

E-Cart Design for Controlling Cart Abandonment in E-Commerce: A Conjoint Experiment



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Abstract: *This study attempted to understand the most important attributes and their preferred levels of an e-shopping cart for maximum utility perceptions by e-commerce customers. The research has significance in the backdrop of observations that online customers have multiple sorts of hesitation on purchase completions, and their cart abandonment tendencies are causing serious challenges to e-commerce firms across the world. Assuming that better e-cart design can minimize cart abandonment intentions, an eight attribute conjoint experiment with a total of nineteen levels was conducted to decide on an optimum cart design. The experiment concluded that online customers prefer an order summary page with product images, add to cart option without login, live chat feature in cart; add to cart button on both sidebar and top of the page; online payment options, security logo and social proof in e-cart, purchase history review option in the cart page, and delivery progress tracking bar in the cart page itself.*

Keywords: *E-commerce, E-shopping Cart, Conjoint experiment, Cart Abandonment, Purchase Hesitation*

I. INTRODUCTION

E-commerce has now become an alternative option for the customer to understand about various products and to have a new shopping experience that nourishes both hedonic and utilitarian motives. The digital platform has introduced many features with technical support to enhance the online shopping experience. The vast literature on customer motivations behind e-commerce usage is predominantly described two sets of factors. First, the effect of various utility linked motivations of the customer to adopt online retailing. These factors include convenience, information readiness for fast and correct decisions, variety in product mix, cost advantage, time-saving [1], absence of crowd visible in

conventional retail shops, better control in the process [2], round the clock shopping comfort [3,4], avoiding direct salesperson pressure [5], easiness in product comparisons [6], category-wise search option [7], etc. The second set of factors that motivate customer usage of online formats are hedonism related. Hedonic motivations impart a feeling of fun, pleasure, stimulation, delight, jovial, relaxation, fantasy, adventure, etc. [8] to customers. The research concludes that online shopping provides multi-sensory stimulation [9] through sensory, emotional, and social experiences [10]. Amidst all the above advantages, a significant disparity is visible between the volume of traffic in online retail portals and actual purchases completed. The cart abandonment syndrome [11] explaining the non-completion of purchases due to some unknown hesitation developed during the final stage of purchases [12,13] significantly disturbs future prospectus of the industry.

The estimated level of cart abandonment rate worldwide is around 70% [14], and even though much research was focused on understanding the reasons behind cart abandonment tendencies, the problem is still rampant. Many studies highlighted that customer concerns about privacy, security, and other risks are critical in the hesitation to complete the purchase. Also, reasons such as information on additional cost, logistic concerns, payment complexities, and technical hitches [15] develop exit intentions. Other reasons for cart abandonment cited in many studies were due to the absence of a salesman effort, no need for ratification for the time spent, easiness in continuing the search in future, and the possibility of getting a better offer in the future [16]. Extant research underlines the importance of 'e-shopping cart' in helping the purchase process in a virtual format [17,18]. E-carts acts as a storage location of customer shortlisted items in the buying process. The customer engages in research and organizing of the shortlisted items and takes a final call about the purchase. E-commerce shopping carts thus helps the customer in completing an online purchase. An increase in cart abandonment rates explains the inadequacy of online portals to impart purchase completion intentions and hence, requires a serious attempt to limit such intentions. The various features in an e-cart are critical in positively influencing purchase completions intentions and thus controlling cart abandonment. Therefore, this study attempts to examine the customer preferences about a few critical features attached to a shopping e-cart for minimizing cart-abandonment intentions.

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A conjoint experiment adopts a market research approach for assessing the value perceived by customers for the features attached to a product or service. The conjoint analysis contains customer evaluations of real-time product combinations and statistical modeling for making decisions about optimum product attributes for market acceptance. A conjoint experiment estimates a customer's choice behavior by maximizing the preference on a set of attributes attached to a product based on total utility perceptions [19]. The total utility perception is the combination of partial utilities (part worth's) attached to each attribute level in the product. Thus, by performing a conjoint analysis, the researcher can create an attribute and its level hierarchy for finalizing the product design of customer preference. Additionally, a comparative estimation of utility perceptions about different levels of attributes included in an e-cart may serve as a positive stimulus that will significantly reduce cart abandonment. Keeping the above observations in the backdrop, this paper aims to understand the important attributes and their preferred options(levels) to be used in the design of an e-cart for a delightful shopping experience that prevent cart abandonment intentions using a conjoint experiment, rectification is not possible.

II. MATERIALS AND METHODS

Cart abandonment rate in simple is the 'ratio of the number of customers who completed the checkout process to the number of customers who initiated the purchase process by loading items in e-carts' [20]. An e-cart available on an e-commerce website is a software feature that helps customers during purchases, for enabling payments, and provides all relevant information to major actors in the process such as the merchant, payment processor, logistic partner, and for the customer. The e-cart helps the firm in analyzing customer journey in an online portal for understanding bottlenecks in the process. Online shopping carts act as a central hub for digital information about purchase process management, inventory holding, and financial planning for both firms and customers [21]. E-carts do offer product review options to justify selection to prevent dissonances afterward. Additionally, e-carts offer flexibility since options exist to keep items in a 'wishlist' for future purchases. E-carts provide a real-time inventory of balance stock, various product-specific offers, express checkout options, etc. to convert shopping a delightful experience. In the post-purchase phase, e-carts provide order confirmation emails and tracking options for customer confidence. Many reports on e-commerce from agencies like Baynard Institute, BI Intelligence, Forrester, etc. provides an estimate of cart abandonment in different stages of the buying process. The most cited reasons, as documented in their reports, pertain to extra cost (shipping, tax), complexities attached to the checkout process, request for additional information, limited payment options, confusion in delivery schedule, risk perceptions to provide credit card information, poor return policy, etc. According to the report by Internet Retailer, 46.1% of cart abandonments happen at the payment

stage, 37.4% at checkout login, 35.7% on realizing shipping costs, and 20.9% at providing billing address [22]. Lengthy and complicated checkout process reduces conversion rates [23,24]. An analysis of reviews available online helped to conclude that major reasons for an unpleasant experience in the last stages of purchases leading to cart abandonment pertain to the "checkout process," "payment issues," "shipping related," "product issues," and "web page related" etc. To have more information about attributes to be considered in the conjoint design, we have conducted a sequential incidence technique(SIT) to identify important areas of concern in the checkout process [25]

A. Sequential Incidence Technique(SIT)

SIT attempts to identify the incidences attached to each stage of a service journey that caused positive or negative experiences to a customer. The SIT includes a service journey oriented qualitative interviewing procedure using a blueprint explaining customer journey in a service process. The major episodes in a checkout process where e-cart is helpful are 'adding to cart', 'verifying contents in a cart', 'shipping', 'payment', and 'review and order tracking.' Customers who are well versed in online shopping were the subjects of the SIT. A judgmental sample of 20 customers was met in person to collect their experiences in a check out process. We have recorded the negative experiences alone since such insights are necessary for selecting the attributes and the levels for the conjoint experiment. Analysis of excerpts from the interviews conducted with respect to episodes helped in suggesting the essential attributes to fit in an e-cart. The major negative incidence related to each stage is summarized in table I.

Table I: Major Negative Incidences Identified from SIT

Stage in the Process	Nature of Adverse Incidences
Adding to Cart	add to cart button not clear, button not visible, slow response, icon is small, need login for add to cart, multiple buttons, remove from cart not possible, multiple items can't be added
Verifying Cart Contents	layout confusing, fonts not bold, color of fonts bad, display not in order, images small and unclear, order summary confusing, last moment comparison difficult
Shipping	too much columns and information, no packaging information, schedule of delivery uncertain, return policy confusing, shipping cost not informed early, mode of delivery not mentioned, time of delivery not mentioned
Payment	limited options, cash on delivery not accepted, all credit cards not accepted, credit card information is saved, no mentioning about safety of money paid, sign in required to make payment

Review and Order Tracking	no up to date information, no call/chat facility, post payment changes not possible, confirmation mails sent were incorrect, sending unwanted mails, variation in the delivery date shown in tracking menu, delivery boy contact details not available
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The above insights helped in finalizing the attributes and their levels to be considered in the conjoint experience.

B. Selection of Cart Attributes and their Levels

The SIT results analyzed with the help of experts suggested that attributes mentioned in table II can significantly improve utility perceptions about the e-cart and will contribute to the better shopper experience. Thus, eight attributes were identified for e-cart redesign and decision on options (levels) to provide such attributes in an e-cart for seeking customer preference is made. Among the eight attributes, for five attributes better from two options and for three attributes better, one from three options were to be decided through conjoint experiment. The attributes and their levels formed product profiles for which customer preferences were sought. Thus, a total of 864(i.e., 25*33) product profiles are possible from the attributes and levels considered. Since it is difficult to ask the customers to rate all the product profiles, we have adopted a fractional factorial design, and therefore created an orthogonal matrix using the orthogonal plan procedure in SPSS 20.0. This matrix consisted of twenty profiles, sixteen of which were to estimate the model parameters and four to be used as hold-out cases to validate the results. The number of profiles selected for the experiment was acceptable since it exceeded the minimum required calculated using the rule, ‘number of levels across all factors – number of factors + 1’ [19] i.e., 12 in this case.

Table II: Attributes and Levels used for Conjoint Experiment

Attribute	Level 1	Level 2	Level 3
Add to Cart Option	with login	without login	
Order Summary Page	with images	without images	
Live Chat Feature	yes	no	
Location of Cart Button	side bar	top of the page	both
Payment	cards	cash on delivery	online
Trust with Payment	security logo	social proof	both
Purchase history availability in cart page	yes	no	
Delivery progress bar in cart page	yes	no	

III. RESULTS

We have opted for a full profile method of data collection because of its perceived realism as well as the ability to reduce the number of comparisons through the use of fractional factorial design. Also, the full profile approach has better predictive validity [26]. We have opted for a rating

approach for measuring the preference of each product profile by the respondent. The rating approach is better to bring better discrimination among profiles [19]. The questionnaire contained details of all the full profiles obtained from the orthogonal design, and the respondents were requested to rate each product profile on a scale of 1 (least ideal) to 7 (most ideal). We have included a detailed description of the purpose of the study in the questionnaire and rating procedure for better clarity. The respondents were customers having adequate experience with online purchases. We have visited major malls in three cities in India, namely Bangalore, Chennai, and Kochi and met customers in person and collected the responses. The selection of the respondents was purely by chance, and responses were sought out of a free will. During the data collection period spanning for 24 days, a sample size of 243 could be achieved. Table III provides descriptive statistics of respondent characteristics.

Table III: Descriptive Statics of Respondents

Item	Measure	Frequency	%
Age	18-28yrs	81	33.3%
	29-38Yrs	70	28.8%
	39-48yrs	45	18.5%
	above 49 yrs	47	19.3%
Gender	Male	132	54.3%
	Female	111	45.7%
City	Bangalore	80	32.9%
	Chennai	78	32.1%
	Kochi	85	35.0%
Income	<Rs.25000/month	52	21.4%
	25000-50000	73	30.0%
	50000-75000	64	26.3%
	>75000	54	22.2%
Total		243	100.0%

The model was estimated using SPSS 20 conjoint procedure. Pearson correlation coefficient and the Kendall tau coefficient were used to test internal validity

A conjoint analysis generates importance values of each attribute in the perception of customers and utility estimates (part-worths) for each attribute level. Further, the conjoint procedure calculates Pearson’s r, which explains the degree of correlation across levels of an attribute, Kendall’s tau, to assess the correlation between the observed and the predicted preferences of the attributes, and Kendall’s tau for holdouts to confirm model’s reliability. The p-values reported along with the above measures help in rejecting the null hypothesis about the inconsistency among different levels of attributes. For estimation, we assumed the relationship between factors for three attributes such as ‘order summary page’, ‘cart button position’, and ‘payment’, which were modeled as discrete no assumption is possible about the relationship between the factor and the scores. For all other attributes, we assumed linear relationships since the presence of such features could increase the preference of the customer. Table IV provides the results of the analysis.



These utility estimates offer a quantitative measure to understand the preference of each level of the attribute. The larger the values suggest, the higher the preference by the customers. The total of utility estimates of a product profile gives the total utility or overall preference of such a combination of levels of attributes. The range of the utility estimates (highest to lowest) of an attribute explains the

important attribute.

The importance values are calculated by taking the dividing the utility range for each attribute by the sum of the utility ranges for all attributes. The importance values sum up to 100. The p-values reported were less than the level of significance of 0.05, to conclude that the attribute levels of the factors under study were internally consistent.

Table IV: Utility Estimates and Importance values of Attributes

Attributes/Levels	Utility Estimates	Importance Values	Rank
Add to Cart Option			
with login	-0.064	8.59	6
without login	0.128		
Order Summary Page			
with images	0.218	18.49	1
without images	-0.195		
Live Chat Feature			
yes	0.229	17.37	3
no	-0.159		
Location of Cart Button			
side bar	-0.056	8.86	5
top of the page	0.014		
both	0.142		
Payment			
cards	0.026	7.92	7
cash on delivery	-0.102		
online	0.075		
Trust with Payment			
security logo	0.063	3.76	8
social proof	0.047		
both	0.131		
Purchase history availability in cart page			
yes	0.261	17.19	4
no	-0.123		
Tracking progress bar in cart page			
yes	0.133	17.82	2
no	-0.265		
(Constant)	4.681		
Pearson's R=0.849;p<0.05			
Kendall's tau=0.643;p<0.05			
Kendall's tau for Holdouts=0.582;p<0.05			

IV. DISCUSSIONS AND CONCLUSIONS

From the conjoint experiment, we could find that the top four attributes to be enabled in an e-cart for minimizing cart abandonment are 'Order Summary page' (importance value=18.49), 'Delivery progress Bar' (importance value=17.82), 'Live Chat Feature' (importance value=17.37), 'Provision to verify Purchase History' (importance value=17.19). technology (20.06%), and value (19.35%). These factors together capture the importance perception summing up to 70.87. The payment trust impairment by

providing security logo or social proof has got the least importance perceptions. Comparative examination of utility estimates concluded that online customers prefer to go to add to cart stage without login; prefer to view thumbnail of product images in order summary page; opt for live chat feature in cart; prefer to have add to cart button on both side bar and top of the page; online payment options more preferred than card or cash on delivery;

like to see both security logo and social proof in e-cart; like to review purchase history in the cart page itself; and require item delivery progress tracking bar in the cart page itself. The provision for the above features in an e-cart impart higher utility perceptions and might control abandonment intentions.

Usage of an e-cart is an indispensable requirement in an online purchase process. Literature suggests maximum cart abandonment occurs at this stage. Even though e-carts are designed in such a way to facilitate the customer in organizing the purchases and to enable fast completion of the purchase process, many times, such carts add confusion to customers.

Major features anticipate in an e-cart pertains to payment options, back search option, assess to product reviews for reassurance from the cart page, details in wish lists and watch lists, purchase summary with all relevant details, order tracking facility, purchase history availability, chat option, etc. Hence, incorporating such provisions in a cart can significantly contribute to their shopping experience and can prevent cart abandonment.

There are many managerial implications of this experiment. This study offers some valid insights for e-shopping cart design and informs about important attributes to be included in the cart for a better online shopping experience. Even though virtual formats offered many advantages to retailers, new challenges surfaced in different ways. Since e-commerce lacks effective human contact to ensure purchase completions, store switching is easy, and hence, the impulses created by many utilitarian and hedonic stimuli in an e-commerce portal need to remain till completion of the purchase process. In e-tail, customer impulsiveness is mostly short-lived since it is easy to browse across portals without much opportunity cost. Even small inconveniences are concerns that can instigate such wandering behavior leading to cart abandonment. Hence, to make complete customer purchases on an e-commerce website, focus on specific features rather than general is essential. Therefore, focus on better e-cart designs contributing to customer experience has implications.

The present attempt is a first step in the endeavor to bring importance among researchers about focusing e-cart design as a remedy to disturbing trends related to cart abandonment. However, the absence of sample heterogeneity causes significant challenges to generalizability. This study used only eight attributes for the conjoint experiment. More attributes and more levels for each attribute might have offered a bigger picture in designing an e-cart that appeal to every customer. Future work in such a direction can offer more contribution to practitioners.

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