

The Impact of Product Sorting and Cognitive Moderators on Consumer Cart Abandonment in E-commerce: A SEM-Based Analysis

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Abstract

Purpose: The purpose of this study was to examine the impact of product sorting on online shopping cart abandonment and to explore the mediating roles of choice overload and forgetting of cart items in influencing consumers' purchase completion behaviour.

Method: An exploratory and descriptive research design was adopted. Data were collected through an online questionnaire distributed via social media platforms such as Instagram and WhatsApp Messenger during the period from July to September 2025. Using purposive sampling, 370 responses were obtained, and after data screening, 350 valid responses were retained for analysis. The questionnaire consisted of 22 items measured on a 5-point Likert scale. Structural Equation Modelling (SEM) was used to analyse the relationships among the variables.

Result: The findings indicate a significant positive relationship between product sorting and online shopping cart abandonment. Furthermore, choice overload and forgetting of cart items were found to significantly mediate this relationship, suggesting that extensive sorting options can increase the cognitive burden and lead consumers to abandon their shopping carts without completing purchases.

Conclusion: The study concludes that while product sorting features are designed to improve navigation and product discovery, excessive sorting options may unintentionally increase cognitive complexity for consumers, contributing to higher shopping cart abandonment rates. Optimising sorting mechanisms can therefore improve the overall online shopping experience.

Future Scope: Future research may adopt longitudinal or experimental research designs to examine causal relationships more effectively. Additionally, incorporating moderating variables and conducting cross-cultural studies could enhance the generalisability of findings and provide deeper insights into consumer behaviour in e-commerce environments.

Keywords: Online Shopping Cart Abandonment, Consumer Behaviour, Product Sorting, Forgetting, and Choice Overload.

Introduction

Online shopping cart abandonment refers to the phenomenon wherein shoppers add items to their online shopping carts but do not complete the purchase, leaving the items in the cart. This behaviour is common in e-commerce and can have various reasons. Shoppers may abandon their carts if they perceive the total cost of the items, including taxes and shipping fees, to be too high. Some shoppers use the cart to compare prices or products across different websites and may abandon carts if they find better deals elsewhere. Hidden costs or fees that are revealed during the checkout process, such as shipping or handling fees, can lead to cart abandonment. Problems with the website, such as slow loading times, glitches, or errors during the checkout process, can frustrate shoppers and lead them to abandon their carts.

Shoppers may abandon carts if they have concerns about the security of their personal or financial information during the checkout process. Limited payment options or complicated payment processes can deter shoppers from completing their purchases. Shoppers may become distracted or lose interest while browsing, leading them to abandon their carts without completing the purchase.

From a theoretical perspective, this behaviour can also be explained through cognitive load theory, which suggests that individuals have a limited cognitive processing capacity when making decisions. When the amount of information presented exceeds this capacity, individuals experience cognitive overload, which can negatively affect decision-making and task completion. In online shopping environments, consumers are frequently exposed to numerous product options, filters, sorting mechanisms, promotional messages, and product comparisons. These elements may increase the cognitive effort required to evaluate alternatives, making it more difficult for consumers to finalise purchase decisions. Consequently, shoppers may postpone the decision or abandon their carts altogether. Among the various psychological factors influencing cart abandonment, forgetting and choice overload have been identified as two significant contributors. Forgetting occurs when shoppers add products to their carts but fail to return and complete the purchase due to distractions, interruptions, or the passage of time. This phenomenon reflects a lapse in attention or memory, which aligns with cognitive load theory, as excessive information processing can reduce the ability to retain and recall intentions. As cognitive demands increase during browsing, consumers may unintentionally forget about the items placed in their carts. Retailers can address this issue by implementing reminder mechanisms, such as follow-up emails, push notifications, or cart recovery messages. Choice overload, in contrast, occurs when consumers are presented with too many product alternatives, making it difficult to select the best option. According to cognitive load theory, an excessive number of choices increases the cognitive burden placed on consumers, which may lead to decision fatigue, dissatisfaction, or procrastination. In the context of online shopping carts, large

product assortments and numerous variations within categories can create confusion and delay decision-making, ultimately resulting in cart abandonment. Retailers can reduce the negative effects of choice overload by simplifying product listings, improving product categorisation, and providing personalised recommendations to help consumers make decisions more efficiently.

Reducing cart abandonment has therefore become a key priority for online retailers. Strategies such as simplifying the checkout process, providing transparent pricing information, offering incentives such as discounts or free shipping, implementing remarketing campaigns, and improving website usability can help reduce abandonment rates and enhance customer experience.

Prior research has extensively examined factors such as pricing, hidden costs, website usability, security concerns, and payment complexity as drivers of cart abandonment. However, product sorting mechanisms and their cognitive consequences have received limited attention, particularly how they may contribute to forgetting and choice overload during online shopping. This gap is important because modern e-commerce platforms increasingly provide extensive sorting and filtering options to improve product discovery. Although these features are designed to assist consumers, they may unintentionally increase cognitive load and complicate the decision-making process.

Addressing this gap, the present study investigates the impact of product sorting on online shopping cart abandonment while examining the mediating roles of forgetting and choice overload. By integrating insights from cognitive load theory, this study aims to better understand how excessive information processing and decision complexity influence consumer behaviour in online shopping environments.

Literature Review

Online Shopping Cart Abandonment

Wang et al. (2023) This study proposes a conceptual model to understand the factors contributing to online shopping cart abandonment, including website design, trust, perceived risk, and purchase intention. *Lin and Zhang (2021)* This study investigates the

reasons behind online shopping cart abandonment through an empirical analysis, highlighting factors such as shipping costs, website usability, and security concerns. *Wu and Wang (2020)* Focusing on high-involvement products, this research explores the factors influencing online purchase intentions, shedding light on how these factors affect cart abandonment rates. *Yuan and Wu (2008)* Examined the impact of website quality on customer satisfaction and purchase intentions, this study discusses how a well-designed website can mitigate cart abandonment issues. *Sung and Lee (2013)* Using logistic modeling, this research analyzes the relationship between service quality and online shopping behaviour, including cart abandonment, emphasizing the importance of customer service in reducing abandonment rates. These studies offer valuable insights into the complex phenomenon of online shopping cart abandonment, providing a basis for further research and practical strategies to address this issue.

Product Sorting

Wang et al. (2023) While not directly focused on cart abandonment, this study examines how changes in product assortment affect customer retention in online retailing. Understanding how assortment changes impact customer behaviour can indirectly shed light on factors influencing cart abandonment. Li et al. (2024) This research explores the impact of online product recommendations on consumers' online choices. Effective product recommendations can potentially reduce cart abandonment rates by guiding customers to relevant products and improving the overall shopping experience. Yuan (2019) investigated how website quality influences customer satisfaction and purchase intentions in the context of online shopping. A well-organized product sorting mechanism on websites can enhance the user experience and reduce cart abandonment. Lee et al (2022) Although not directly focusing on product sorting, this research delves into the antecedents of online shopping cart abandonment, including factors like website design and trust. Product sorting mechanisms can play a role in website design and navigation, thereby affecting abandonment rates. Zhao et al.(2021) This study discusses personalised recommendation systems in e-commerce

applications. Tailored product recommendations based on user preferences can potentially reduce cart abandonment by presenting customers with items they are more likely to purchase.

Forgetting and Choice Overload

Smith and Johnson (2022) found that forgetting plays a significant role in online shopping cart abandonment. They conducted interviews with online shoppers and identified instances in which shoppers added items to their carts but forgot to complete the purchase because of distractions or interruptions. Similarly, Lee et al. (2022) conducted an observational study tracking users' online shopping behaviour and found that a considerable number of abandoned carts were due to forgetting. They recommended implementing reminder notifications or emails to prompt shoppers to revisit their carts and complete the purchase. Contrary to previous research, Jones et al. (2024) suggested that forgetting may not always be the primary reason for cart abandonment. Their study found that other factors, such as price concerns and technical issues, had a more significant impact on abandonment rates. However, they acknowledged that reminders could still be effective in reducing abandonment among forgetful shoppers. In addition, Schwartz et al. (2021) highlighted the negative impact of choice overload on online shopping cart abandonment. They conducted experiments in which participants were presented with varying numbers of product options and found that higher choice sets led to increased decision difficulty and decreased purchase likelihood. Wang et al. (2021) observed that online shoppers who encountered a wide range of product options within a category were more likely to experience choice overload and abandon their shopping carts. The researchers recommended simplifying product offerings and providing personalised recommendations to mitigate the effects of choice overload. In contrast, Zhao et al. (2021) proposed that choice overload may not always lead to cart abandonment. Their study found that certain demographic factors, such as age and income level, moderated the relationship between choice overload and abandonment behaviour. They suggested that retailers should tailor their strategies based on customer characteristics to effectively

address choice overload. Overall, existing literature suggests that both Forgetting and Choice overload can contribute to online shopping cart abandonment. While reminders and simplification strategies can help mitigate these factors, additional research is needed to understand the nuanced effects of individual differences and situational factors on abandonment behaviour. This gap is filled by the current study and contributes towards investigating the influence of sorting on online shopping cart abandonment while considering the moderation effect of Forgetting and Choice overload of shopping cart item.

Hypothesis of the Study

HO₁: Product sorting positively impacts online shopping cart abandonment.

HO₂: Forgetting mediates the relationship between product sorting and online cart abandonment.

HO₃: Choice Overload is mediation between product sorting and Online cart abandonment

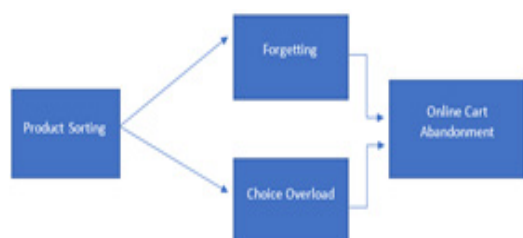


Figure 1 Conceptual Model of the Study

Materials and Methods

The current study had an exploratory combined-descriptive research design. Information was acquired through a virtual poll distributed at random via social media platforms, such as Instagram and WhatsApp Messenger, to meet the study's objectives. The type of sampling used in this study was purposeful sampling, which allows researchers to get responses more quickly and efficiently. Since every question on the survey had to be answered, none was omitted. After the study was conducted between July and September 2025, 370 completed questionnaires were received. However, 20 responses were eliminated owing to a non-response error following an initial examination of the data collected.

This sample is adequate because Israel (1992) indicated that 204 samples are required to reach an accuracy level for populations larger than 100,000.

Thus, the current study's sample size of 370 exceeds the benchmark. Using structural equation modeling, all of the data were statistically tested. The twenty-two questions in the online survey were broken up into many pieces. The first section collected socioeconomic data from respondents, followed by any further sections that were required. The survey items were scored on a 5-point Likert scale. Participants were asked to select an answer on a scale from 1 (SD) to 5 (SA).

Analysis of Data

Structural Equation Modelling

(Hair et al., 2012) in their book on multivariate data analysis explain that "structural equation modelling is a family of statistical models that seek to explain the relationships among multiple variables. It is a procedure for estimating a series of dependence relationships among a set of constructs represented by multiple measured variables and incorporated into an integrated model." Here, constructs are unobservable or latent factors represented by multiple variables. The foundation of SEM lies in two similar multivariate techniques: factor analysis and regression analysis.

The Following Requirements must be met Before using the SEM

1. The **sample size should be at least 10 times the number of variables/items**: The study included 22 statements for which SEM had to be utilised. Therefore, the data must consist of 220 respondents and the dataset in this case contains 370 respondents, which is satisfactory.
2. **All measured variables/items must be on a metric scale**. The items/measured variables used in the study are on a metric scale.
3. **All latent constructs or variables must be reflective**. In the current investigation, all latent constructs or variables are reflective.
4. **The data should be normally distributed**. Using the test of normality, it should be determined whether the data are normally distributed or not. According to Ryu (2011), values of the multivariate kurtosis that are less than 50 are considered acceptable. In other words, if its value is less than 50, the data are said to be normally distributed. Data in this study are normally distributed, as indicated by the value of 32.29

Table 1 Assessment of Normality

Variable	Min	Max	Skew	C.R.	Kurtosis	C.R.
V6	1.000	5.000	-.719	-3.872	-.405	-1.089
V1	1.000	5.000	-.854	-4.597	.032	.087
V11	1.000	5.000	-.781	-4.204	-.408	-1.099
V16	1.000	5.000	-.769	-4.140	-.494	-1.331
V3	1.000	5.000	-.847	-4.561	.340	.914
V18	1.000	5.000	-.604	-3.252	-.836	-2.251
V8	1.000	5.000	-.667	-3.593	-.728	-1.960
V13	1.000	5.000	-.220	-1.183	-1.131	-3.044
V15	1.000	5.000	-.739	-3.980	-.195	-.526
V20	1.000	5.000	-.660	-3.553	.160	.431
V10	1.000	5.000	-.697	-3.753	-.457	-1.230
V5	1.000	5.000	-.754	-4.059	.172	.464
V2	1.000	5.000	-1.040	-5.602	1.042	2.806
V7	1.000	5.000	-.865	-4.658	.166	.447
V17	1.000	5.000	-.813	-4.377	-.424	-1.142
V12	1.000	5.000	-.838	-4.511	-.071	-.191
V4	1.000	5.000	-.786	-4.231	-.463	-1.246
V19	1.000	5.000	-.664	-3.574	-.286	-.770
V21	1.000	5.000	-.594	-3.197	-.903	-2.432
V9	1.000	5.000	-.603	-3.248	-.782	-2.106
V14	1.000	5.000	-.729	-3.924	.103	.276
S12	1.000	5.000	-.506	-2.723	-.308	-.830
S2	1.000	5.000	-.657	-3.536	-.655	-1.763
S7	1.000	5.000	-.734	-3.953	.438	1.179
S17	1.000	5.000	-.973	-5.239	.539	1.451
S20	1.000	5.000	-.999	-5.382	.581	1.565
S15	1.000	5.000	-.803	-4.322	.398	1.071
S5	1.000	5.000	-.871	-4.690	.013	.034
S10	1.000	5.000	-.569	-3.063	-.403	-1.085
S3	1.000	5.000	-.828	-4.458	.209	.563
S8	1.000	5.000	-.921	-4.958	.308	.828
S18	1.000	5.000	-.904	-4.866	.314	.846
S13	1.000	5.000	-.494	-2.660	-.667	-1.797
S14	1.000	5.000	-.522	-2.809	-.944	-2.541
S22	1.000	5.000	-.813	-4.377	-.165	-.444
S9	1.000	5.000	-.620	-3.338	-.037	-.099
S19	1.000	5.000	-.567	-3.053	-.739	-1.990
S4	1.000	5.000	-.872	-4.695	.087	.233

S6	1.000	5.000	-.708	-3.812	-.091	-.245
S21	1.000	5.000	-.669	-3.601	-.532	-1.432
S16	1.000	5.000	-.791	-4.260	.008	.021
S11	1.000	5.000	-.807	-4.348	-.020	-.053
S1	1.000	5.000	-.763	-4.107	-.660	-1.777
Multivariate					32.29	9.49

(Source: Primary Data)

5. ***There should be no common bias in the data.*** In this study, the common method bias was checked using Harman's Single-Factor Method. There is no bias in the data if a single factor emerges

from the data set and accounts for less than 50 percent of the variance. Hence, the findings suggest that the full dataset was free of bias and that more analysis could be conducted.

Table 2 Results of the Harmon Single Factor

Total Variance Explained						
Factor	Initial Eigenvalues			Extraction Sums of Squared Loadings		
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	7.989	18.580	18.580	7.338	17.065	17.065
2	7.777	18.087	36.667			
3	3.954	9.195	45.862			
4	3.857	8.971	54.832			
5	2.955	6.872	61.704			
6	2.666	6.200	67.904			
7	2.353	5.471	73.376			
8	2.150	4.999	78.375			
9	1.778	4.135	82.510			
10	1.570	3.652	86.163			
11	.585	1.359	87.522			
12	.467	1.085	88.607			
13	.434	1.008	89.615			
14	.385	.895	90.511			
15	.349	.811	91.321			
16	.318	.739	92.061			
17	.294	.684	92.745			
18	.274	.637	93.382			
19	.261	.607	93.988			
20	.215	.499	95.488			
21	.212	.492	99.980			
22	.203	.471	100.00			

This study met all of the aforementioned conditions, ensuring the use of the SEM model in this objective.

Specifying SEM Model

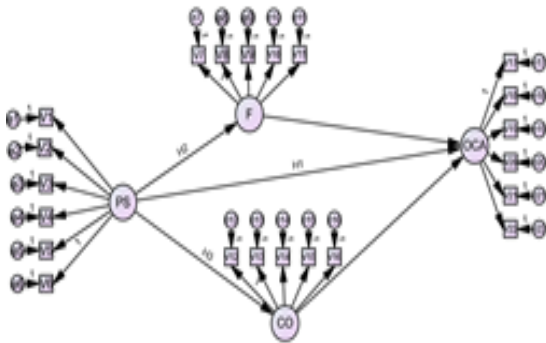


Table 3 Model Fit Indices Values

CMIN/DF	Goodness of Fit		Badness of Fit	
	GFI	AGFI	CFI	RMSEA
3.111	.994	.949	.926	.066

All goodness of fit values are greater than their threshold limits (that is, GFI.994;>.95 which is Great; AGFI.949> 0.90 which is Great; CFI.926> 0.90, which is good), and badness of fit is less than its threshold limit (RMSEA.066 <0.10 which is moderate). CMIN/DF 3.111 is less than 5, which is permissible. All of these values indicate that the Model Fit is good and the Structural Model is valid.

Drawing conclusions as the Structural Model is Valid

Table 4 Unstandardized Regression Weights

Constructs			Unstandardized Weights	S.E.	C.R.	P	Hypothesis Supported
Product Sorting	<---	Online shopping cart abandonment	.834	.086	9.653	***	Yes
Forgetting	<---	Online shopping cart abandonment	.625	.067	9.288	***	
Choice Overload	<---	Online shopping cart abandonment	1.000				
Product Sorting	<---	Forgetting and Choice Overload	.835	.078	10.651	***	

(Source: Primary Data)

Table 4 shows the unstandardized estimates. The unstandardised regression weight for product sorting and online shopping cart abandonment is .834, which implies that when online shopping cart abandonment increases by 1, product sorting increases by .834, which is significant at the 5% level of significance ($p = .000 < .05$), indicating that the main hypothesis, i.e., H01, is **accepted** that interprets as product sorting positively impacts online shopping cart abandonment.

Table 5 Standardized Regression Weights

Constructs			Standardized Weights
Product Sorting	<---	Online shopping cart abandonment	.630

Forgetting	<---	Online shopping cart abandonment	.558
Choice Overload	<---	Online shopping cart abandonment	.799
Product Sorting	<---	Forgetting and Choice Overload	.663

(Source: Primary Data)

Table 5 shows the Standardized estimates. The standardised regression weight for product sorting and online shopping cart abandonment is .630, which implies that when online shopping cart abandonment increases by one standard deviation, product sorting increases by 0.63 standard deviations. All other standardised values were found to be more than 0.5.

Table 6 Regression Weights

Constructs			Unstandardized Estimates	Standardized Estimates	S.E.	C.R.	P	Hypothesis Supported
Product Sorting	<---	Online shopping cart abandonment	.834	.630	.075	-1.905	.057	Yes
Forgetting	<---	Online shopping cart abandonment	.625	.558	.113	-2.676	***	Yes
Choice Overload	<---	Online shopping cart abandonment	1.000	.799	.087	-2.216	***	Yes
Product Sorting	<---	Forgetting and Choice Overload	.835	.663	.078	-.873	.383	-

Table 6 shows the unstandardized estimates. The highest unstandardized estimate was between choice overload and online shopping cart abandonment i.e. 1.000 that implies when the online shopping cart abandonment goes up by 1, choice overload goes up by 1.000, which is found to be significant at a 5% level of significance (p-value .000 < .05). The lowest and unstandardised estimate was between forgetting and online shopping cart abandonment i.e. .625 that implies when online shopping cart abandonment goes up by 1 the forgetting goes down by .625, which is found to be insignificant at 5% level of significance (p value .625 > .05).

Findings and Discussion

Table 7 Conclusion of Structural Model

Hypotheses	Hypotheses Supported
HO1: Product Sorting positively impacts Online shopping cart abandonment.	Yes
HO2: Forgetting is mediation between product sorting and Online cart abandonment.	Yes
HO3: Choice Overload is mediation between product sorting and Online cart abandonment	Yes

The above table concludes that there is a positive relationship between product sorting and online shopping cart abandonment. In addition, choice overload and forgetting act as mediators

between product sorting and online shopping cart abandonment.

Implications of the Study

The outcomes of this study offer a nuanced understanding of the role of sorting mechanisms in online shopping cart abandonment, considering the moderating effects of forgetting and choice overload. By integrating insights from cognitive psychology and decision-making theories, our framework provides a theoretical foundation for future empirical research aimed at elucidating the underlying mechanisms driving online shopping behaviour. Moreover, our findings have practical implications for e-commerce practitioners seeking to optimise sorting strategies and enhance user experience to mitigate cart abandonment and drive conversion rates.

Managerial Suggestions

Based on the finding that product sorting has a positive relationship with online shopping cart abandonment, and that choice overload and forgetting act as mediating factors, several practical suggestions can be proposed for e-commerce platforms.

1. First, online retailers should simplify product sorting and filtering mechanisms. Although sorting options help consumers navigate products, providing too many sorting categories or complex filtering tools can increase cognitive load and create confusion. Platforms should limit the number of sorting options and present the most relevant ones, such as price, popularity,

ratings, or newest products. A clean and intuitive interface can help consumers make quicker decisions and reduce the chances of cart abandonment.

2. Second, e-commerce platforms should minimise choice overload by organising product information effectively. This can be achieved by displaying recommended products, highlighting best-selling items, and using personalised suggestions based on previous browsing or purchasing behaviour. Categorising products clearly and reducing unnecessary variations can help consumers focus on fewer but more relevant alternatives, thereby improving decision-making.
3. Third, retailers should implement reminder systems to address lapses, which is a major contributor to cart abandonment. Automated reminder emails, push notifications, and retargeting advertisements can be used to remind consumers about items left in their carts. Providing gentle reminders or limited-time offers can encourage shoppers to return and complete their purchases.
4. Fourth, e-commerce websites should improve their user interface design and navigation to reduce the cognitive effort required during the shopping process. Clear product descriptions, easy comparison features, and simple navigation menus can reduce the mental effort involved in evaluating products and completing purchases.
5. Fifth, retailers can use personalisation and intelligent algorithms to present customised product sorting based on consumer preferences and browsing history. Personalised sorting reduces the number of irrelevant options displayed to consumers and helps them find desired products more quickly.
6. Finally, e-commerce platforms should focus on creating a seamless and efficient shopping experience by reducing distractions, improving website performance, and ensuring faster loading times. When consumers experience less cognitive burden and a smoother browsing process, they are more likely to complete their purchases rather than abandon their shopping carts.

Overall, by simplifying sorting mechanisms, reducing choice overload, and implementing effective reminder strategies, e-commerce businesses can significantly reduce online shopping cart abandonment and enhance customer satisfaction and conversion rates.

Limitations of the Study

Despite providing valuable insights into the relationship between product sorting and online shopping cart abandonment, this study has certain limitations that should be acknowledged.

First, the study adopted an exploratory and descriptive research design, which mainly focuses on identifying relationships among variables rather than establishing strong causal relationships. Therefore, the findings should be interpreted with caution, as the study does not fully explain cause-effect relationships between product sorting, choice overload, forgetting, and cart abandonment.

Second, the study relied on purposive sampling, which may limit the generalisability of the results. Since respondents were selected through social media platforms such as Instagram and WhatsApp Messenger, the sample may primarily represent individuals who are active on these platforms and comfortable with online surveys. Consequently, the findings may not fully represent the behaviour of all online shoppers, particularly those who are less active on social media.

Third, the data were collected using a self-reported questionnaire, which may introduce response bias. Participants might provide socially desirable answers or may not accurately recall their online shopping behaviour, which could affect the accuracy of the responses.

Fourth, the study used cross-sectional data collected within a short time frame (July–September 2025). Consumer behaviour in e-commerce may change over time because of technological advancements, seasonal shopping trends, or changes in online platforms. Therefore, the results may not capture long-term behavioural patterns. Fifth, the study utilised a 5-point Likert scale and an online survey consisting of 22 items, which may limit the depth of responses. Although the Likert scale is useful for measuring attitudes and perceptions, it

may not fully capture complex psychological factors influencing online shopping cart abandonment.

Finally, the research focused only on product sorting, forgetting, and choice overload as key variables influencing cart abandonment. Other important factors, such as website design, trust, perceived risk, payment security, pricing strategies, and delivery options, were not included in the analysis, which may also influence consumer decisions. Considering these limitations, future research can adopt more diverse sampling techniques, larger and more representative samples, longitudinal research designs, and additional variables to provide a more comprehensive understanding of online shopping cart abandonment behaviour.

Future Directions

Longitudinal studies can investigate how sorting strategies impact online shopping cart abandonment over time.

Individual differences can be explored in terms of forgetting and choice overload susceptibility and their moderating effects on the relationship between sorting and cart abandonment.

Contextual factors, such as product type, task complexity, and user motivations, can influence the effectiveness of sorting strategies in reducing cart abandonment.

The power of machine learning can be harnessed by using algorithms and artificial intelligence to develop adaptive sorting algorithms that dynamically adjust to users' preferences and behaviour patterns in real-time.

By pursuing these future directions, researchers can advance our understanding of the complex interplay between sorting, forgetting, and choice overload in online shopping cart abandonment. By shedding light on these underlying mechanisms, scholars can inform the design of more effective sorting mechanisms and interventions to reduce cart abandonment and enhance online shopping experiences.

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