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RESEARCH ARTICLE

Analyzing customer behavior and retention strategies in the edible vegetable oil e-commerce industry

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Abstract

The research article explores consumer behaviour on e-commerce platform and proposes strategies to enhance customer retention within the edible vegetable oil industry. The growing adoption of e-commerce presents a crucial opportunity to understand purchasing patterns and consumer preferences compared to traditional retail models. The study is based on data collected from 200 respondents, providing valuable insights into customer behaviour regarding edible oils like soybean oil, palm oil and sunflower oil, which dominate both the Indian and global markets. The research examines factors influencing customer loyalty, including brand awareness, online promotions, pricing and product quality. The findings are expected to offer significant insights for companies seeking to optimize operations in the edible oil industry while refining e-commerce strategies. Additionally, the study aims to support the development of long-term customer relationships in a highly competitive market.

Keywords

competitive market; consumer preference; customer loyalty; digital marketing; e-commerce trends; health; online shopping

Introduction

Consumer behavior in the edible oil industry is influenced by a combination of health awareness, environmental concerns, cultural preferences and economic factors. As a staple ingredient in cooking, edible oils possess various attributes that shapes consumer choice, with increasing attention being placed on the health implications of different oils. Rising awareness of the health risks associated with oils high in saturated fats has led to a shift in preference towards oils with higher levels of unsaturated fats, such as sunflower and olive oil. These oils are perceived as healthier alternatives compared to oils rich in saturated fats, such as coconut and palm oil. Scientific research supports this shift, highlighting the cardiovascular benefits of unsaturated fats, which contribute to a reduction in cardiovascular risk and the management of cholesterol levels (1).

The global demand for edible oils, including palm oil, has surged in recent years, driven by rising incomes, changing lifestyles and increased consumerism. Palm oil, for instance, accounts for around 80 % to 90 % of global production, with the majority being directed for human food consumption, while the remaining 10 % is consumed by industries such as pharmaceuticals, biodiesel and cosmetics (2). However, health organizations and educational campaigns have raised awareness about the risks of trans-fats, influencing consumer choices and fostering a preference for oils labeled "cholesterol-free" or "heart-healthy." Consumer preferences are also shaped by cultural factors, with oils such as mustard oil being popular in Eastern and Northern

India, coconut oil in the South, groundnut oil in Maharashtra and Gujarat and soybean oil in vegetarian communities (3). These regional preferences play a significant role in purchasing decisions, with local varieties and regional brands dominating the market. As noted in 2019, "olive oil" was among the most frequently notified products in the category of 'fats and oils (4).

The role of e-commerce in the agri-business sector, including the edible oil industry, has transformed how consumers purchase oils. E-commerce platforms have enabled businesses to reach a broader audience, including underserved rural and urban areas and have streamlined supply chains, making it easier for consumers to access a variety of products from different brands. Agribusinesses, which involve marketing farm products, utilize facilities such as processing plants, warehouses and wholesale and retail outlets for the production and marketing of raw materials like oils and other food products (5). Technological advancements, including mobile apps, digital payment systems and online marketplaces, have further facilitated this shift, providing consumers with more convenience and enabling businesses to better understand customer needs. These platforms also provide valuable information, such as product reviews and pricing, which aid consumers in making informed purchasing decisions, especially during times when the convenience of online shopping becomes more essential, such as during busy schedules or crises. This platform has the potential to improve market access by overcoming geographical barriers (6).

In the competitive edible oil market, customer retention strategies are crucial for business success. Retaining customers requires a multifaceted approach that addresses customer experiences, health preferences and product quality expectations. Key retention strategies include engaging with consumers to gather feedback, personalizing product offerings and emphasizing sustainable and health-conscious products. Businesses that create emotional connections with their customers and offer premium oils with perceived health benefits can build brand loyalty, leading to repeat purchases and positive word-of-mouth referrals (7). By using data analytics, loyalty programs and customer feedback, businesses can continuously refine their strategies to ensure long-term growth and maintain a competitive edge in the market (8).

The primary purpose of this study is to analyze the consumer purchasing behaviour in the edible vegetable oil industry, focusing on the issues and factors associated with satisfaction. The objectives of this study are as follows:

1. *To assess consumer preferences for different types of edible oils purchased online.*
2. *To investigate the key factors that influence customer retention in the e-commerce edible oil market.*
3. *To identify the effectiveness of various online promotional strategies in retaining customers.*

Thus, consumer behavior in the edible oil industry is influenced by a complex interplay of health consciousness, convenience, cultural preferences and economic factors. With 80 % to 90 % of palm oil being used for human food consumption and e-commerce playing a pivotal role in shaping purchasing decisions, businesses must adopt strategies that cater to these factors while enhancing customer retention to succeed in the competitive edible oil market.

Theoretical underpinning

The Theory of Planned Behaviour (TPB)

This theory falls under the consumer behaviour models of this study. It was developed by Icek Ajzen and Wodeley and is used as a psychological framework to explain individual behaviour and the dynamics of intention. TPB builds upon the "Theory of Reasoned Action (9)" by incorporating additional factors that influence behaviour. This theory posits that behaviour, driven by intention, is mainly influenced by factors such as perceived behavioural control, subjective norms and attitude toward the behaviour. TPB helps explain the behaviour that leads to product purchase (10). In the context of edible oil purchases, consumers' attitudes toward health benefits, brand perception and the ease of online purchasing play a significant role in determining their choices. This is highly beneficial for business marketing, as emerging technologies can help develop a positive workplace culture and maintain a good customer experience (Fig. 1).

It is shaped through personal experiences, information and beliefs from various sources such as product labels, health recommendations and advertising. Positive attitudes increase the likelihood of purchasing the product, as the consumer is influenced by their favorable evaluation. Subjective norms refer to the perceived social pressure to perform or not perform a behavior. As noted, "Subjective norms represent the views of group pressures from close individuals to act in a specific way" (10). Perceived behavioural control refers to the individual's perception of their ability to perform a behaviour, considering factors such as resources, skills and obstacles. The theory provides valuable insights to business owners, encouraging them to adopt technologies and gather signals that offer sustainable, relevant and practical information about market trends and culture, enabling them to align these insights with well-planned strategies.

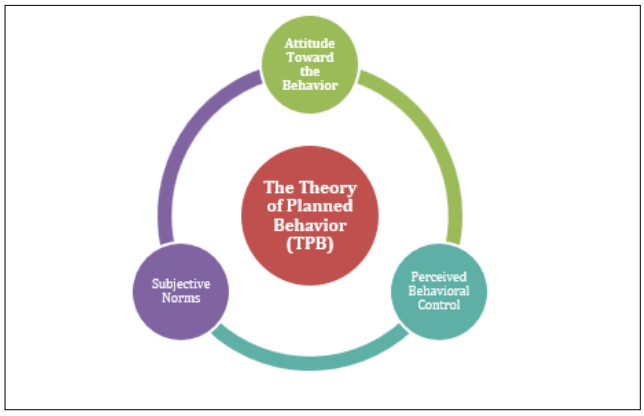

Fig. 1. The theory of planned behaviour.

The Technology Acceptance Model (11)

The theory emphasizes the E-commerce adoption models developed by Fred Davis, using a widely recognized framework for understanding how individuals accept and use technology. Among the primary factors influencing technology acceptance are the perceived ease of use and perceived usefulness, as outlined in the Technology Acceptance Model (TAM). In this model, behavioral intentions are used to predict the actual usage of a system (12). Consumers who find e-commerce platforms convenient and efficient for purchasing oils are more likely to engage in online shopping. The model also incorporates a range of additional factors, such as facilitating

conditions and social influences, to provide a more comprehensive understanding of e-commerce adoption in rural and semi-rural regions. The speed and pattern of the diffusion of new products, practices and ideas within a population are also considered. Various brands and companies are increasingly adopting digital tools to modify and enhance their existing business processes (Fig. 2).

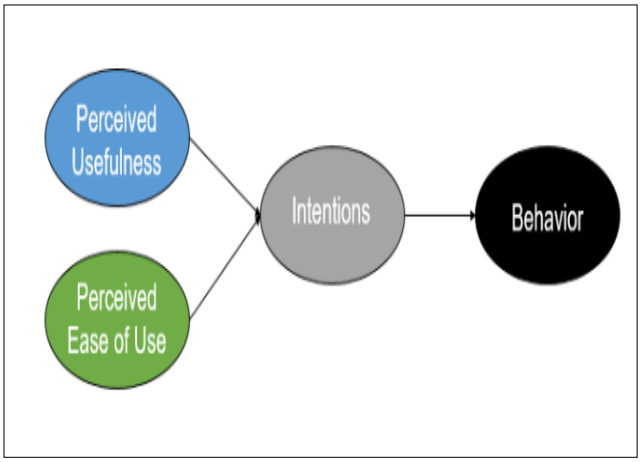

Fig. 2. The technology acceptance model.

The model provides valuable insights into the competition surrounding new technologies in the agribusiness sector. Digital technologies and innovation enable companies to reassess their operations, develop new capabilities and align resources with business activities. As stated, “The actual use of the system is influenced by its ease of use, which leads to increased productivity.” Marketing strategies are evolving rapidly, making it essential to continuously assess the situation and adjust strategies according to market needs. One emerging market need is the acceptance of technology and this model offers valuable insights into how consumers adopt e-commerce platforms for purchasing edible oils. Technology acceptance further benefits the industry by facilitating customer integration and engagement, encouraging positive interactions between the brand and consumers. These interactions may occur through social networks, the company’s website, or third-party websites.

Materials and Methodology

The selection of appropriate methods in research is essential for conducting the study systematically and obtaining the desired results. Regarding the ontology of research, research philosophy represents the outer layer, encompassing the appropriate methodology for the ongoing study. As mentioned by Al-Ababneh (2020), research philosophy can be divided into four categories: "pragmatism," "positivism," "realism," and "interpretivism." Based on the characteristics of these philosophies, the "positivist research philosophy" has been followed in this study, as it supports the reality of the context and the social phenomena associated with the research.

"Research approach" is the second stage, which provides guidance on the selection of data collection and interpretation process. The "inductive approach" is a crucial for proceeding with subjectivist knowledge regarding the research context (13). In line with this, an "inductive research approach" has been adopted in this study, focusing on consumers purchasing intention towards edible vegetable oil.

"Research design" is another essential part in selecting appropriate methods and techniques, as it provides a structured plan for completing the research systematically. "Exploratory research design" has been identified as a productive approach, allowing the researcher to explore social phenomena. This characteristic makes it especially suitable for this study.

As discussed earlier, purchasing edible vegetable oil is an emerging trend in the industry. Therefore, collecting data directly from consumers has been identified as the most suitable approach for this study. Given the purpose of this research, "primary quantitative data" has been selected for collection, as it provides real-time data and direct consumer perspectives regarding the effectiveness of e-commerce platforms for purchasing relevant products. Due to the type of data collected, statistical analysis has been employed to interpret the data and obtain the desired results. IBM SPSS has been used for analysis, incorporating descriptive statistics, correlation analysis, regression analysis and reliability statistics.

For selecting the sample size, a "purposive sampling technique" has been followed. This technique allows researchers to stay focused on the study's purpose, particularly when selecting a sample for data collection (14). Using this method, 200 samples directly related to purchasing products from the edible vegetable oil industry were selected. The relevance of these samples in providing effective data for the context of the study ensures the validity and reliability of the data. Furthermore, the researcher has provided participants with the option to withdraw, ensuring integrity and transparency throughout the research process.

Results and Discussion

This section of the research mainly deals with representing the findings of the study through analyzing the data. As previously mentioned in this study, "primary quantitative data" has been used in this study. Therefore, the data presented in this section were generated using IBM SPSS, where the numeric responses from 200 selected participants were analysed. Descriptive statistics, correlation analysis, regression analysis and reliability statistics were employed to analyse the data.

Descriptive statistics

Descriptive statistics is the foundational and most essential statistical analysis method, used to summarise and interpret the collected data in a research study, providing a clear understanding of the distribution of the data. In cases where a variable has a restricted range of discrete values, frequency tabulation is useful for generating clear data summaries that assist in analyzing sample patterns (15). By using a cumulative percentage distribution, further interpretive information regarding the relative positioning of specific scores within the overall distribution of the sample can be obtained. Therefore, this statistical analysis is crucial for providing key insights into consumer purchasing intentions from e-commerce platforms in the edible vegetable oil industry.

The mean and standard deviation (7) are two essential segments of this analysis, offering insights into the data distribution in the generated dataset. For one of the demographic

questions, a mean value of 1.94 was identified, with an SD of 1.496. The proximity of the mean and SD values suggests that the responses provided by the selected consumers are relatively consistent in the demographic context. In contrast, for the variable-based section, the mean value was recorded at 1.79, with an SD of 0.701. This also indicates a clustered distribution within the dataset. Based on the findings from this section, it can be concluded that the data distribution is clustered.

This section of the research primarily focuses on presenting the study's findings by analyzing the data. As previously mentioned, this study uses "primary quantitative data," and the data represented in this section were generated using IBM SPSS, where numeric responses from 200 selected participants were analyzed. Descriptive statistics, correlation analysis, regression analysis and reliability statistics were employed (Table 1).

Correlation analysis

The results of the correlation analysis provide valuable insights into the variability of the variables (16). Pearson correlation analysis was carried out in this study to elucidate the variability among the selected variables and to provide insights into the elements of consumer purchasing pattern that contribute to positive purchase intentions within the edible vegetable oil industry. The correlation value between the variables is effectively illustrated in the figure above.

In this study, Pearson correlation analysis examined consumer purchasing patterns in relation to independent variables, such as issues faced by consumers and their level of satisfaction. The correlation value between consumers' purchasing patterns and the issues faced by consumers was reported at 0.085, which is significantly lower than the standard correlation value. However, this value remains on the positive

Table 1. Descriptive statistics of the study

Descriptive Statistics	Age	Gender	Qualification	Profession	Family Income (In Rs.)	Family Type	Family Size	State
Mean	2.21	1.34	3.57	1.94	2.69	1.18	1.12	1
Median	2	1	4	2	3	1	1	1
Mode	2	1	4	0	3	1	1	1
Std. Deviation	1.095	0.475	0.761	1.496	0.773	0.385	0.551	0
Skewness	-0.18	0.681	-1.917	-0.024	-2.637	1.678	0.057	
Std. Error of Skewness	0.172	0.172	0.172	0.172	0.172	0.172	0.172	0.172
Kurtosis	-0.59	-1.552	3.664	-1.382	6.005	0.825	0.181	
Std. Error of Kurtosis	0.342	0.342	0.342	0.342	0.342	0.342	0.342	0.342
Minimum	0	1	0	0	0	1	0	1
Maximum	4	2	4	4	3	2	2	1

	Issues faced by customers					Satisfaction level				
Descriptive Statistics	Customer awareness of e-commerce purchases of edible vegetable oil	How often they purchase	Trust on e-commerce shopping	Disclosure of personal information	Difficulty in returning the product	Delay in delivery	Shipping cost	Overall e-commerce experience of purchasing edible vegetable oil	Variety of edible vegetable oil brands available on the platforms	Pricing of edible vegetable oil brands available on the platforms
Mean	0.59	1.19	4.07	3.77	2.39	2.14	2.65	3.18	3.26	2.61
Median	0	1	5	4	2	1	3	4	4	3
Mode	0	1	5	3	2	1	3	4	4	3
Std. Deviation	0.738	0.393	1.216	0.757	1.115	1.637	1.045	1.111	1.067	1.143
Skewness	0.822	1.592	-0.922	0.421	0.512	1.086	-0.298	-1.32	-1.941	-1.201
Std. Error of Skewness	0.172	0.172	0.172	0.172	0.172	0.172	0.172	0.172	0.172	0.172
Kurtosis	-0.71	0.541	-0.826	-1.144	-0.615	-0.626	-1.081	0.929	3.408	0.751
Std. Error of Kurtosis	0.342	0.342	0.342	0.342	0.342	0.342	0.342	0.342	0.342	0.342
Minimum	0	1	2	3	1	1	1	0	0	0
Maximum	2	2	5	5	5	5	4	4	4	4

Descriptive Statistics	Delivery process of the edible vegetable oil order	Packaging of edible vegetable oil product upon delivery	How likely are you to recommend this e-commerce platform for purchasing edible vegetable oil to friends and family?	How many liters of edible vegetable oil do your family consumer per month on average?	New trails	Product satisfaction
Mean	2.13	2.75	3.12	1.75	4.15	1.8
Median	3	3	4	2	4	1
Mode	3	3	4	2	6	1
Std. Deviation	1.293	1.155	1.153	0.742	2.089	1.109
Skewness	-0.54	-1.218	-1.202	-0.159	-0.361	1.532
Std. Error of Skewness	0.172	0.172	0.172	0.172	0.172	0.172
Kurtosis	-1.13	0.899	0.314	-0.251	-0.877	1.562
Std. Error of Kurtosis	0.342	0.342	0.342	0.342	0.342	0.342
Minimum	0	0	0	0	0	1
Maximum	4	4	4	3	8	5

side, indicating that consumer purchasing patterns in the edible vegetable oil industry are positively correlated with the challenges consumers face when using e-commerce platforms.

On the other hand, the correlation value between consumer purchasing frequency and the variety of edible oil provided in the industry was recorded at 0.121. This can be considered a relatively high correlation, suggesting that the variety provided by the edible vegetable oil industry positively influences purchasing frequency among consumers, particularly those selected for this study.

Regression analysis

The linear relationship between the variables is depicted in the figure above. The calculated R-value of 0.484 indicates a strong and positive correlation between the variables. Similarly, the Adjusted R-squared value of 0.234 serves as critical evidence of significant variability among the variables. The closeness between the R-squared and Adjusted R-squared values in this specific context can be interpreted as evidence supporting the generalizability of the findings. In other words, these values affirm the reliability and validity of the conclusions derived from the comprehensive analysis (Table 2).

Table 2. Regression analysis consumer purchasing pattern

Model Summary				
Model	**R**	**R Square**	**Adjusted R Square**	**Std. Error of the Estimate**
1	0.484[a]	0.234	0.219	0.348
Predictors				

Analysis of Variance (ANOVA)

The variations between the means of different variable groups in the dataset are illustrated in the represented figure. In this context, a p-value less than 0.05 is commonly considered a standard threshold for significance. The significance value provides critical evidence for understanding the differences in group means among the variables. The figure indicates a significance value of 0.000, which is well below the standard threshold. This suggests considerable variations in the average duration of data recorded for each research segment (Table 3).

Reliability statistics

From the perspective of primary data analysis, reliability analysis serves as a valuable tool for evaluating the validity of a study's overall conclusions. According to a study, Cronbach's alpha reliability is crucial for understanding the legitimacy of research findings. In this research, the calculated value of Cronbach's alpha is approximately 0.161. While relatively low, this value suggests that the conclusions may still hold validity within a broader context and can be considered a meaningful contribution (17) (Table 4).

Table 4. Reliability statistics of the study

Cronbach's Alpha	N of items
0.161	8

Conclusion

The study used IBM SPSS to analyze primary quantitative data, employing methods such as regression, correlation and descriptive analysis. It shed light on key factors influencing consumers' decisions to purchase edible vegetable oil online, including product variety and challenges associated with e-commerce. The findings provide valuable insights into consumer behavior and offer pathway for enhancing customer satisfaction and purchase intentions within this market.

However, the absence of secondary data limits the depth of the study, highlighting the need for future research to address this gap. Critical issues such as trust, security and product variety on e-commerce platforms emerged as significant determinants of consumer purchasing decisions.

Authors' contributions

AA, DK and MM participated in the conceptualization of the study and listed the required methodology for the study; validation of the study carried out by KM and SCS; formal analysis carried out by AA and DK; investigation conducted by AA, DK, KM and SCS; writing-original draft preparation carried out by AA; review and editing carried out by AA, DK, MM, KM and SCS. All authors have read and agreed to the final version of the manuscript.

Compliance with ethical standards

Conflict of interest: Authors do not have any conflict of interests to declare.

Ethical issues: None

Declaration of generative AI and AI-assisted technologies in the writing process

During the preparation of this work, the authors used Gemini AI to improve language. After using this tool/service, the authors reviewed and edited the content as needed and will take full responsibility for the content of the publication.

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Table 3. Analysis of variance of consumer purchasing pattern

	Model	Sum of Squares	df	Mean Square	F	Sig.
1	**Regression**	7.215	4	1.804	14.926	0.00
	Residual	23.565	195	0.121		
	Total	30.78	199			

a. Dependent variable: How often they purchase

b. Predictors: (Constant), Product satisfaction, issues faced by the customers towards e-commerce edible vegetable oil purchase (Disclosure of personal information), How likely are you to recommend this e-commerce platform for purchasing vegetable oil to friends and family?, How satisfied are you with the overall e-commerce experience of purchasing edible vegetable oil?

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