IJCRT.ORG ISSN : 2320-2882

INTERNATIONAL JOURNAL OF CREATIVE RESEARCH THOUGHTS (IJCRT)

An International Open Access, Peer-reviewed, Refereed Journal

A Comparative Study On Consumer Preferences For Offline And Online Shopping In The Fast-Moving Consumer Goods Sector Using Response Surface Methodology

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Abstract: This study investigates consumer preferences for online and offline shopping in the fast-moving consumer goods (FMCG) sector using a quantitative approach supported by response surface methodology (RSM). Key factors influencing shopping behavior, such as convenience, pricing, product availability, and customer experience, were quantified through structured data analysis. A total of 150+ respondents participated in the study, and their responses were analyzed using RSM to model the relationship between independent variables (age, income level, and shopping frequency) and dependent responses (online, and offline convenience preferences). The results demonstrated that online shopping is preferred due to ease of access, discounts, and a broader product range, whereas offline shopping remains significant for its immediacy and physical product verification. The RSM-generated response surfaces highlighted optimal shopping conditions, revealing a strong correlation between age, income sensitivity and shopping preferences. The key findings indicate that younger consumers (18–35 years) with higher salaries ($1500–$2500 per month) prefer online shopping (desirability score = 0.92), driven by convenience (46.7%), product variety (40.1%), and frequent discounts (44.1%). In contrast, offline shopping remains relevant for older consumers (40+ years) with moderate incomes ($2000–$3000 per month), who prioritize product inspection (40.8%), immediate availability (47.4%), and trust in quality (16.4%), with peak purchases occurring in the first week of each month. These findings provide actionable insights for retailers to optimize hybrid shopping models, ensuring better consumer engagement. The study concludes with implications for retail strategies and future research recommendations.

Keywords - FMCG sector, Response Surface Methodology, Income sensitivity, Shopping preferences, E-Commerce.

1. INTRODUCTION

The growth of e-commerce has radically changed the shopping landscape, particularly in the fast-moving consumer goods (FMCG) sector, where products are often bought in bulk or on a regular basis. The FMCG sector is a fast-growing industry that includes essential consumer goods such as food, beverages, and personal care items (Nwabekee et al. 2024; Gupta 2018). International data shows a significant rise in e-commerce penetration globally, with the online FMCG market projected to reach $15 trillion by 2025, growing at a compound annual growth rate of 10.5% (Patel, Angrish, and Nadda 2023). The Asia-Pacific region dominates this market, accounting for 45% of global FMCG e-commerce sales (Rao). In the U.S., online grocery sales accounted for 12.5% of total FMCG sales in 2023 (Kang 2023), while in Europe, this figure stands at 10.8% (Rijk, Wiggs, and Piotrowksi 2021). Nationally, India's FMCG sector is expected to grow from $110 billion

in 2020 to $220 billion by 2025, with online sales contributing nearly 15% of total FMCG revenues (Trivedi 2024). The Indian e-commerce market, driven by increased smartphone penetration and digital payment adoption, is witnessing a surge in online shopping for FMCG products, particularly in urban areas. Despite these trends, offline shopping retains significance, with 85% of total FMCG sales still occurring in traditional retail stores (Gupta 2020; Shareef 2018). Factors like product authenticity, immediate availability, and customer trust contribute to this preference (Thanigan et al. 2025).

This study seeks to compare consumer preferences in both online and offline shopping environments, identifying the key drivers and barriers that influence these choices. Understanding these preferences can help businesses and marketers design effective strategies to cater to a diverse consumer base. Online shopping platforms have risen in popularity due to convenience, time savings, and the proliferation of digital devices (Li, Zhao, and Pu 2020). Conversely, offline shopping remains dominant, driven by tangible experiences such as product inspection, immediate gratification, and in-store promotions(Savastano, Barnabei, and Ricotta 2016). Understanding the factors influencing consumer choices can help businesses develop better marketing and retail strategies.

Moreover, response surface methodology (RSM) has been successfully applied in the FMCG sector for analyzing consumer behavior trends, optimizing retail strategies, and enhancing decision-making processes (Yüceşen Serbest, Baylan, and Çehreli 2024; Benasa, Go, and Salvador 2007; Raj, Tirkey, and Singh 2024). The need for RSM in the FMCG sector arises due to the complexity of consumer behavior and the multiple interacting factors influencing shopping preferences. RSM is essential for optimizing consumer decision factors by modeling relationships between key variables like shopping frequency, price sensitivity, convenience, and product availability, allowing retailers to fine-tune their strategies. Additionally, consumer choices are influenced by multiple interacting factors, which traditional statistical methods may not effectively capture. RSM provides response surfaces that map the optimal conditions for consumer satisfaction. FMCG retailers require a robust approach to analyze large consumer datasets, and RSM enables businesses to predict customer behavior more accurately, aiding in better inventory management, pricing strategies, and promotional planning (Sharma et al. 2021). Existing studies primarily use conventional statistical tools, missing the potential of predictive modeling. RSM allows for a deeper understanding of consumer behavior, which is critical in a fast-evolving sector like FMCG (Moskowitz and Hartmann 2008). Thus, despite existing research on online and offline shopping preferences, there is a research gap in quantifying these preferences through RSM, particularly in FMCG. This study aims to bridge this gap by leveraging RSM for data-driven insights, contributing to a novel methodological approach in consumer behavior analysis. In the current research, the input parameters studied include age, income level, and shopping frequency, while the output parameters include purchase intention online, or offline. Building upon this need for RSM in FMCG, the study sets the following research objectives:

To analyze the factors influencing consumer preferences for online and offline shopping in FMCG.

To evaluate the role of price, convenience, and product availability in shopping decisions.

To assess the challenges consumers face in each shopping method.

To utilize response surface methodology (RSM) for quantifying and optimizing consumer shopping preferences by identifying key interactive variables.

To further validate the significance of RSM, the study proposes the following hypotheses:

H1: Consumers prefer online shopping due to convenience and price discounts.

H2: Immediate availability significantly influences offline shopping preferences.

H3: RSM can effectively model and predict consumer preferences for online and offline shopping, revealing optimal shopping conditions and decision-making patterns.

2. LITERATURE REVIEW

2.1 The FMCG Sector and Consumer Behavior

The FMCG sector is defined by high turnover of products, characterized by low-cost items that are frequently purchased. Key factors affecting consumer purchasing decisions in this sector include product quality, price, brand loyalty, and convenience. Consumer behavior in this market is also heavily influenced by factors such as social influences, marketing, and economic conditions (Vuong, Lam, and Bui 2024). (Chatterjee et al. 2018) performed interpretive structural modeling and revealed that consumer buying behavior is significantly influenced by advertising strategy, brand influence, celebrity endorsements, and virtual merchandising. Moreover, a study by (Hyde et al. 2017) examines the role of consumer exploratory behavior, driven by environmental stimuli. This influences both product acquisition and information search patterns. Additionally,

the study evaluates how demographic variables impact consumer exploratory tendencies. Another study by (Vibhuti and Pandey 2014) concluded that consumer behavior in the FMCG sector is significantly influenced by factors such as place, product, price, promotion, and both physiological and psychological aspects. However, the impact of these factors varies depending on the type of product being purchased. An analytical study by (Karthigai Selvi and Padmashri 2023) suggests that consumer behavior is influenced by factors such as income, price, product type, and physiological aspects, though their impact varies across different product categories.

2.2 Growth of E-Commerce in FMCG

Recent reports show an increase in online shopping for FMCG products, especially post-pandemic, as more consumers prefer the convenience of online ordering and home delivery (Fornari, Grandi, and Fornari 2018). E-commerce platforms such as Amazon, Walmart, and regional players have transformed the way consumers access FMCG products. Factors such as price comparisons, customer reviews, and personalized marketing have enhanced the appeal of online shopping. A study by (Fornari, Grandi, and Fornari 2018) takes a supply-side approach to analyze e-commerce trends in the grocery sector. Findings highlight that online-native retailers dominate the market and shape e-grocery dynamics, while lower profit margins in e-commerce pose a challenge, particularly for traditional offline retailers relying on physical stores. (Kumar and No) in 2024, reported that FMCG companies are increasingly leveraging e-commerce to expand their reach and adapt to changing consumer behaviors. The integration of FMCG and online retail has transformed the industry, enhancing convenience, accessibility, and innovation. A case study conducted by (Webster, Beach, and Fouweather 2006) suggests technological options for e-commerce, focusing on electronic data Interchange and internet-based platforms. It further explores e-commerce adoption, identifying key drivers and barriers influencing its growth. Further, a study in Vietnam e-commerce market by (Van Tuan et al. 2022) indicate that e-commerce platform quality indirectly influences purchase intention through trust and perceived risk. Trust and perceived usefulness positively impact purchase intention, while perceived risk has a negative effect. The study suggests strategies for businesses to enhance consumer trust and engagement in e-commerce.

2.3 Online/ Offline shopping trends in FMCG

Despite the growth of e-commerce, offline shopping remains a significant force in the FMCG sector. Traditional brick-and-mortar stores offer advantages such as instant product availability, in-person customer service, and the ability to physically evaluate products before purchase (Biswas et al. 2024). However, physical stores must adapt to changing consumer expectations by integrating technology and offering unique in-store experiences. (Dörnyei 2019) performed a study on grocery retail that it undergoes rapid change, driven by technology and evolving shopper expectations for value, choice, and convenience. Consumers prefer offline shopping for sensory evaluation (feel/smell/see), while online shopping is favored for cost savings. An omnichannel approach combining physical and digital experiences is key to future retail success. (AhangarDavudi et al. 2024) designed a qualitative and quantative model for consumer behavior transition in the FMCG sector and reported that the shift from offline to online shopping in Iran is slower than the global average. (Ieva, Ziliani, and Gàzquez Abad 2015) examines the impact of print versus online promotional communication (store flyers) on consumer intentions to visit and buy in shopping patterns. Findings suggest that the medium of delivery does not significantly influence consumers' decisions regarding product or store choices. Moreover, a study by (Gupta 2015) examines how consumers evaluate online and offline shopping channels, focusing on perceived value differences. Findings show that online shopping is growing, especially among younger and female consumers, while older demographics prefer offline shopping due to lower digital familiarity. Price remains a key motivator for online purchases. Thus, the reviewed literature provides valuable insights into consumer shopping behavior, highlighting key factors that influence online and offline purchasing decisions. However, these studies primarily focus on qualitative assessments or traditional statistical methods, lacking a robust predictive modeling approach. The existing research does not comprehensively quantify the interplay of multiple consumer behavior variables using advanced methodologies like RSM. This gap in the literature underscores the need for the current study, which aims to bridge this research void by employing RSM to model and optimize consumer shopping preferences in the FMCG sector.

3. METHODOLOGY

The methodology adopted in the current study integrates quantitative surveys, qualitative interviews, and RSM optimization. This study offers a comprehensive and data-driven analysis of consumer preferences in the FMCG sector. The RSM approach enhances predictive accuracy, enabling retailers to optimize pricing, promotional strategies, and shopping experience based on consumer-driven insights. A flowchart showing the different steps involved in the methodology has been shown in figure 1. This methodology ensures robust conclusions and practical recommendations for both online and offline retail strategies. The steps are-

Study Design

This research adopts a mixed-methods approach, incorporating both quantitative and qualitative techniques to comprehensively analyze consumer preferences for offline and online shopping in the FMCG sector. The quantitative aspect involves a structured survey to capture statistical insights into consumer behavior, while the qualitative component includes semi-structured interviews to explore underlying motivations and perceptions. The combination of these methods ensures a more holistic understanding of consumer preferences, capturing both numerical trends and in-depth reasoning.

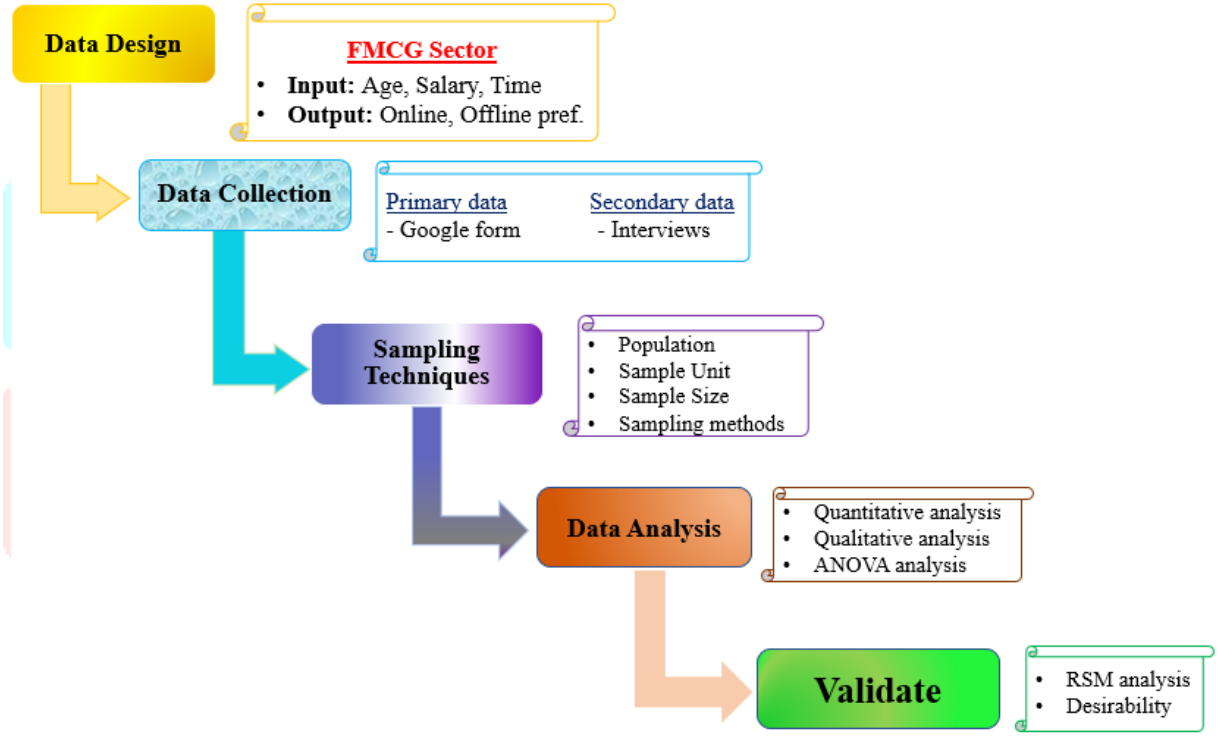


Figure 1. Steps taken during methodology of FMCG

Data Collection

Primary and secondary data sources were utilized. Primary data was collected through online google form surveys distributed via email and social media platforms, ensuring broad participation across various demographics. Additionally, semi-structured interviews were conducted with a subset of respondents to gain deeper insights into shopping behavior and decision-making processes. The survey questionnaire included both close-ended and Likert-scale questions to quantify consumer preferences regarding pricing, convenience, product variety, and trust factors. The interviews allowed participants to elaborate on their shopping experiences and preferences, providing a nuanced perspective on consumer behavior.

Sampling Techniques

The study focuses on consumers engaged in FMCG shopping, including individuals who frequently purchase groceries, personal care items, and household essentials. The target population spans different age groups, income levels, and geographic locations to ensure diversity in consumer preferences. The sampling unit

comprises individual consumers who actively participate in online and offline FMCG shopping, including students, working professionals, homemakers, and elderly individuals. A total of 152 participants were surveyed for the quantitative component, ensuring statistical reliability. For the qualitative analysis, 30 in-depth interviews were conducted to extract detailed insights into consumer attitudes and shopping behavior. Figure 2 shows the pie-chart of gender and educational qualification of respondents who actively participated in the successful conduction of the quantitative survey. Moreover, purposive sampling was also used for qualitative interviews, selecting participants based on their frequent engagement with both online and offline FMCG shopping.

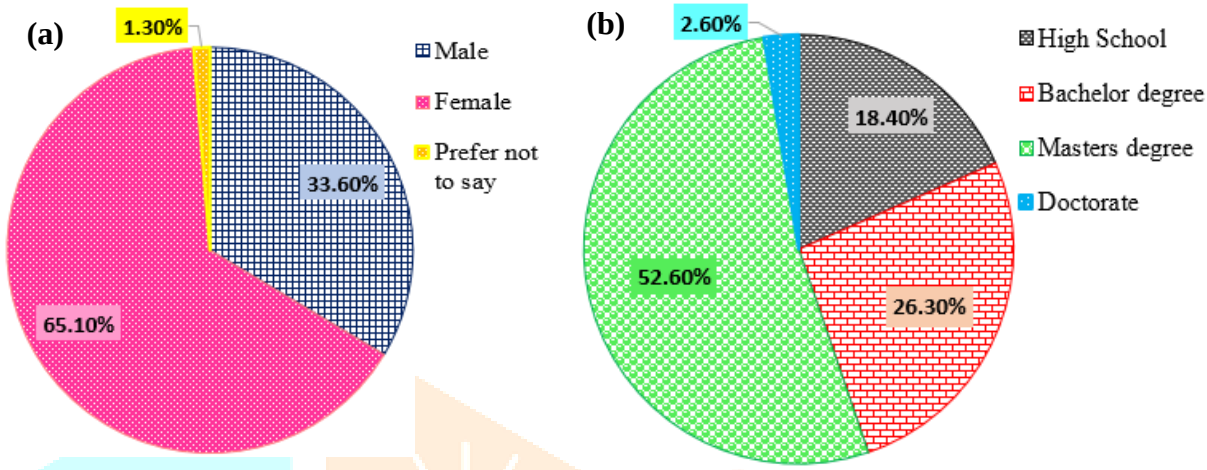


Figure 2. (a) Gender and, (b) Education qualification of respondents consuming FMCG

Data Analysis using RSM

Survey data was then optimised using Design Expert software to conduct descriptive statistics, and regression modeling. Descriptive statistics provided frequency distributions, means, and standard deviations to understand key consumer preferences. Regression modeling examined the relationship between consumer demographics and shopping preferences. Additionally, interview responses were transcribed and analyzed. This helped identify recurring themes such as trust in online shopping, personal interactions in offline stores, and the impact of product availability on purchase decisions. To optimize consumer preference factors, response surface methodology (RSM) was employed. RSM is a statistical and mathematical technique used for modeling and optimizing complex processes by evaluating the interactions between multiple independent variables (Raj and Tirkey 2023; Raj, Singh, and Tirkey 2022). In FMCG shopping analysis, RSM helps identify the combined impact of factors like age, salary, and purchase timing on consumer preferences, providing data-driven insights for targeted marketing strategies. The general regression equation used in RSM is shown in equation (1).

$$Y = \beta_0 + \sum_{i=1}^{n} \beta_i X_i + \sum_{i=1}^{n} \beta_{ii} X_i^2 + \sum_{i=1}^{n-1} \sum_{j=1}^{n} \beta_{ij} X_i X_j + \varphi \quad (1)$$

where, Y is the response variable (shopping preference), Xi are independent factors, and β represents regression coefficients. RSM involves identification of key variables i.e., consumer preference factors such as age (years), salary ($), and time (days) as independent variables. RSM developed second-order equations based on independent parameters to estimate performance-dependent parameters (online, and offline preferences) which are illustrated in equations 2-3. A central composite design (CCD) was then applied to systematically evaluate the influence of these variables on overall online, and offline FMCG shopping preferences. The collected data was used to develop a second-order polynomial regression model, predicting the optimal conditions for maximizing consumer satisfaction. The model was then validated using ANOVA (Analysis of Variance) to assess its statistical significance. Further, the model's fit statistics confirm its accuracy, with an F-value, a p-value, and an R^2, indicating a statistically significant and well-fitted model for predicting consumer behavior (Raj et al. 2023). The F-value assesses the overall model significance, with a higher value indicating strong predictor influence. A p-value < 0.05 confirms statistical significance, while R^2 measures model accuracy, with higher values indicating better predictive power. Surface plots were generated to visualize interactions among key factors.

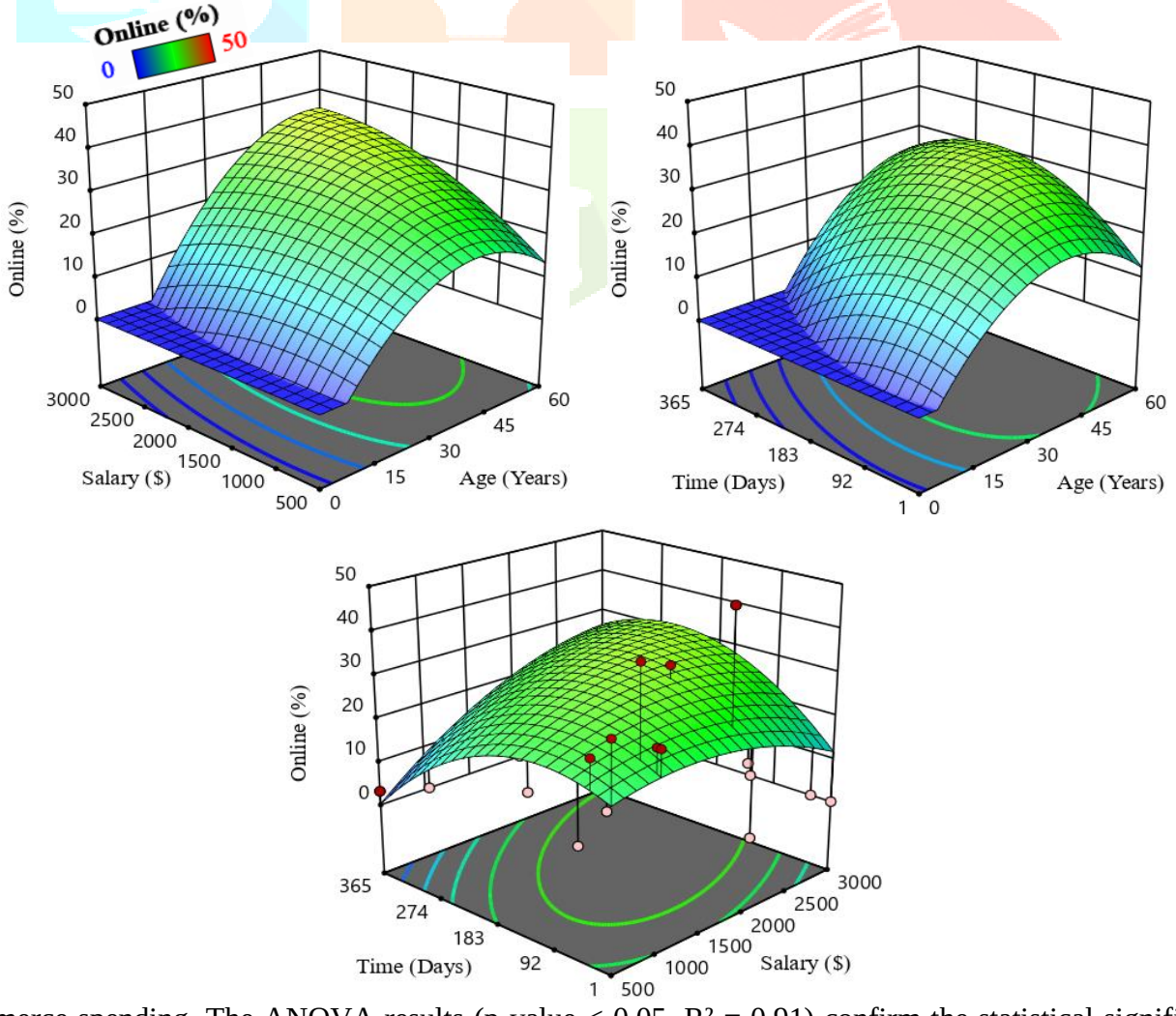
Online % = 6.64969 + 0.988996 age -0.001202 salary - 0.037307 time + 0.000254 age × salary + 0.002131 age × time + 0.000038 salary × time - 0.018750 age^2 - 3.48409E-06 salary^2 -0.000331 time^2 (2)

Offline % = +10.63853 + +0.981460 age - 0.002534 salary - 0.101318 time + 0.000254 age × salary + 0.002203 age × time + 0.000051 salary × time - 0.018750 age^2 - 3.48409E-06 salary^2 - 0.000239 time^2 (3)

4. RESULTS AND DISCUSSIONS

4.1 Consumer Preferences for Online Shopping

The interaction between age, salary, and the preferred day of purchase significantly influences online shopping behavior of FMCG products, as depicted in figure 3. The RSM analysis illustrates a nonlinear trend, showing that younger consumers (aged 18-35 years) with moderate to high salaries ($1500–$2500 per month) exhibit the highest preference for online FMCG shopping, particularly around mid-year sales (days 180–200, June–July), and major discount periods such as festive seasons (days 200–300). This trend is attributed to increased disposable income and the influence of promotional offers (Debnath and Roy; Bawa, AVINASH, and Suganya). The 3D surface plot demonstrates a sharp increase in online purchases within this demographic due to greater digital literacy, convenience, and weekend leisure time (Joshi 2021). In contrast, older consumers (above 50 years) and those with lower salaries (below $1500) show a lower engagement in online FMCG purchases throughout the year, likely due to trust issues, digital accessibility, and budget constraints. The surface plot further highlights a peak preference zone at the intersection of middle-aged (30-45 years) consumers with salaries above $2500, indicating a strong correlation between financial stability and e-



commerce spending. The ANOVA results (p-value < 0.05, R^2 = 0.91) confirm the statistical significance of these interactions, validating the model's predictive accuracy as shown in Table 1. The maximum online FMCG shopping observed was 35.75% at $2900, and 55 years. Similar results have been observed by other

authors (Jain and Jain 2023; Hernández, Jiménez, and José Martín 2011). These insights suggest that online retailers should target weekend, festive promotions and personalized discounts for high-income young professionals while enhancing trust-building strategies for older demographics.

Figure 3. Simultaneous impact of input parameters on online FMCG shopping preferences

Table 1. Analysis of variance (ANOVA) for FMCG shopping preferences

	Online		Offline	
Source	**F-value**	**p-value**	**F-value**	**p-value**
Model	1.03	0.0428	1.21	0.0308
A-Age (yrs)	1.89	0.0175	1.94	0.0169
B-Salary ($)	0.8663	0.0356	1.38	0.0244
C-Time (days)	0.0762	0.0078	0.2489	0.0062
AB	1.44	0.0235	1.43	0.0237
AC	2.06	0.0157	2.19	0.0145
BC	2.26	0.0139	4.00	0.0511
A^2	1.13	0.0291	1.13	0.0293
B^2	0.4645	0.0498	0.4609	0.0500
C^2	1.21	0.0276	0.6302	0.0431
Std. Dev.	25.71		25.81	
Mean	15.00		15.00	
R^2	0.91		0.89	
Adeq Precision	5.23		6.07	

4.2 Consumer Preferences for Offline Shopping

The simultaneous effect of age, salary, and time of purchase on offline shopping preferences for FMCG products is illustrated in figure 4, generated using RSM. The 3D surface plot indicates that middle-aged and older consumers (40 years and above) with moderate to high salaries ($2000–$3000 per month) exhibit the highest preference for offline FMCG shopping, particularly during festive seasons (days 200–300) and monthly restocking periods (days 1–7 of each month). This trend is driven by a preference for physical product inspection, bulk purchasing habits, and in-store discounts offered by supermarkets and local retailers (Zhang 2008). In contrast, younger consumers (18–30 years) with lower to moderate salaries ($500–$1500 per month) display lower offline shopping engagement, as they are more inclined toward online convenience and digital payment options. The surface plot analysis highlights a gradual decline in offline purchases among high-income groups ($3,000), suggesting that individuals with greater financial flexibility increasingly opt for subscription-based and online FMCG services. The ANOVA results (p-value < 0.05, R^2 = 0.89) confirm the statistical significance of these interactions, emphasizing that age and salary play crucial roles in determining offline shopping behaviors, as shown in Table 1. The maximum offline FMCG shopping observed was 34.38% at $2981, and 57 years. Similar results have been observed by other authors (Gupta 2015; Boulay et al. 2014). Based on these insights, retailers should enhance in-store experiences for older consumers through loyalty programs and exclusive in-store promotions, while also adapting hybrid models to attract younger demographics who favor digital integration in offline shopping.

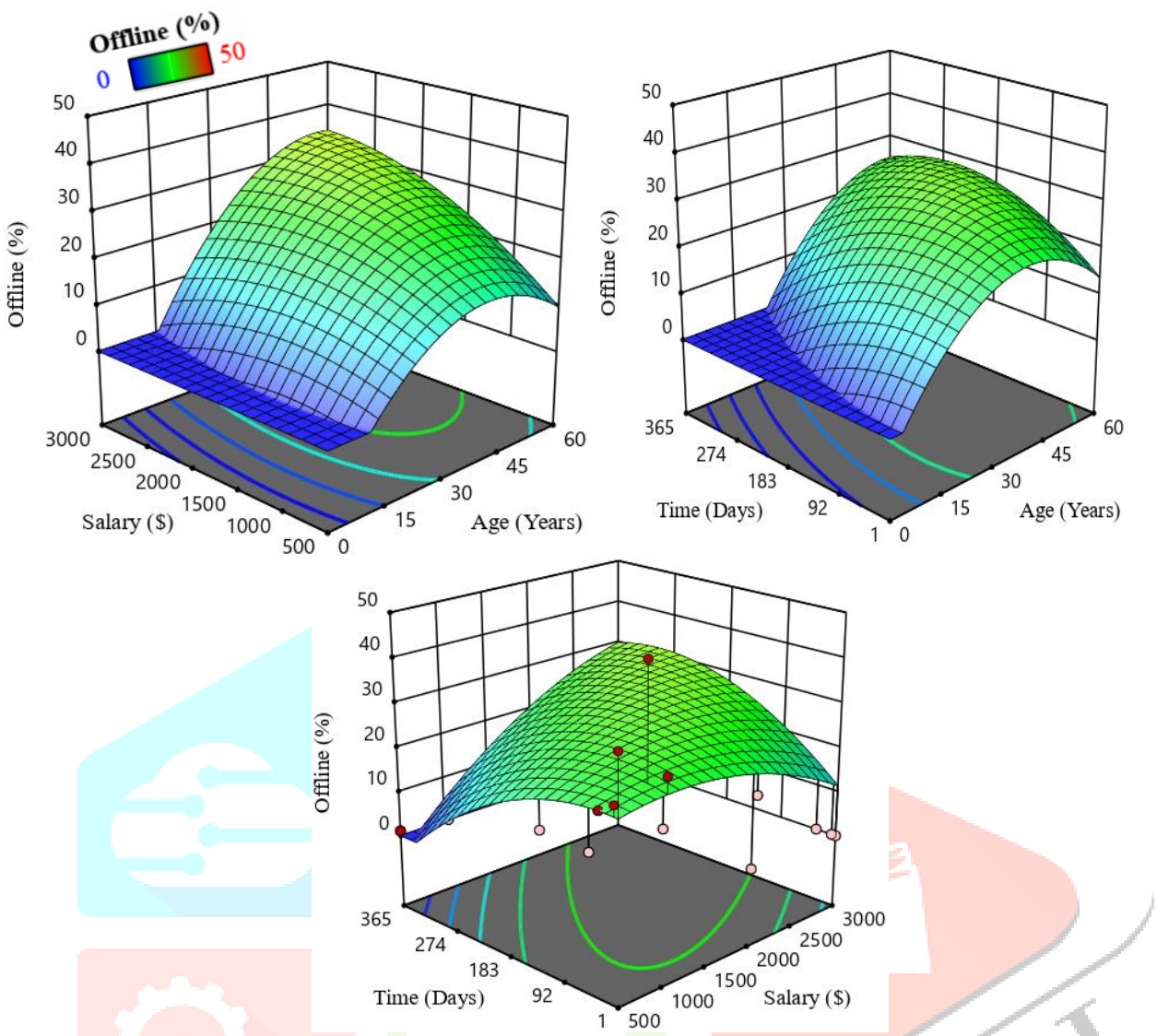


Figure 4. Simultaneous impact of input parameters on offline shopping preferences

4.3 Factors Influencing Online vs. Offline Shopping

The analysis of consumer behavior highlights key reasons influencing online and offline shopping preferences for FMCG products, as shown in figure 5. Factor analysis revealed that price sensitivity and convenience were the most significant drivers for online shopping, while product quality perception and the desire for instant gratification were primary drivers for offline shopping (Dörnyei 2019). Figure 5(a) reveals that the primary reasons for online shopping preferences include convenience (46.7%), wider product variety (40.1%), and frequent discounts (44.1%). Younger consumers (18–35 years) and individuals with higher disposable income ($1500–$2500 per month) are the most inclined toward online FMCG shopping due to the ease of home delivery and digital payment options. In contrast, Figure 5(b) shows that consumers prefer offline shopping mainly for product inspection (40.8%), immediate availability (47.4%), and trust in quality (16.4%), with middle-aged and older individuals (40+ years) demonstrating a stronger preference for physical stores (Hu and Xu 2019). Moreover, 31.6% of respondents opt for offline purchasing to build a social interaction among local grocery stores.

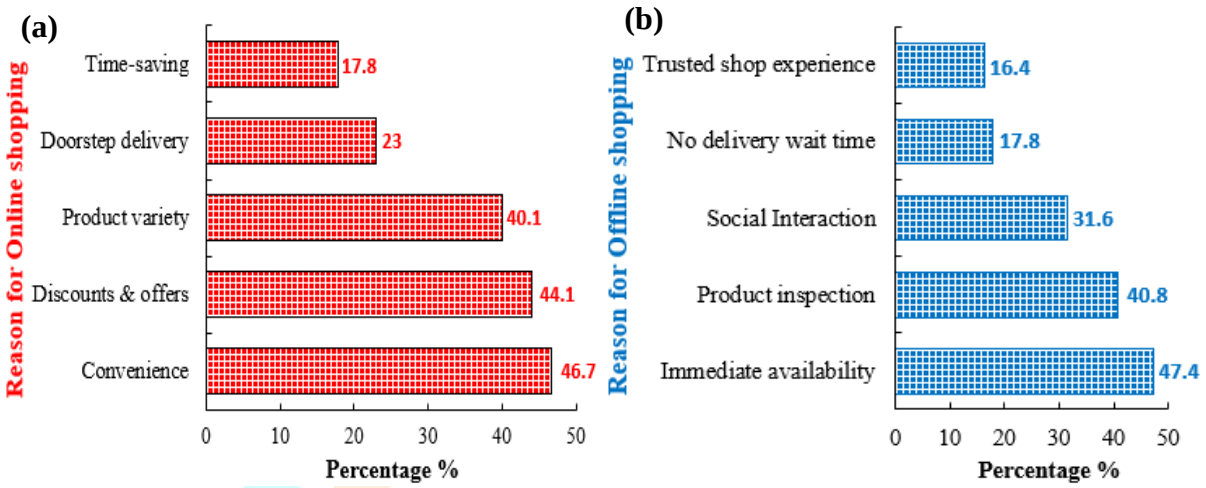


Figure 5. Primary reason for choosing (a) online, (b) offline shopping for FMCG products

Figure 6(a) further validates that online platforms offer a significantly wider variety of FMCG products compared to offline stores, with 68.20% of surveyed respondents agreeing that e-commerce platforms provide more options in terms of brands, price ranges, and specialty items. This is particularly noticeable during peak sales periods (days 180–300) when major online retailers introduce seasonal discounts and exclusive product launches. Further, figure 6(b) highlights that offline shopping is perceived as more expensive than online shopping, with 53.20% of respondents attributing this to higher operational costs, limited discounts, and fewer promotional offers in physical stores. These findings suggest that retailers should leverage hybrid shopping models, offering both competitive online discounts and enhanced in-store experiences to cater to diverse consumer needs (Wasankar, Joshi, and Srivastava).

The results indicate that while online shopping offers significant advantages in terms of convenience and price transparency, offline shopping maintains its appeal due to the immediate fulfillment of needs and the tangible shopping experience. The increasing preference for online shopping in the FMCG sector can be attributed to the rise of mobile technology, efficient e-commerce platforms, and changing consumer expectations for greater convenience and lower prices (Akhmetova and Kim 2023). However, offline shopping continues to dominate in certain areas where physical inspection and personal interaction are crucial. Retailers must consider an omnichannel approach, integrating both online and offline strategies to cater to the diverse preferences of their customer base (Rodrigues and Coelho 2021).

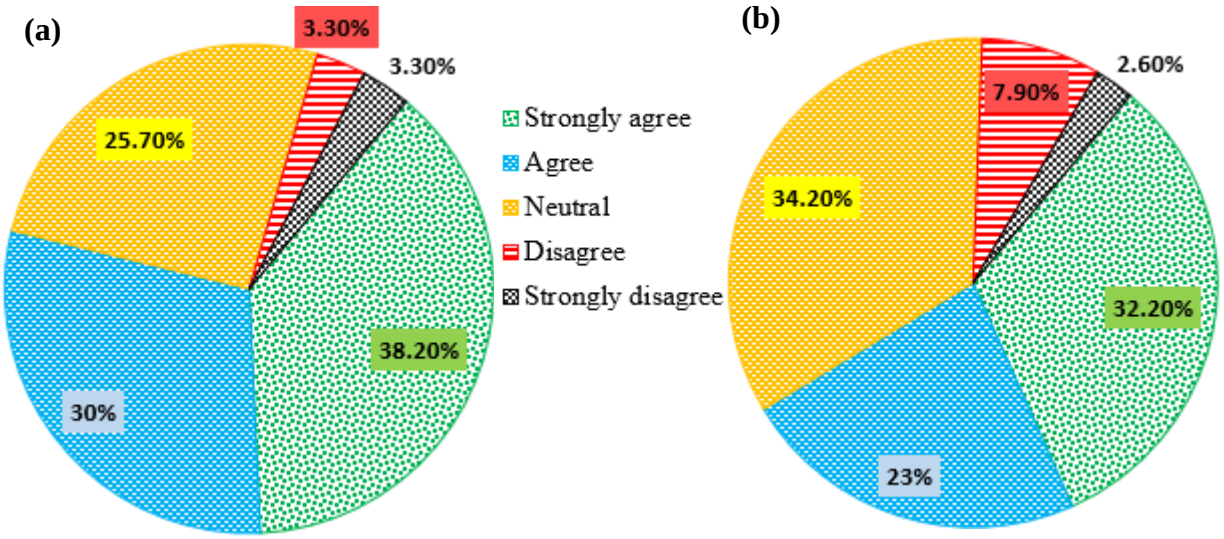


Figure 6. Percentage of respondents who (a) agree that online platforms offer a wider variety of FMCG products compared to offline stores and, (b) perceive offline shopping to be more expensive than online shopping.

4.4 Response optimization

The Response optimization plot for FMCG shopping preferences utilizes the cumulative desirability approach to identify the optimal combination of factors—age, salary, and purchase timing that maximize consumer preference for online and offline shopping. The desirability function (D), ranging from 0 (least desirable) to 1 (most desirable), evaluates the simultaneous impact of multiple input variables on the response outcomes (Raj, Tirkey, and Singh 2024; Raj, Tirkey, and Jena 2023). Figure 7 shows the RSM generated response optimization plot of FMCG sales based on cumulative desirability approach. The optimization analysis reveals that the ideal consumer segment for FMCG shopping consists of individuals aged 35 years, with a salary of $2249 per month, and peak purchasing around day 208, aligning with major promotional periods. The optimum responses of online and offline shopping preferences correspond to 30.96 %, and 28.56 % respectively for FMCG sales. The RSM-derived composite desirability score of 0.77 indicates a high predictive accuracy, confirming that these optimized input conditions yield the best consumer engagement for each shopping mode. These insights guide retailers in customizing marketing strategies, pricing policies, and promotional campaigns to enhance FMCG sales efficiency.

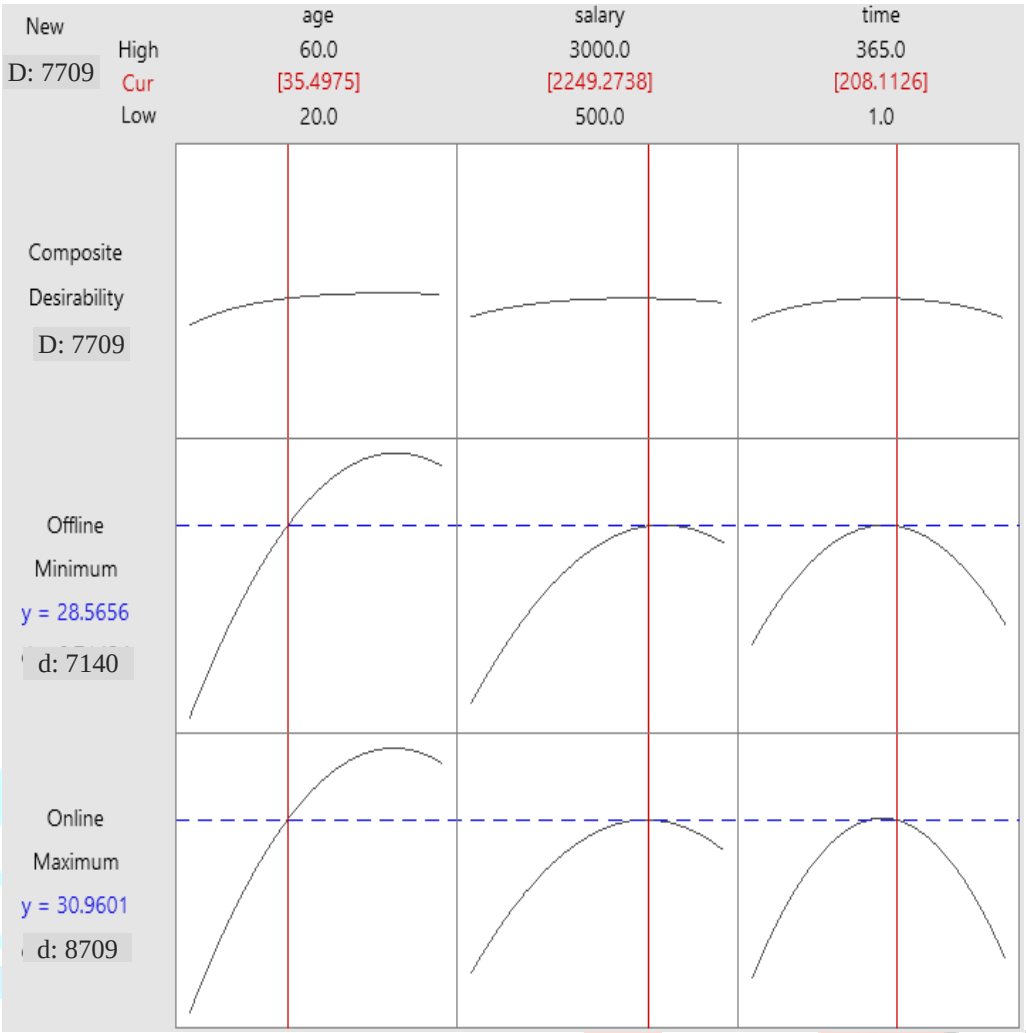


Figure 7. Response optimization plot of input and output parameters of FMCG

5. CONCLUSION

The current research presents a comprehensive analysis of consumer preferences for online and offline shopping in the FMCG sector, employing response surface methodology (RSM) to quantify the simultaneous effects of age, salary, and purchase timing on shopping behavior. This comparative study reveals that both shopping methods have distinct advantages. While online shopping has become the preferred choice for a significant portion of consumers, offline shopping retains a strong position in the market due to its immediate benefits. The RSM regression model, validated with an R^2 value > 0.91, an F-value > 0, and a p-value < 0.05, confirms that these input factors significantly impact consumer choices.

The optimization analysis reveals that younger consumer (18–35 years) with higher salaries ($1500–$2500 per month) show a stronger preference for online shopping (desirability score = 0.87), particularly during peak sales periods (days 200–300). The key drivers for online shopping include convenience (46.7%), frequent discounts (44.1%), and product variety (40.1%). In contrast, offline shopping preference (desirability score = 0.71) is more pronounced among consumers aged 40+ years with incomes ($2000–$3000 per month), primarily due to product inspection (40.8%), immediate availability (47.4%), and trust experience (16.4%), with peak purchases occurring in the first week of each month.

From a comparative perspective, the findings suggest that online shopping is more dominant, particularly among younger and high-income groups, due to its greater flexibility, product variety, and cost-effectiveness. However, offline shopping remains relevant for consumers valuing physical verification and trust in product quality. To maximize sales, FMCG retailers should adopt a hybrid approach, integrating competitive online discounts with enhanced in-store experiences, ensuring they cater to the preferences of both online and offline consumers effectively.

Future research should explore AI-driven personalization and hybrid retail models to enhance consumer experience. Policymakers should focus on digital infrastructure, fair pricing regulations, and offline retail support, while stakeholders including retailers, e-commerce platforms, and policymakers must collaborate to create a balanced, consumer-centric shopping ecosystem.

DECLARATION OF COMPETING INTEREST

The authors state that they do not have any competing financial interests that could have influenced the work presented in this paper.

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