	PhD	10	8.4	8.4	95.0
	Others	6	5.0	5.0	100.0
	Total	119	100.0	100.0	
<b>Age</b>		<b>Frequency</b>	<b>Percent</b>	<b>Valid Percent</b>	<b>Cumulative Percent</b>
Valid	less than 21	8	6.7	6.7	6.7
	21 to 30	75	63.0	63.0	69.7
	31 to 40	11	9.2	9.2	79.0
	41 to 50	22	18.5	18.5	97.5
	above 50	3	2.5	2.5	100.0
	Total	119	100.0	100.0	
<b>Income (per month)</b>		<b>Frequency</b>	<b>Percent</b>	<b>Valid Percent</b>	<b>Cumulative Percent</b>
Valid	less than 30000	60	50.4	50.4	50.4
	31000 to 50000	25	21.0	21.0	71.4
	51000 to 70000	22	18.5	18.5	89.9
	70000 to I lakh	2	1.7	1.7	91.6
	Above I lakh	10	8.4	8.4	100.0
	Total	119	100.0	100.0	

#### 5. Research Hypothesis

**Hypothesis 1:** The consumer groups themselves based on attitude and buying behavior with reference to sustainable and eco clothing.

There are different segments which can be classified based on their attitude and buying pattern. This classification tend to give the inputs about the consumer types and the common attributes necessary for distinguishing one from other.

**Hypothesis2:** The awareness level about sustainable and eco clothing differs among male and female.

Null hypothesis is H0: The awareness level about sustainable and eco clothing is independent of Gender.

Alternate Hypothesis H1: There is a significant relationship between gender and the awareness level.

**Hypothesis 3:** Willingness to pay extra for sustainable and eco clothing differs among male and female.

Null hypothesis is H0: Willingness to pay extra for sustainable and eco clothing is independent of gender.

Alternate Hypothesis H1: There is a significant relationship between gender and Willingness to pay extra for sustainable and eco clothing.

**Hypothesis 4:** Willingness to pay extra for sustainable and eco clothing depends on the age group.

Null hypothesis is H0: Willingness to pay extra for sustainable and eco clothing is independent of age group.

Alternate Hypothesis H1: There is a significant relationship between age group and Willingness to pay extra for sustainable and eco clothing.

## 6. Research Analysis

Based on factor analysis varimax rotation it is found that seven factors have been extracted which accounts for about 68.8 % of total variation having Eigen Value more than 1.

Factor 1: They are **Socio-Ecological** consumer generally check producers country while buying clothes and buy clothes made by natural products, buy clothes which has eco labels, eco-friendly tags before buying, they consider the rights of the workers at workplace, they redesign old clothes and they check whether the product involves child labor, they also check raw material composition before buying clothes. **Socio-Ecological** consumer represented 17.74 % of the surveyed population of consumers.

Factor 2: They are **Fashion Trendy** consumer frequently buy new clothes for self and member of family they are influenced by fashion and new trends and care about the brand while buying clothes they like original, unique & designer clothes they like to buy clothes of global brands. They do not believe in recycling of clothes. **Fashion Trendy** consumer represented 12.59 % of the surveyed population of consumers.

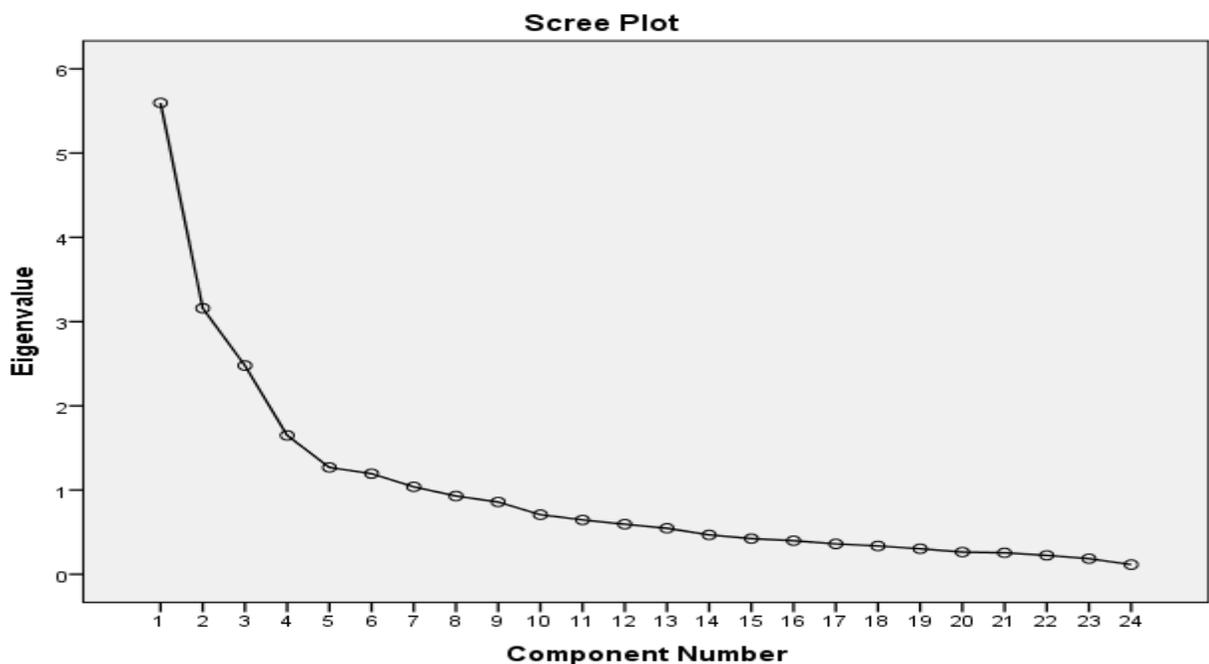
Factor 3: They are **Conservative consumer** kind of people who gives old clothes in charity they believe in recycling of clothes and buy clothes to wear them for several months they redesign old clothes and give old clothes to my friends or family members. They don't like original, unique & designer clothes. **Conservative** consumer represented 8.58% of the surveyed population of consumers.

Factor 4: They are **Ecological consumer** and always buy clothes which are durable and tough and believe clothing industry create adverse effect on the environment, always value classical, subdued (light colors/not harsh) products, the price of the clothes are important to them and would buy one up market products than several less expensive products of inferior quality they never check producers country while buying clothes they I never buy new clothes for themselves or member of family. **Ecological** consumer represented 8.38% of the surveyed population of consumers.

Factor 5: They are **Utilitarian consumer** they frequently buy clothes at local markets they give old clothes to friends or family members they always check whether the product involves child labor they redesign old clothes. They would never buy one up market products than several less expensive products of inferior quality **Utilitarian** consumer represented 7.74% of the surveyed population of consumers.

Factor 6: They are **Price Conscious consumer** and always buy clothes at the sale (Discount) they believe the price of the clothes are important they buy clothes to wear them for several months they frequently buy clothes at local markets. They may never consider the rights of the workers were maintained and never check whether the product involves child labor **Price Conscious** consumer represented 7.64 % of the surveyed population of consumers.

Factor 7: They are **Slow Fashionistas**, they feel they will not wear what they have bought they believe clothing industry create adverse effect on the environment they always check whether the product involves child labor and frequently buy new clothes for themselves or member of family and only buy clothes made by natural products .They will never check raw material composition before buying clothes they never value classical, subdued (light colors/not harsh) products they never like to buy clothes of global brands **Slow Fashionistas** consumer represented 5.56% of the surveyed population of consumers.



Rotated Component Matrix <sup>a</sup>							
	Component						
	Socio Ecological	Fashion Trender	Conservative	Ecological	Utilitarian	Price Conscious	Slow Fashionistas
I care about the brand while buying clothes	.206	<b>.733</b>	-.023	.011	-.253	.248	-.131
I like original, unique & designer clothes	.133	<b>.637</b>	-.128	.265	-.183	.052	-.056
I like to buy clothes of global brands	.359	<b>.610</b>	.052	.002	-.390	.254	-.191
I'd buy one up market products than several less expensive products of inferior quality	.203	.349	.099	.370	-.499	.168	-.178
I feel I will not wear what I have bought	.456	-.133	.129	.083	-.078	.120	<b>.719</b>
I will always check raw material composition before buying clothes	.504	.078	.141	.238	-.139	.052	-.558

I always value classical, subdued(light colors/not harsh)products	.183	.338	.072	<b>.566</b>	.075	.018	-.342
I always check producers country while buying clothes	.812	.148	.083	-.033	-.057	.246	-.034
I always check the clothes has eco labels, eco-friendly tags before buying	.793	.222	-.049	-.020	.036	.019	-.056
I always check whether the product involves child labour	.587	.202	.206	.098	<b>.305</b>	-.197	.285
I always consider the rights of the workers were maintained	.753	.060	-.009	.142	.130	-.442	.027
I only buy clothes made by natural products	.794	.007	-.046	.225	.013	.195	.092
I always buy	.253	.081	.261	.026	.200	<b>.726</b>	.077

clothes at the sale(Discount)							
I frequently buy clothes at local markets	.081	-.006	.077	.144	<b>.725</b>	.344	-.020
The price of the clothes are important to me	-.124	.157	-.062	<b>.501</b>	.028	<b>.653</b>	.000
I always buy clothes which are durable and tough	.023	.040	.171	<b>.817</b>	-.080	.021	-.063
I believe clothing industry create adverse effect on the environment	.185	.035	.062	<b>.590</b>	.167	.157	<b>.303</b>
I believe in recycling of clothes	.163	-.193	<b>.708</b>	.140	.160	.193	-.075
I redesign my old clothes	.630	.017	<b>.430</b>	.051	.275	-.055	.084
I give my old clothes to my friends or family members	.293	-.052	.299	-.009	<b>.669</b>	-.012	-.036
I give my old clothes in charity	.114	.191	<b>.754</b>	.056	.085	-.132	.070

**Hypothesis2:** The awareness level about sustainable and eco clothing differs among male and female.

Null hypothesis is H0: The awareness level about sustainable and eco clothing is independent of Gender.

Alternate Hypothesis H1: There is a significant relationship between gender and the awareness level.

Chi-Square Tests			
	Value	Df	Asymp. Sig. (2-sided)
Pearson Chi-Square	3.134 <sup>a</sup>	6	.792
Likelihood Ratio	3.223	6	.780
Linear-by-Linear Association	.516	1	.472
N of Valid Cases	119		

- a. 4 cells (28.6%) have expected count less than 5. The minimum expected count is .69.

At 0.5 % significance level it is evident using chi square at p value of 0.792 it is significant that the awareness level does not differ in male and female.

**Hypothesis 3:** Willingness to pay extra for sustainable and eco clothing differs among male and female.

Null hypothesis is H0: Willingness to pay extra for sustainable and eco clothing is independent of gender.

Alternate Hypothesis H1: There is a significant relationship between gender and Willingness to pay extra for sustainable and eco clothing.

Cross Tab

Gender * How much will you pay more for clothes labeled as “sustainable” or “environmentally-friendly” than a “higher quality” clothes. Cross tabulation								
		How much will you pay more for clothes labeled as “sustainable” or “environmentally-friendly” than a “higher quality” clothes.					Total	
		10-20%	20-30%	30-40%	40-50%	more than 50%		
Gender	male	Count	50	13	9	3	3	78
		Expected Count	51.1	13.8	7.9	2.6	2.6	78.0
	female	Count	28	8	3	1	1	41
		Expected Count	26.9	7.2	4.1	1.4	1.4	41.0
Total		Count	78	21	12	4	4	119
		Expected Count	78.0	21.0	12.0	4.0	4.0	119.0

Chi-Square Tests			
	Value	Df	Asymp. Sig. (2-sided)
Pearson Chi-Square	.987 <sup>a</sup>	4	.912
Likelihood Ratio	1.027	4	.906
Linear-by-Linear Association	.609	1	.435
N of Valid Cases	119		
a. 5 cells (50.0%) have expected count less than 5. The minimum expected count is 1.38.			

At 0.5 % significance level it is evident using chi square at p value of 0.912 that willingness to pay extra does not vary according to gender. The male and female are equally likely to pay premium prices for sustainable and eco clothing.

**Hypothesis 4:** Willingness to pay extra for sustainable and eco clothing depends on the age group. Null hypothesis is H0: Willingness to pay extra for sustainable and eco clothing is independent of age group.

Alternate Hypothesis H1: There is a significant relationship between age group and Willingness to pay extra for sustainable and eco clothing.

Cross Tab

Age * How much will you pay more for clothes labeled as “sustainable” or “environmentally-friendly” than a “higher quality” clothes. Crosstabulation									
			How much will you pay more for clothes labeled as “sustainable” or “environmentally-friendly” than a “higher quality” clothes.					Total	
			10-20%	20-30%	30-40%	40-50%	more than 50%		
Age	less than 21	Count	5	1	1	1	0	8	
		Expected Count	5.2	1.4	.8	.3	.3	8.0	
	21 to 30	Count	48	12	11	2	2	75	
		Expected Count	49.2	13.2	7.6	2.5	2.5	75.0	
	31 to 40	Count	5	5	0	1	0	11	
		Expected Count	7.2	1.9	1.1	.4	.4	11.0	
	41 to 50	Count	17	3	0	0	2	22	
		Expected Count	14.4	3.9	2.2	.7	.7	22.0	
	above 50	Count	3	0	0	0	0	3	
		Expected Count	2.0	.5	.3	.1	.1	3.0	
	Total		Count	78	21	12	4	4	119
			Expected Count	78.0	21.0	12.0	4.0	4.0	119.0

Chi-Square Tests			
	Value	Df	Asymp. Sig. (2-sided)
Pearson Chi-Square	19.750 <sup>a</sup>	16	.232
Likelihood Ratio	21.991	16	.143
Linear-by-Linear Association	.946	1	.331
N of Valid Cases	119		

At 0.5 % significance level using chi square it may be concluded that at p value of 0.232 we must accept null hypothesis i.e willingness to pay extra for sustainable and eco clothing is independent of age group.

## 7. Conclusion

The consumers can be broadly classified based on their buying behavior and attitude in seven categories for the purpose of eco clothing. **Socio-Ecological** consumers have share of 17.74 % where as **Fashion Trendy consumer have a share of 12.59 %**. It is significantly proved that the gender and age does not make any difference while selecting the eco clothing. It is also evident that willingness to spend more on eco clothing does not depend on the gender and age group. Since maximum sample are from the age group of 21-30 and mainly students so income level is not taken into consideration for cause and effect and other statistical test. In addition to the previous studies where six factors were extracted this study has categorized the consumer with seven distinct factors. Some of the material listed creates impacts on the environment and some alternative were also suggested for sustainable clothing's.

## 8. Scope for Further Research

Since this research is carried in very closed geographical region with limited samples due to time constrains especially around wakad and Tathwade, Pune it can be further extended to other region or different states of India altogether with more samples to get the exact knowledge about the attitude and buying preference. It can also be tested and compared with other Asian and South Asian countries where clothing and apparel were available at the lowest cost due to low cost of raw material and cheap labor.

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