

Effect of sustainability-related activity on behaviour: consumer vs. designer

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Abstract. The lack of awareness of the possible consequences of natural resource depletion is the major reason behind human carelessness toward nature. In this regard, designers who have a greater understanding of using materials for different applications, are to be more concern about its scarcity. It has been hypothesized in this work that compared to end users, designers who have direct experience with the consequences of material depletion would be more inclined to take responsibility to preserve the minerals. We made a survey questionnaire and collected the data from participants (N=100) across India to understand the relation between the designer (N=50) and consumer (N=50) perceptions of material use and standards related to the sustainable product. We found that designers are more concerned about the appropriate use of natural resources. They are keen to act effectively with a mind-set to preserve natural mineral resources. We can say that these perceptual differences are an indication of enthusiasm to save the climate. Therefore, highlighting the relationship between consumer and designer perception about material consumption and development of related policies may be a useful strategy for increasing the awareness toward conservation of minerals.

Keywords: Sustainable Product; Minerals; Consumer; Designer, Perception, Sustainable Behaviour

1. Introduction

The commonly used definition of sustainable development was given by Brundtland [1], which states “Sustainable development is the development that meets the need of present without compromising the ability of future generation to meet their own”. However, the sustainable product can be defined as “A product which has the ability to continue a well-defined social, economic and environmental performance forever”. It is known that nature is the source of all mineral required survival of all living beings. Thus, if we continue to consume natural resources without conservation, the survival will be difficult for all living beings [2]. To save the natural resources, the concepts such as designing products with 3R [3] principles and use of sustainable product [4,5] have already been introduced in many developed and developing nations. However, these targets cannot be achieved without major changes in societal structures that will necessarily require a commitment of the wider public to use the sustainable product and save minerals [6]. Many surveys have been conducted on public perception of the sustainable product [4,7–10] and many people are concern about the sustainable product. However, they are not adopting sustainable behaviour [4] may be due to the perception that it is a distant issue i.e. sustainable product are not available thus people are not expected to use it [11].

Since during above-mentioned survey, people have indicated a lack of availability of sustainable products. Thus, the role of a designer comes into the picture. Designers are expected to design the sustainable product by taking care of conservation of minerals as well as public demand. Hence, designers are under more pressure to fulfil public demand by designing more number of the sustainable product. Designers are using different sustainability criteria to design sustainable product [12,13]. Additionally, design researcher also trying to get a number of design methods to assist the designer in various design stages to design a sustainable product [14]. However, selection of material is one of the criteria, as a wrong selection or wastage of material can have larger associated impacts on the environment[7,8]. For example, researchers are using the minimum amount of lubricants for



machining [15], so that the wastage of lubricants, as well as associated environmental impacts, can be reduced. Thus, we can save the minerals directly as well as we can initiate various activities to save minerals indirectly [16–18], such as minimizing the use of technology [19] by understanding the use suitable technology for the specific application.

We observe, that the lack of awareness about the possible consequences of resource depletion might be one of the possible reason that people do not care about conservation of minerals. We conducted an online survey to understand the awareness about the importance of material from the perspective of the designer (who probability more aware of materials consumption and conservation) and consumer (who are the end users of the product). We believe that highlighting of studies related to the perceptual difference of people would be beneficial for the public so that they can take appropriate action to improve their behaviour towards the environment.

2. Methodology

2.1. Formulation of survey

We prepared an online survey questionnaire to observe designer and consumer perceptions of materials and standards related to sustainable products. Questions were prepared by a panel of two academic researchers and further refined after drawing feedback from a pilot study. Two designers and two consumers participated in the pilot study. Questions assessing individual's action and the importance of material and standards relating to the sustainable product are given in Table 1. Participants were asked to indicate their response on a rating scale of one to three, where one represents the least preferred choice and three represents the highly preferred choice. Although the questions were not straightforward, however, we intended to understand their perception through closely related activity happening around them. We have sent the online survey link to more than 100 people until we get the required sample size of informed participants. The sample size was decided to be 100 (50 designers and 50 consumers) consisting of adult participants from different regions of India.

Table 1: Questions assessing personal activities and behaviour

Concept	Questions	Option	Designer Mean (SD)	Consumer Mean (SD)
Profession	What is the best way to describe your profession?		Designer / Consumer	
Perception regarding the involvement in different activity of using material and standards	Recyclable material	Three-point scale (No-Less-High)	2.80 (0.45)	2.70 (0.58)
	Long lasting product		2.76 (0.48)	2.10 (0.81)
	Standard compliant product		2.54 (0.54)	2.12 (0.72)
	Life cycle of the product		2.68 (0.55)	2.16 (0.79)
	Optimum material		2.68 (0.51)	2.02 (0.77)
Understanding one's responsibility for conservation of natural resources through regular habits and activities	Use biodegradable utensil	Three-point scale (No-Rarely-Often)	2.06 (0.79)	1.54 (0.84)
	Energy Conservation at home		2.82 (0.44)	2.22 (0.89)
	Energy Conservation at Office		2.60 (0.64)	1.98 (0.91)
	Take own bags for shopping		2.62 (0.57)	1.94 (0.93)
	Use separate bin for waste disposal		2.34 (0.77)	1.84 (0.77)

2.2. Analysis of survey data

We collected the responses using Google® survey followed by their compilation in a Microsoft Excel® worksheet. Further, mean and standard deviation of responses were evaluated. This was followed by an ANOVA single factor analysis with $\alpha < 0.01$ and 99% confidence level to examine the difference in perception and personal activities of designer and consumer. The variables such as age, gender, educational background were considered separately within the analysis, to ensure the results free from their effect.

3. Results and Discussion

3.1. Perception regarding the involvement in different activity of using material and standards

We calculated the mean and standard deviation of responses on a scale of one to three. Analysis of responses reveals that the designer, as well as consumer both, are having a similar concern about the importance of using the recyclable material for the sustainable product. However, on the importance of other related aspects (i.e. the importance of long lasting product, standard compliant product, the life cycle of product and use of optimum material) in developing a sustainable product, designers are more concerned than consumers as shown in Fig 1. With ANOVA single factor analysis of mean values from Table 1, we found that the perceptual difference of various aspects is significantly different between designer and consumer. We also found the significant difference between their activities. For example, we can interpret the results that consumers are the least concern about the use of optimum material with a mean rating of 2.02 and highly concern of recyclable material with a mean rating of 2.70, which differ significantly.

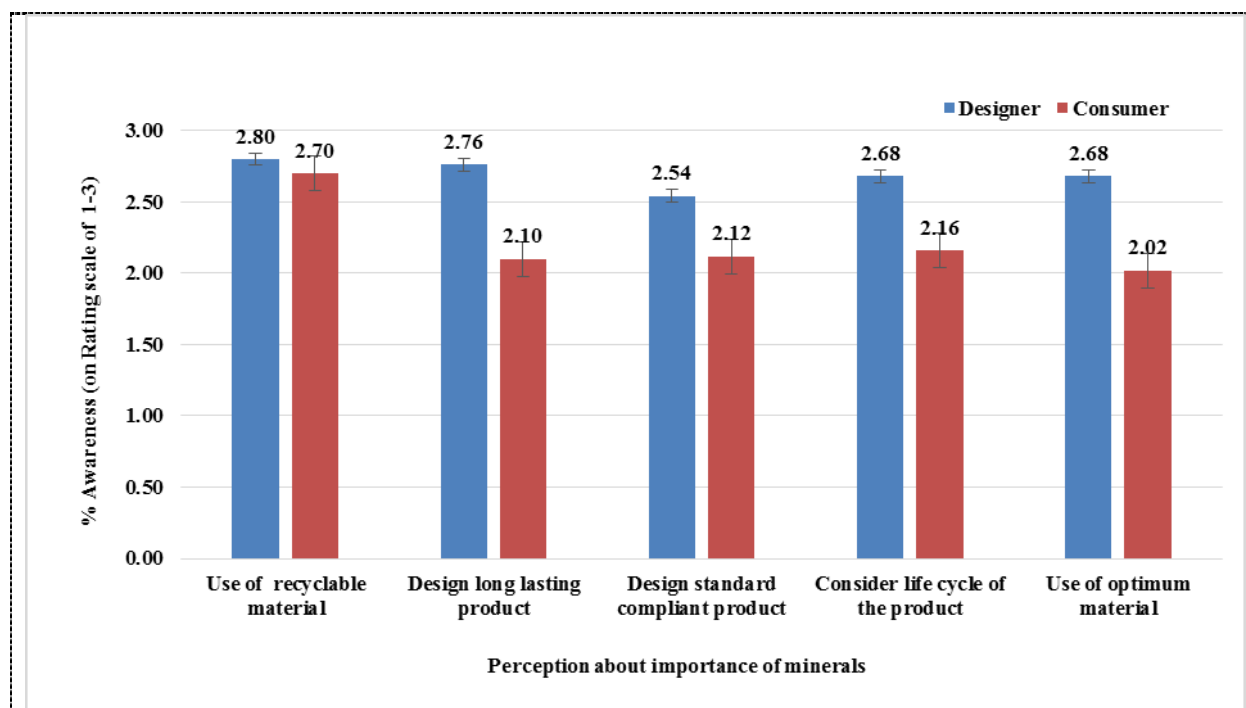


Figure 1. Perception regarding the involvement in different activity of using material and standards

The significant difference between a designer and consumer perception support our hypothesis, that, designers who are directly involved with designing products, should be more concern of the matter in comparison to the consumer. Although consumers' awareness of recyclable material might have increased in recent years, they are still unaware of using the optimum material for sustainable product development. Therefore, it is the responsibility of the manufacturers to share material and energy consumption details with consumers. In addition, the current status of the material available in nature and possible consequences of its scarcity should also be mentioned. This may help in changing the consumer attitude towards the sustainable use of the product.

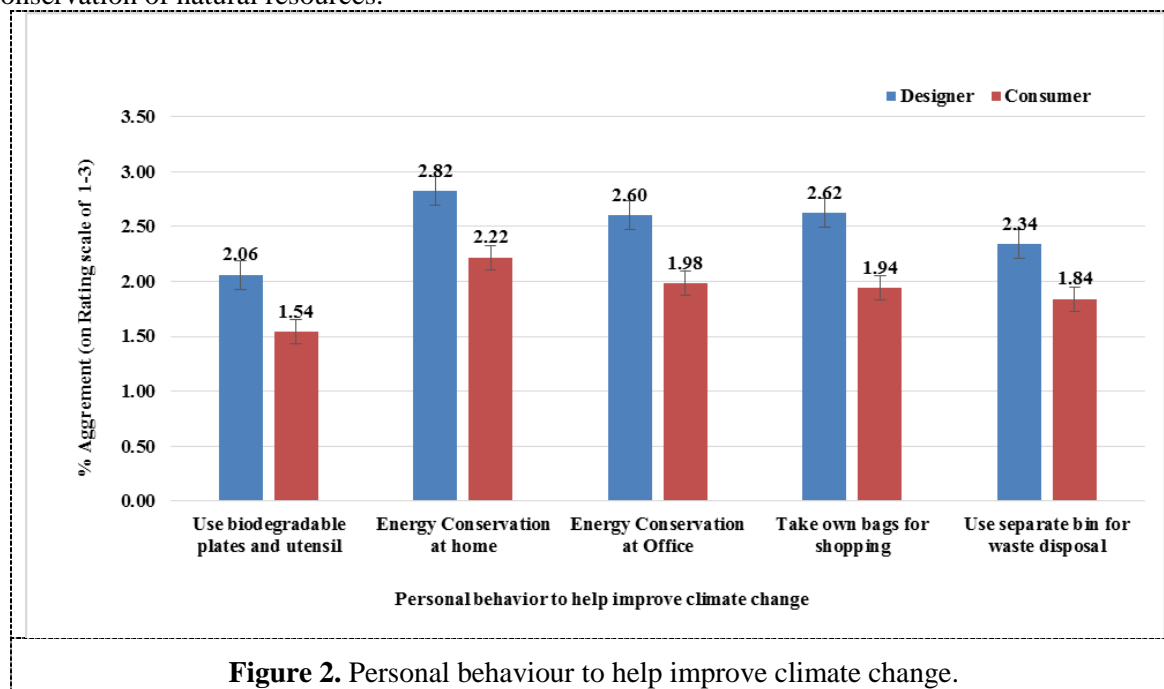
It was observed that designers also had a difference of opinions among themselves. This may be attributed to their individual preferences or to their unawareness towards possible ways to introduce sustainability into the product. For example, within designers, we can interpret that, the designer has

shown least concern of producing the standard compliant product. However, it is unclear from the survey that whether the designers are aware of sufficient standards or there is non-availability of a standard related to sustainable products. Thus, it should be assessed that whether there is a need for an increase in design standards for sustainable products or not. In addition, we should focus on increasing the methods to support the designer in various design stages of a sustainable product.

3.2. Understanding one's responsibility for conservation of natural resources in regular activities

The responses related to individual's responsibility toward nature we found that cost plays a major role in adopting a sustainability habit. For example, energy saving at home is highly preferred, whereas, use of biodegradable plates and utensils is a least preferred habit. In addition, the popularity of the energy saving campaign in the country over activities such as the use of biodegradable products may also be a major reason for the disparity. Furthermore, it is interesting to notice that people are adopting the habits such as energy saving at the office, use of reusable carry bags and use of distinct bins for a typical garbage.

A deeper interpretation of results shows a significant difference between the mindset, individual habits, and practices of a designer and a consumer. For example, it was observed that designer feel significantly more responsible for their actions in comparison to the consumer as shown in Fig 2. This is a further support to our hypothesis that designer is more inclined to take responsibility towards conservation of natural resources.



3.3. Understanding relation between perception and personal activities

To understand the relation between perception regarding the importance of material and one's responsibility for conservation of natural resources, we observed the variation of rating as shown in Table 2.

Table 2. The relation between perception and personal activities

	Designer (Mean)	Consumer (Mean)
Awareness	Varies between 2 to 3	Varies between 2 to 3
Activities	Varies between 2 to 3	Varies between 1 to 2

From Table 2, it is clear that average ratings of awareness toward sustainability and environment conservation are for both designer and consumer are on the higher side (i.e. lies between 2 and 3). Furthermore, designers rating for sustainable practices also varies from 2-3, however, consumers rating for sustainable practices are at the lower side (i.e. lies between 1 and 3). It is shown that except the practice of saving energy at home, consumers always lag behind designers while adopting sustainability practices in every aspect of individual habits and practices, designers as a whole designer are always more concerned, hence awareness plays an important role to adopt sustainable practices. Another possibility of consumer energy saving activity is, that they really feel the absence of electricity, thus they care more for energy saving. Subsequently, consumers doing other activities rarely, either they are not aware or the required product to perform that activity is not there, such as lack of multifunction dustbin.

4. Conclusions

The present study highlights the perceptual difference between a designer and consumer for the importance of materials related to sustainable product development. We also studied the difference in their responsibility toward nature. We found that designer is more concerned about the issues and have a greater interest in adopting sustainable design practices. We did the study with 100 participants, this looks like limitation of our work at first sight, however, we found various studies in literature with around these number of participants such as 86 participants from one country [4], 232 participant from 7 different country on an average of 33 per country [20], 12 participants of one country [21], thus we believe that 100 number of participants is not unusual in the study of consumer perception. Additionally, we found the lack of studies with 50 designer's perception. This is another reason; we have intentionally a limited number of participants to 100 to pertain equal importance to both. However, in future, the detailed study with more number of participants can be carried out for further validation of the findings.

We found that there might be a lack of standards related to the sustainable product that might be the reason, designers have shown least awareness towards a design standard-compliant product. Additionally, development of more policies and increase in awareness regarding mineral conservation would be helpful for achieving sustainable development. We also believe that equal awareness of designers and consumers may ease the process of achieving sustainable development. Thus this study may enhance the knowledge of consumers, as well as designers so that their actions towards natural resource conservation may be improved.

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