RESEARCH ARTICLE

Understanding the impact of product's form on perceived pragmatic quality, hedonic quality, and purchase preferences of pocket water bottles

Subhankar Banerjee[1], Rajarshi Paul[2], Sanjit Dey[1], Somnath Gangopadhyay[1*]

ABSTRACT

Background: The user experience of user-driven products can be perceived through pragmatic and hedonic quality. Pragmatic quality (PQ) refers to a product's practicality, ergonomic quality, and overall functionality. Hedonic quality (HQ) reflects a product's attractiveness, aesthetics, and novelty. *Aim:* The purpose is to find the differences between product purchase preference, and pragmatic and hedonic quality. *Materials and Methods*: Using stratified random sampling, 103 users were selected. A short-version User Experience Questionnaire (UEQ-S) was applied to quantify the Pragmatic and Hedonic quality of two 250 mL cylindrical and pear-shaped pocket water bottles. The purchase preference (PP) was assessed using an 11-point rating scale. *Results*: The PQ and PP were significantly higher in cylindrical bottles and HQ in pear-shaped bottles. Male users perceived significantly higher product quality (PQ) in the cylindrical bottle than in the pear-shaped one. Female users perceived similar product quality (PQ) in both types of bottles. Both genders perceived higher HQ in the pear-shaped bottles than the cylindrical ones. PP was significantly higher for the cylindrical bottles than for the pear-shaped bottles. *Conclusion*: Cylindrical bottles have lesser HQ but higher PQ and purchase preference because of better efficiency, holding ability, and usability. Hence, PQ is more important for user-driven products. Higher HQ does not confirm increased chances of purchase preference. HQ only adds extra ability to interact between consumers and products.

Keywords: User experience, Product form, Gender, User-driven products, Consumer.

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INTRODUCTION

Consumers perceive and evaluate a particular product from two different perspectives: pragmatic and hedonic quality.[1] Pragmatic quality (PQ) refers to the usefulness, practicality, or ergonomic quality of a product. It serves as an indicator of how well something works in real-world circumstances and how effectively it satisfies user needs. Hedonic quality (HQ) refers to the pleasure or satisfaction that is derived from an experience or product. It is often used in the context of consumer research, where it measures the perceived satisfaction, enjoyment, and pleasure a person experiences when using a product or service.[2] In this modern era, both pragmatic and hedonic attributions play an important role in product preference.[3] In this scenario, giving importance only to either pragmatic or hedonic quality may cause the failure of a product.[4] Thus, successful product design unifies both pragmatic and hedonic considerations to meet overall product preferences.

Pocket water bottles are one of the essential user-driven products for commuting workers, restaurant consumers, and social gatherings like- marriages, birthdays, etc. There are different types of pocket water bottles which are used to fulfill the consumer needs. Product designers must take into account both the form and function of pocket water bottles to produce a positive user experience. This involves creating pocket water bottles that ensemble the demands and expectations of their intended market while also being aesthetically beautiful and user-friendly. The hedonic and pragmatic qualities of pocket water bottles can be significantly influenced by their forms. Thus, pragmatic and hedonic qualities can influence the purchase preferences of user-driven products, such as pocket water bottles.[5,6]

The purpose of this study is to compare the Pragmatic Quality, Hedonic Quality, and Purchase Preferences between cylindrical and pear-shaped pocket water bottles. The objectives of this research are to find out the gender differences between Pragmatic Quality, Hedonic Quality, and purchase preferences.

Research Hypotheses

Thus, research hypotheses can be formed as follows:

H_1: Perceived Hedonic quality, Pragmatic quality and Purchase preference of pocket water bottles significantly vary with their forms.

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H_2: Forms of pocket water bottles can influence the perceived Hedonic quality, Pragmatic quality, and Purchase preference differently in genders.

METHODS

Ethical Clearance

The human ethical protocol clearance certificate (Ref No. IHEC/SG/P97/2019) was issued by the Institutional Human Ethical Committee, Department of Physiology, University of Calcutta**.**

Participants Selection

One hundred and three (103) consumers were selected using stratified random sampling from different cities in India (Table 1). Among them 50 were male and 53 were female. The age range of all the consumers is 18 to 55 years (mean ± standard deviation = 25.9 ± 5.35 years).

Regular pocket water bottle users and users with normal or corrected vision were included in the study. Participants who do not use pocket water bottles and participants with Disabilities or deformities in hand (s) and Finger(s) were excluded from the study. No handedness of the product was involved in this study. Inclusion and exclusion criteria have been satisfied based on the data acquired from the participants.

The minimum sample size of this study has been calculated using G* Power software when α error probability = 0.05 and power (1-β error probability) = 0.80. The calculated sample size for the two-tailed paired t-test and independent t-test were 34, 52 respectively.

Choice of the Product

Two pocket water bottles with 2 different shapes were selected through an online application. The categories of water bottles were cylindrical and pear-shaped water bottles. Different diameters of the bottles were measured using a sliding caliper. Both of the bottles have same volume with similar cap and base diameters (Figure 1). Whereas, these bottles have different height, neck and mid-body diameters. The choice of the pocket water bottles as a research element can be justified because the participants were familiar with the form and the function of this product.

Table 1: Descriptive statistics of the participants

Parameter	*Categories*	*Number (n)*	*Percent (%)*
Gender	Male	50	48.5
	Female	53	51.5
Location	Urban	56	54.4
	Rural	47	45.6
Educational Qualification	Higher secondary or below	15	14.6
	Graduate	31	30.1
	Post-graduate	57	55.3

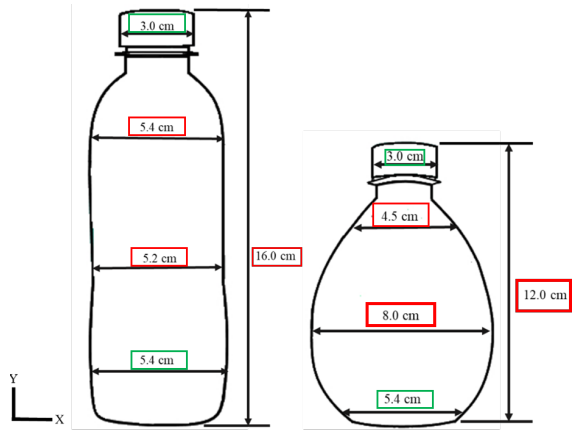

Figure 1: Cylindrical and Pear-shaped bottles along with their different dimensions. Similar dimensions are marked in green, and dissimilar dimensions are marked in red

Pragmatic and Hedonic Quality Assessment

A short User experience Questionnaire (UEQ-S) was used to assess and measure the subjective impression of the Pragmatic and Hedonic Quality of the water bottles.[5,7] Hedonic quality (HQ) reflects a product's attractiveness, aesthetics, and novelty.[8,5] It is often used in the context of consumer research, where it is used to measure the perceived satisfaction, enjoyment, or pleasure that a person experiences when using a product or service. This can be used to evaluate the overall quality or value of a product or service and to make improvements or changes to increase customer satisfaction. Pragmatic quality (PQ) refers to the usefulness or practicality of a product. It is a measure of how well something performs in real-world situations and how well it meets the needs of the people who use it. For example, a product that is high in pragmatic quality is easy to use, reliable, and effectively solves the problem it was designed to address. Pragmatic quality (PQ) is a product's practicality, ergonomic quality, and functionality [8]. UEQ-S consists of 8 items (Table 2). This is a seven-point semantic diagram scale that ranges from -3 to +3.

Purchase Preference Assessment

The purchase preference was assessed using a single 11-point rating scale. This scale Ranges from 0 to 10.

Consumer's Voice

At the end of the task, participants were asked which of the following options might apply in terms of optimized opening, holding, and efficiency- none, cylindrical-shape, pear-shape, and both.

Statistical Analysis

The Kolmogorov-Smirnov test was applied to check the normality assumptions. A paired and independent t-test

Table 2: Short user experience questionnaire items

Negative	*Positive*
Obstructive	Supportive
Complicated	Easy
Inefficient	Efficient
Confusing	Clear
Boring	Exciting
Not Interesting	Interesting
Conventional	Inventive
Usual	Leading Edge

was applied for the hypothesis testing when the level of significance (α error probability) is 0.05 [9]. Statistics have been performed using SPSS 26 and the data have been presented using GraphPad 9 software.

Procedure

The procedure of this cross-sectional study has been given in Figure 2.

RESULT

The perceived pragmatic quality, hedonic quality, and purchase preference score of cylindrical and pear-shaped bottles did not deviate significantly from normal (Table 3). Participants perceived higher (p <0.05) pragmatic quality and lower (p <0.05) hedonic quality in the cylindrical bottles than in the pear-shaped ones. The purchase preference for the cylindrical bottles was statistically higher (p < 0.05) than for the pear-shaped ones. The PQ of the Cylindrical bottles is higher (Δ = 0.629, t = 3.830, p = 0.0002) than that of Pear-shaped bottles (Cohen's D = 0.373), as presented in Figure 3A. On the other hand, as indicated in Figure 3B, the HQ of the Cylindrical bottles is lower (Δ = -1.243, t = -7.528, $p = 2.1 \times 10^{-11}$) than that of Pear-shaped bottles (Cohen's D = -0.742). When the purchase preferences of the two types of bottles were compared (Figure 3C), the Cylindrical bottles scored higher (Δ = 1.786, t = 4.3656, p = 0.00003) than that of Pear-shaped bottles (Cohen's D = 0.430).

Male users perceived statistically higher pragmatic quality in the cylindrical bottles than in the pear-shaped bottles. On the other hand, female users perceived statistically similar pragmatic quality in the cylindrical bottles and the pear-shaped ones. Both male and female users perceived statistically lower hedonic quality in the cylindrical bottles than in the pear-shaped bottles. The perceived purchase preference by both genders is significantly higher in the cylindrical bottles than the pear-shaped bottles. Table 4 represents the results that have been obtained from the paired sample t-test of pragmatic quality, hedonic quality, and purchase preference of cylindrical and pear-shaped water bottles among males and females.

Both genders perceived statistically similar pragmatic and hedonic quality of the cylindrical bottles. On the other

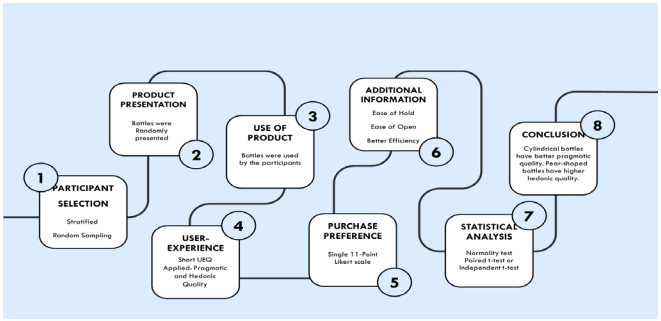

Figure 2: The procedure of this study

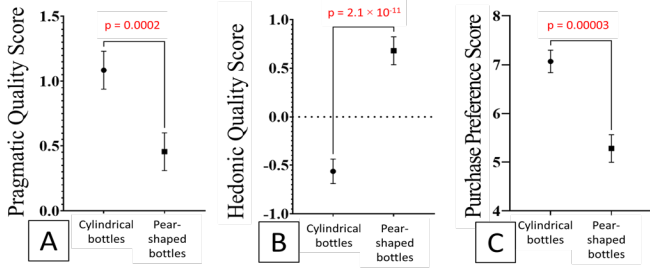

Figure 3: Comparative Assessment of A. Pragmatic Quality and B. Hedonic Quality and C. Purchase Preference between Cylindrical and Pear-shaped Water Bottles

Table 3: Kolmogorov-Smirnov test statistics for the normality

Variables		*Statistic*	*p-value*
Pragmatic quality of cylindrical and pear-shaped water bottle		0.1108	0.159
Hedonic quality of cylindrical and pear-shaped water bottle		0.0829	0.478
Purchase preference of cylindrical and pear-shaped water bottle		0.1131	0.144
Pragmatic quality of cylindrical and pear-shaped water bottles for	male users	0.1267	0.398
	female users	0.0892	0.793
Hedonic quality of cylindrical and pear-shaped water bottles for	male users	0.1270	0.396
	female users	0.0987	0.680
Purchase preference of cylindrical and pear-shaped water bottles for	male users	0.1537	0.188
	female users	0.0815	0.873

Table 4: Paired-sample t-test of pragmatic quality, hedonic quality, and purchase preference of cylindrical and pear-shaped water bottles in males and females

Sex	*Variables*	*Bottle type*	*Mean ± SEM*	*Δ*	*95% CI*		*t-value*	*df*	*p-value*	*D*
					U	*L*				
Male	Pragmatic quality	C	0.97 ± 0.22	0.93	1.49	0.38	3.39	49	0.0012	0.48
		P	0.03 ± 0.21							
	Hedonic quality	C	-0.50 ± 0.19	-0.88	-0.44	-1.35	-3.85	49	0.0003	-0.54
		P	0.38 ± 0.21							
	Purchase preference	C	7.18 ± 0.43	1.90	3.10	0.70	3.18	49	0.003	0.45
		P	5.28 ± 0.35							
Female	Pragmatic quality	C	1.19 ± 0.19	0.34	0.70	-0.02	1.90	52	0.063^{ns}	0.26
		P	0.85 ± 0.19							
	Hedonic quality	C	-0.62 ± 0.17	-1.58	-1.12	-2.04	-6.90	52	7.1×10^{-9}	-0.95
		P	0.96 ± 0.19							
	Purchase preference	C	6.96 ± 0.31	1.68	2.82	0.54	2.96	52	0.005	0.41
		P	5.28 ± 0.38							

C = Cylindrical bottles, P = Pear-shaped bottles, Δ = Difference of mean, CI = Confidence interval, U = upper limit, L = lower limit, df = degree of freedom, p = probability, D = Effect size (Cohen's D)

Table 5: Levene's test and independent sample t-test of pragmatic quality, hedonic quality, and purchase preference of cylindrical and pear-shaped water bottles between males and females

Parameters			*Pragmatic quality*		*Hedonic quality pear*		*Purchase preference of*	
Categories			*C*	*P*	*C*	*P*	*C*	*P*
Levene's Test for Equality of Variances								
F statistics			1.49	0.05	0.02	0.08	2.22	0.61
Significance			0.22	0.83	0.88	0.77	0.14	0.44
t-test for Equality of Means								
t value			-0.76	-2.89	0.45	-2.06	0.47	-0.005
Degree of freedom			101	101	101	101	101	101
Significance (2-tailed)			0.45	0.005*	0.66	0.04*	0.64	0.99
Mean Difference			-0.22	-0.82	0.11	-0.58	0.22	-0.003
Standard Error Difference			0.29	0.28	0.25	0.28	0.46	0.57
95% Confidence Interval of the Difference	Lower	-0.80		-1.38	-0.39	-1.14	-0.70	-1.14
	Upper	0.356		-0.26	0.61	-0.02	1.13	1.14

C = Cylindrical bottles, P = Pear-shaped bottles, *= $p < 0.05$.

hand, females perceived significantly higher pragmatic and hedonic quality than males for pear-shaped bottles. There are no significant differences in purchase preferences between male and female users regarding cylindrical and pear-shaped bottles separately. Table 5 indicates the results of Levenes's equality of variances test and independent sample t-test.

Figure 4 indicates the opinions of users on the ease of holding, ease of opening, and best efficiency of cylindrical *versus* pear-shaped water bottles. Whereas, Figure 5 indicates the percentage of male and female users who have chosen water bottles on the basis of easy to open, best efficiency and easy to hold.

DISCUSSION

The results show that the perceived pragmatic and hedonic qualities are substantially influenced by the variations in the product's form. Thus, it influenced the purchase preferences of pocket water bottles. Different dimensions (Figure 1) of these two pocket water bottles resulted in significantly different perceived pragmatic, hedonic qualities, and

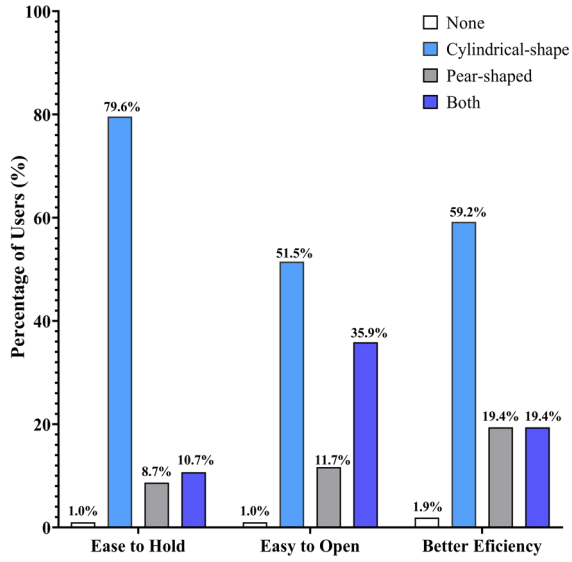

Figure 4: Users' opinions on ease to hold, ease to open, and best efficiency in cylindrical and pear-shaped water bottles

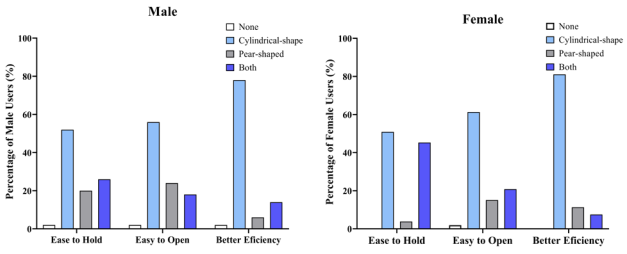

Figure 5: Percentage of Male and Female Users have chosen Water Bottles based on Easy to Open, Best Efficiency and Easy to Hold

purchase preferences of the cylindrical and pear-shaped water bottles. It was also observed that most of the users preferred cylindrical bottles because they were easy to hold, easy to open, and better efficiency. The differences in height, neck, and mid-body diameters have caused a preference for cylindrical bottles over pear-shaped bottles. Apart from the above-mentioned factors, other product preference-determining factors were the same in both pocket bottles.

Male users have prioritized the pragmatic quality while selecting a pocket water bottle for use. Therefore, a smaller mid-body diameter and a higher neck diameter resulted in better ease of holding, ease of opening, and better efficiency of the cylindrical bottle. On the other hand, a pear-shaped water bottle has a wider mid-body diameter than a cylindrical water bottle. This wider shape creates a hindrance to holding and opening the bottle properly. The shorter height of the pear-shaped water bottle reduces its efficiency. The above-mentioned reasons for the reduced pragmatic quality of pear-shaped bottles to cylindrical water bottles particularly in male users [10]. Hence, the pragmatic quality of the cylindrical bottle is higher than the pear-shaped one. The overall form of the cylindrical bottle has influenced the perceived functionality, usability, and user-friendliness the male users.[11] On the other hand, female users have perceived similar pragmatic quality of both bottles. The overall shape of the pear-shaped bottle did not influence the perceived pragmatic quality in female users. Both male and female users perceived statistically similar pragmatic quality in the cylindrical bottle. The pragmatic quality of cylindrical bottles was similar between male and female users. There was no influence of the genders on the pragmatic aspect of the cylindrical bottle.[12,13]

Further, it was also found that both male and female users perceived more hedonic quality in pear-shaped bottles than in cylindrical bottles. The unique shape of the pear-shaped bottle has been enacted as a stimulatory factor for the users. A shorter length and higher mid-body diameter resulted in a more attractive, novel, and aesthetic attribution of the pear-shaped bottle. This unusual form of pear-shaped bottle caused a higher hedonic perception in female users.[13,14] Additionally, this unique and innovative form of the pear-shaped water bottle makes a pleasurable connection between female consumers and the product.[15] Users of both sexes significantly preferred to purchase the cylindrical pocket water bottle over a pear-shaped bottle. The purchase preference for cylindrical as well as pear-shaped bottles between male and female users was statistically similar. This result revealed that pragmatic quality is associated with purchase preference more than hedonic quality.[16] Hedonic quality can increase the purchasing preference for a product. This result can be explained by adopting Jordan's hierarchy of consumer needs principle.[17] According to the principle, functionality is a prerequisite to develop a product and this needs to be addressed first. In the second hierarchy, the usability plays an important role. After meeting these two needs, users want products that can deliver pleasure and stimulate positive emotions. This study corroborates similar explanations to the observed results.

These results showed the presence of a 'hedonic halo effect' ('beautiful is usable') for female users.[14] Therefore, attractive, aesthetic, unique, or novel designs or forms can influence the perceived pragmatic (functionality, usability, and user-friendliness) of a product.[18] In this study, the unorthodox designing of the pear-shape pocket shape water bottle predisposed female users. In contrast, the 'pragmatic halo effect' ('usable gets beautiful') is absent in male users.[14] The hedonic quality of the pear-shaped bottle does not influence the pragmatic quality of both the bottles. The attractive and aesthetic form did not affect the functionality and usability of the product.

Hence, it can be stated that male users prioritize the pragmatic aspects of a product. On the other hand, female users prioritize pragmatic as well as hedonic aspects of a product. Product designers and manufactures should incorporate designing principles and manufacturing policies according to the target population. This will elicit the purchase preference of a user driven product like pocket water bottle.

CONCLUSION

It can be concluded that the Purchase Preference for the cylindrical water bottle is higher than the pear-shaped water bottle in both genders. Male users prioritized usability, functionality, and ergonomic aspects of a product like a pocket water bottle. While female users prioritized novelty, uniqueness, attractiveness, and aesthetics of products. Finally, the results were measured by ratings of subjective feeling. Further, physiological parameters like- event-related potentials (ERPs), Galvanic skin response (GSR), and Eye tracking-based neuromarketing studies are needed to overcome the limitations of these subjective assessments.[19-22]

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PEER-REVIEWED CERTIFICATION

During the review of this manuscript, a double-blind peer-review policy has been followed. The author(s) of this manuscript received review comments from a minimum of two peer-reviewers. Author(s) submitted revised manuscript as per the comments of the assigned reviewers. On the basis of revision(s) done by the author(s) and compliance to the Reviewers' comments on the manuscript, Editor(s) has approved the revised manuscript for final publication.