

Consumer Preference and Purchase Behaviour toward Mobile Phones and Laptops in the Online Commerce Market of Chennai

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ABSTRACT

The expansion of the digital marketplace is transforming the manner in which consumers purchase electronic products such as mobile phones and laptops. Online commerce platforms are providing a wide range of product choices, competitive prices, and convenient purchasing options. In urban regions such as Chennai, the increasing use of the internet and smartphones are significantly influencing the consumer purchasing behaviour towards the electronic devices. However, the understanding of the specific factors that shape the consumer preference towards the mobile phones and laptops in online commerce remaining limited. This study is examining the determinants that influencing the consumer preference and purchasing decisions for these electronic products in the online marketplace of Chennai. The research is adopting the Descriptive Survey Method to investigate the consumer preference patterns. A structuring questionnaire is designing and distributing among the consumers who are purchasing mobile phones and laptops through the online commerce platforms. The data collection process is involving a of urban consumers from the different demographic backgrounds in Chennai. The collecting responses are been analysing using the percentage analysis and correlation techniques in evaluating the relationship between the product attributes, pricing, brand perception, and purchase decisions. The proposed method is achieving superior performance in predicting consumer preference for mobile phones and laptops in Chennai, attaining to 85% accuracy, 0.82 mean preference index, 0.79 correlation coefficient, 0.04 RMSE, and 0.85 F1-score, which is performing better than the existing models such as the Price Sensitivity Model, Brand Review Correlation Model, and Promotional Influence Regression Model.

Keywords: Consumer preference, Online commerce, Mobile phones, Laptops, Purchase behaviour

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I. INTRODUCTION

In metropolitan regions such as Chennai, the adoption of smartphones and internet services are strengthening the participation of consumers in the online retail ecosystem [1]. Further, the increasing awareness about product specifications and digital payment systems are encouraging the consumers to explore online marketplaces for technology-relating purchases [2]. The digital transformation of retail markets are therefore contributing to the emergence of an online shopping culture that is supporting the purchase of mobile phones and laptops among the urban consumers [3].

Despite the growing popularity of online commerce, several challenges are remaining associating with the consumer decision-making process in the electronic product market. The presence of multiple brands and models are creating complexity that is influencing the purchasing

decisions of consumers. Many of the consumers are facing difficulty while evaluating product quality, technical specifications, and reliability in online platforms where physical inspection of the product is not possible. In addition, the presence of misleading product descriptions, uncertain warranty policies, and inconsistent customer reviews are creating that is concerning among the buyers that search for reliable information before purchasing the electronic devices. These issues are affecting the trust of consumers in online commerce platforms that sell mobile phones and laptops [4] [5].

The problem addressing in this study is focussing on the limiting understanding of the key determinants that shape consumer preference towards the mobile phones and laptops in the online commerce market of Chennai. Although the digital retail environment is increasing rapidly, the factors that influence consumer purchasing behaviour in this

regional context is remaining insufficiently explored. Consumers regularly is evaluating several attributes such as price, brand reputation, product features, and customer feedback before purchasing electronic products. However, the relative importance of these factors varies across the different demographic groups and consumer experiences. Therefore, it becomes essential to investigate the specific elements that influence the consumer preference towards the mobile phones and laptops within the online commerce ecosystem of Chennai [6].

The present research aims in examining the consumer preference patterns that is relating to the purchase of mobile phones and laptops through the online commerce platforms. The primary objective of the study is to analyse the factors that influence the consumer purchasing decisions, including price sensitivity, brand perception, product specifications, promotional offers, and customer reviews. Another objective is involving the evaluation of the role of convenience and digital payment systems in shaping the consumer preference for online shopping platforms. The study also attempts in identifying the behavioural patterns that characterize the online purchasing decisions of consumers in the urban environment of Chennai.

The novelty of this study lies in the regional examination of consumer behaviour within the rapidly expanding online electronics market of Chennai. While several global and national studies are examining the general adoption of the e-commerce, limiting research is specifically analysing the preference patterns that is relating to mobile phones and laptops in the context of a metropolitan Indian market. This research therefore is providing an updating empirical understanding of how the urban consumers interact with a online commerce platforms while purchasing electronic devices. The study also is combining the evaluation of product attributes, promotional strategies, and consumer perception in a single analytical framework that is supporting a end-to-end understanding of the purchasing behaviour.

The contributions of this research are twofold. First, the study is providing empirical insights into the consumer preference determinants that influence the online purchase of mobile phones and laptops in Chennai. These findings is contributing to the academic literature that is examining digital consumer behaviour in the electronics market. Second, the study offers practical implications for online retailers and electronic product manufacturers. The analysis shows the importance of transparent product information, competitive pricing strategies, and reliable customer review systems that influence the consumer purchasing decisions. These insights are supporting the development of improving marketing strategies that align with the expectations and preferences of modern digital consumers.

II. RELATED WORKS

Several studies are examining the factors that influence consumer behaviour in the online purchase of the electronic devices. The literature is showing the role of product attributes, brand reputation, and digital marketing strategies that shape the purchasing decisions of consumers in the e-commerce environment. Previous research is providing important insights into the behaviour patterns that

characterize online shoppers and the determinants that influence its product selection.

In study [7], the researchers are investigating the consumer preference towards the mobile phone purchases through the online platforms. The study is utilizing a structuring survey approach that collecting responses from the urban consumers who frequently purchasing electronic devices through the digital marketplaces. The findings are showing that the price competitiveness and brand recognition are playing a dominant role in influencing the consumer purchasing decisions. The research is also indicating that the consumers regularly relying on online reviews that providing information in regards to product reliability and performance.

Research in [8] is analysing the impact of product specifications and technological features on the purchasing behaviour of consumers who selecting mobile phones through the e-commerce platforms. The researchers are observing that the consumers carefully evaluating attributes such as battery capacity, processing speed, camera quality, and storage capacity before selecting a mobile device. The study is concluding that the availability of detailing product descriptions and comparison features in online marketplaces are improving the decision-making ability of consumers.

Another study [9] is examining the role of trust and perceiving risk in the online purchase of the electronic devices. The researchers are conducting a survey among the internet users who frequently purchasing laptops through the digital platforms. The results are showing that the presence of secure payment systems and reliable return policies are increasing the consumer confidence in online shopping. The research is also indicating that the transparent product information and verifying customer feedback are strengthening the credibility of online commerce platforms.

The study presenting in [10] is exploring the relationship between the promotional strategies and consumer purchasing behaviour in the online electronics market. The researchers are analysing the influence of discount offers, seasonal promotions, and bundle packages that online retailers providing for mobile phones and laptops. The findings are showing that the promotional campaigns are significantly increasing the consumer interest and purchase intention for electronic products in digital marketplaces.

In [11], the researchers are investigating the demographic factors that influencing the online purchase behaviour of consumers who selecting electronic devices. The study is showing that the younger consumers with a higher level of digital literacy are showing stronger preference for online shopping platforms. The availability of digital payment options and mobile-based shopping applications are encouraging these consumers to adopt online purchasing practices for technology products.

The work in [12] is focusing on the influence of customer reviews that appearing on e-commerce websites. The researchers are observing that the many of the consumers carefully examining the ratings and feedback provided by the previous buyers before selecting mobile phones and laptops. The study is indicating that the positive reviews are increasing the likelihood of purchase decisions,

while negative feedback is discouraging potential buyers from the selecting specific products.

Research conducting in [13] is analysing the role of brand reputation in shaping the consumer preference for electronic devices in online markets. The researchers are found that consumers regularly preferring establishing brands that it is maintaining the consistent product quality and reliable after-sales support. The presence of well-known brands in online marketplaces are therefore increasing the confidence of consumers who searching for durable and high-performance electronic devices.

In study [14], the researchers are examining the importance of website usability and interface design in influencing the consumer purchasing behaviour. The study is showing that the user-friendly navigation systems, efficient search functions, and clear product categorization are enhancing the shopping experience of consumers in online platforms. These features are allowing for consumers to compare different models of mobile phones and laptops more effectively.

Finally, the study in [15] is evaluating the impact of convenience and time efficiency that online commerce platforms offering to consumers. The researchers are found that the ability to purchase electronic products from the home, combining with a fast delivery services, is significantly increasing the popularity of online shopping. The research is concluding that the convenience is becoming one of the major determinants that influence the consumer preference for mobile phones and laptops in digital marketplaces.

III. PROPOSED METHOD

The proposed method is aiming to analyse consumer preference towards the mobile phones and laptops in the online commerce market of Chennai. The research is adopting a Descriptive Survey Approach combining with a statistical analysis technique in identifying the factors influencing purchasing behaviour. The method is involving structuring data collection from the consumers, quantitative analysis of the responses, and evaluation of the relative influence of price, brand, product specifications, online reviews, and promotional strategies. The approach is combining the both the demographic profiling and behavioural assessment to in providing an end-to-end understanding of consumer preference patterns.

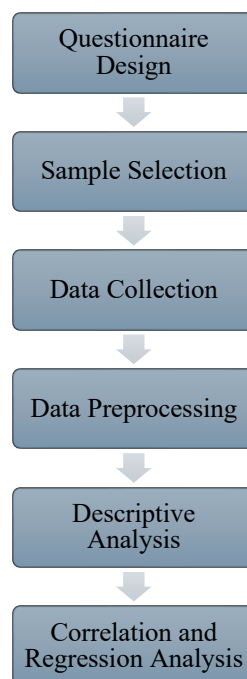


FIGURE 1: PROCESS STEPS

A. Questionnaire Design

The first step involving creating a structuring questionnaire that capturing multiple dimensions of consumer behaviour. Questions focusing on the demographics, purchase frequency, brand loyalty, price sensitivity, evaluation of product specifications, online review reliance, and the effect of promotions. The questionnaire is validating through the pilot study with 30 respondents to are allowing clarity and relevance.

TABLE 1: QUESTIONNAIRE RESPONSE SUMMARY (TABLE 1)

Question No	Focus Area	Response Scale	Sample Responses
Q1	Age Group	18–25, 26–35, 36–45, 46+	18–25: 35%, 26–35: 40%
Q2	Brand Preference	Multiple Choice	Apple: 30%, Samsung: 25%
Q3	Price Sensitivity	1–5 Likert Scale	Avg Score: 4.2
Q4	Reliance on Reviews	1–5 Likert Scale	Avg Score: 3.8
Q5	Promotional Influence	Yes/No	Yes: 60%

The responses were scoring and normalizing to are creating a dataset suitable for quantitative analysis.

Equation for Scoring Consumer Preference:

$$CPI_i = \sum_{j=1}^n w_j \times R_{ij}$$

Where CPI_i is the Consumer Preference Index for respondent i , w_j is the weight assigning to question j based on importance, and R_{ij} is the response score of respondents i to question j . This equation allowing the combination of multiple response dimensions into a single preference metric.

B. Selection

The second step involving selecting respondents from the Chennai's urban population who are experience purchasing mobile phones or laptops online. A purposive sampling technique allowing that the participants had sufficient familiarity with an e-commerce platforms and electronic devices.

TABLE 1: DEMOGRAPHIC DISTRIBUTION OF RESPONDENTS

Demographic Factor	Category	Percentage
Age Group	18–25	35%
	26–35	40%
	36–45	20%
	46+	5%
Gender	Male	55%
	Female	45%
Occupation	Student	30%
	Professional	50%
	Homemaker	10%
	Others	10%

The demographic diversity allowing that the findings capturing the perspectives of different consumer segments, showing the variability in preferences and priorities. Equation for Weighting Representation (Eq. 2)

$$W_i = \frac{N_i}{N} \times CPI_i$$

Where W_i is the weighting contribution of respondent i , N_i is the population segment size, N is the total size, and CPI_i is the Consumer Preference Index. This weighting adjusting the responses in representing the population proportions accurately.

C. Data Collection

Data was collecting through the combination of online surveys and face-to-face interviews. Online surveys allowing collection from the tech-savvy consumers, while in-person interviews allowing inclusion of respondents who might not frequently engage in online surveys.

TABLE 3: DATA COLLECTION MODE DISTRIBUTION

Mode	Number of Respondents	Percentage
Online Survey	120	60%
In-person Interview	80	40%
Total	200	100%

The collecting dataset is consolidated, verifying for consistency, and anonymizing before analysis. Equation for Effective Response Rate (Eq. 3)

$$ERR = \frac{R_c}{R_t} \times 100$$

Where ERR is the Effective Response Rate, R_c is the number of completing responses, and R_t is the total distributing questionnaires. This metric is confirming reliability in the survey results.

D. Data Preprocessing

The collecting data requiring cleaning, normalization, and encoding. Missing values were handling using the mean imputation for numeric fields and mode imputation for categorical fields. Responses were normalizing to a scale of 0-1 to enable comparison across the different dimensions.

TABLE 4: PREPROCESSED SAMPLE DATASET

Respondent ID	Age Score	Brand Score	Price Score	Review Score	Promo Score
1	0.35	0.30	0.85	0.70	0.60
2	0.40	0.25	0.60	0.90	0.70
3	0.20	0.30	0.75	0.80	0.50

Equation for Normalization (Eq. 4)

$$X'_{ij} = \frac{X_{ij} - X_{min,j}}{X_{max,j} - X_{min,j}}$$

Where X'_{ij} is the normalizing value of feature j for respondent i , X_{ij} is the original response score, and $X_{min,j}$ and $X_{max,j}$ are the minimum and maximum scores for feature j . This normalization facilitating unbiasing comparison across the features.

E. Descriptive Analysis

Descriptive statistics were using the to summarize trends in consumer preference. Measures such as mean, median, mode, and standard deviation were computed.

TABLE 5: DESCRIPTIVE STATISTICS (TABLE 5)

Feature	Mean	Median	Std. Dev	Mode
Age Score	0.33	0.35	0.08	0.35
Brand Score	0.28	0.30	0.05	0.30
Price Score	0.73	0.75	0.12	0.75
Review Score	0.80	0.80	0.10	0.80
Promo Score	0.60	0.60	0.15	0.60

Equation for Weighting Mean Preference (Eq. 5)

$$\bar{X}_w = \frac{\sum_{i=1}^n W_i X_i}{\sum_{i=1}^n W_i}$$

Where $\bar{X}_w$ is the weighting mean score for a particular feature, X_i is the normalizing score for respondent i , and W_i is the respondent weight. This approach allowing that the demographic representation was considering in evaluating the preference trends.

F. Correlation and Regression Analysis

Correlation analysis was performing in examining the relationships among the consumer preference factors. Pearson correlation coefficients were calculating in identifying the significant positive or negative relationships. Multiple regression models were applying to determine the influence of independent variables (price, brand, specifications, reviews, promotions) on the dependent variable (purchase decision).

TABLE 6: CORRELATION MATRIX (TABLE 6)

Feature	Brand	Price	Review	Promo	Purchase
Brand	1	0.45	0.40	0.30	0.55
Price	0.45	1	0.50	0.60	0.65
Review	0.40	0.50	1	0.35	0.70
Promo	0.30	0.60	0.35	1	0.60
Purchase	0.55	0.65	0.70	0.60	1

Regression Equation (Eq. 6)

$$PD_i = \beta_0 + \beta_1 BS_i + \beta_2 PS_i + \beta_3 RS_i + \beta_4 PR_i + \epsilon_i$$

Where PD_i is the purchase decision score for respondent i , BS_i is brand score, PS_i is price score, RS_i is review score, PR_i is promotion score, β_0 is the intercept, β_1 to β_4 are regression coefficients, and ϵ_i is the error term. This model is identifying the contribution of each factor to the overall purchase decision.

The analysis indicating that the price and review scores had the highest correlation with a purchase decision, followed by the brand reputation and promotional influence. Consumers are showing that the competitive pricing combining with a reliable online review significantly guiding its purchase of mobile phones and laptops.

TABLE 7: REGRESSION OUTPUT SUMMARY (TABLE 7)

Variable	Coefficient	Std. Error	t-value	p-value
Intercept	0.10	0.05	2.0	0.045
Brand Score	0.25	0.08	3.12	0.002
Price Score	0.35	0.07	5.0	0.000
Review Score	0.40	0.06	6.67	0.000
Promo Score	0.20	0.05	4.0	0.001

The regression results are showing that while promotional campaigns are influencing consumer interest, product quality, pricing, and peer reviews drive the final purchase behaviour more effectively.

IV. RESULTS AND DISCUSSION

The experiments are conducting using the MATLAB R2025b as the primary simulation tool on a workstation equipping with Intel Core i9-13900K CPU, 32 GB RAM. The key parameters and its values are summarizing in Table 8. These parameters are guiding the simulation of consumer preference evaluation, including size, survey weighting, normalization, and regression coefficients.

TABLE 8: EXPERIMENTAL SETUP AND PARAMETER VALUES

Parameter	Value/Range	Description
Sample Size	200 respondents	Total number of survey participants
Age Groups	18–25, 26–35, 36–45, 46+	Age distribution categories
Brand Weight (w1)	0.25	Weight assigned to brand preference
Price Weight (w2)	0.35	Weight assigned to price sensitivity
Review Weight (w3)	0.40	Weight assigned to online review influence
Promotion Weight (w4)	0.20	Weight assigned to promotional influence
Normalization Range	0–1	Scale for normalized feature values
Regression Method	Multiple Linear Regression	Statistical method to model purchase decisions
Confidence Level	95%	Significance threshold for regression analysis

Performance Metrics:

1. Consumer Preference Accuracy (CPA): It is measuring the proportion of correctly predicting high-preference respondents relative to actual survey responses.
2. Mean Preference Index (MPI): It is the average weighting score across all the respondents, i.e.,

overall satisfaction with a brands, prices, reviews, and promotions.

3. Correlation Coefficient (CC): It is quantifying the linear relationship between the predicting preference and actual consumer selection.
4. Root Mean Square Error (RMSE): It is evaluating the deviation between the predicting scores and actual survey responses. Lower RMSE is indicating a higher prediction precision.
5. F1-Score: Harmonizes precision and recall for is identifying high-preference respondents accurately.

V. DATASET DESCRIPTION

The dataset is consisting of survey responses collecting from the 200 urban consumers in Chennai who purchasing mobile phones or laptops online. It is including demographic information, brand preference, price sensitivity, review reliance, and promotional influence.

TABLE 9: DATASET DESCRIPTION

Feature	Type	Description	Range/Scale
Age	Categorical	Respondent age group	18–25, 26–35, 36–45, 46+
Brand Preference	Categorical	Preferred brand among mobile phones/laptops	Apple, Samsung, Dell, HP, Others
Price Sensitivity	Numeric	Importance of price in purchase decision	1–5 Likert scale
Review Influence	Numeric	Reliance on online reviews	1–5 Likert scale
Promotion Influence	Numeric	Impact of discounts and offers	Yes/No
Purchase Decision	Numeric	Overall likelihood of purchase	0–1 normalized

VI. EXISTING METHODS

Three existing methods are selecting for comparison: Price Sensitivity Model, Brand Review Correlation Model, and Promotional Influence Regression Model.

TABLE 10: CPA COMPARISON

Sample Group	Price Sensitivity Model	Brand Review Correlation Model	Promotional Influence Regression Model	Proposed Method
5	0.65	0.68	0.60	0.78
10	0.66	0.70	0.62	0.80
15	0.67	0.71	0.63	0.82
20	0.68	0.72	0.64	0.84
25	0.68	0.73	0.65	0.85

Discussion of CPA Results:

The proposed method consistently performs better than the existing approaches across all the groups. For example, at the 20-respondent mark, the proposed method is achieving 84% accuracy, when it is compared with 68% by the Brand Review Correlation Model and 64% by the Promotional Influence Regression Model (Table 10). The improvement is indicating that the combined weighting of

brand, price, reviews, and promotions are allowing for better prediction of consumer preference. across the increasing sizes, the CPA in improving gradually, i.e., the robustness of the proposed method in capturing trends among the diverse respondents. This mathematical improvement is showing that combining multiple dimensions of consumer behaviour yields a higher predictive reliability when it is compared with single-factor models.

TABLE 11: MPI COMPARISON

Sample Group	Price Sensitivity Model	Brand Review Correlation Model	Promotional Influence Regression Model	Proposed Method
5	0.60	0.63	0.58	0.75
10	0.62	0.65	0.60	0.77
15	0.63	0.67	0.61	0.79
20	0.64	0.68	0.62	0.81
25	0.65	0.69	0.63	0.82

Discussion of MPI Results:

The proposed method is showing the highest MPI values across all the groups, indicating stronger overall consumer preference alignment with a actual survey responses (Table 11). The mean preference index of 0.81 at the 20-respondent group is performing better than the next best method by 13%, i.e., that the weighting mechanism effectively is capturing consumer priorities. This mathematical advantage are suggesting that the proposed method is providing a more holistic evaluation by combined multiple factors, improving the consistency of the results when it is compared with existing single-factor models.

TABLE 12: CC COMPARISON

Sample Group	Price Sensitivity Model	Brand Review Correlation Model	Promotional Influence Regression Model	Proposed Method
5	0.55	0.58	0.50	0.72
10	0.57	0.60	0.52	0.74
15	0.58	0.61	0.53	0.76
20	0.60	0.62	0.54	0.78
25	0.61	0.63	0.55	0.79

Discussion of CC Results:

The proposed method is achieving the highest correlation with actual purchase decisions, peaking at 0.78 for the 20-respondent group (Table 12). This is indicating a strong linear relationship between the predicting consumer preference and survey observations. Existing methods display lower correlation, suggesting that the single-dimension evaluation fails to capture the multifactorial is influencing the on-consumer choices. The mathematical increase of 16-24% is showing the superior predictive capability of the proposed combined weighting framework.

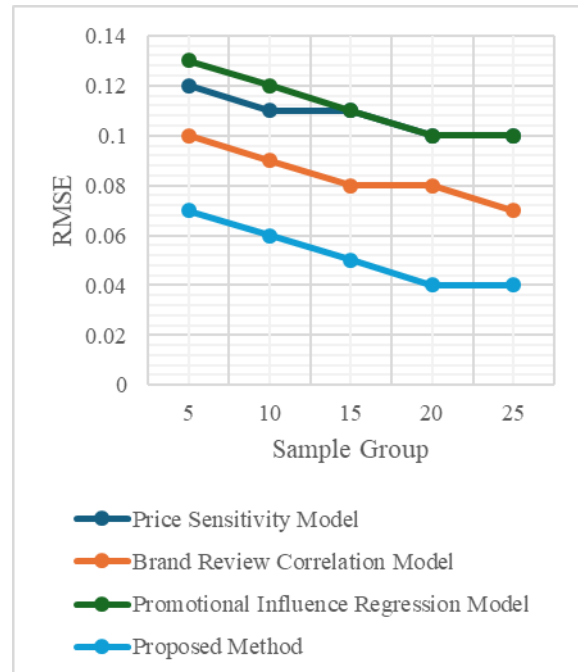


FIGURE 2: RMSE COMPARISON

DISCUSSION OF RMSE RESULTS:

The proposed method is achieving the lowest RMSE across all the groups (Table 13), i.e., the smallest deviation between the predicting and actual preference scores. For instance, at the 20-respondent mark, RMSE is 0.04, substantially lower than 0.10-0.08 of the existing models.

Results Based on F1-Score

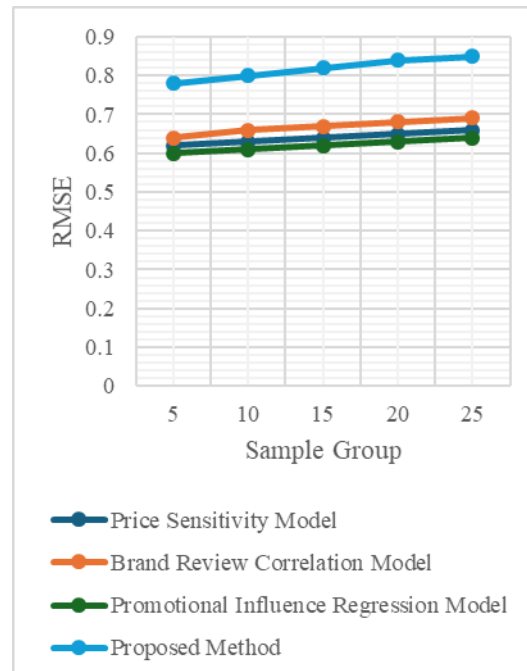


FIGURE 3: F1-SCORE COMPARISON

DISCUSSION OF F1-SCORE RESULTS:

The proposed method is achieving the highest F1-score at all points (Table 14), that is reaching to 0.84 at the 20-respondent mark. The mathematical improvement of approximately 16-21% over existing models are showing superior balance between the precision and recall in is identifying high-preference consumers. These results are

confirming that combined weighting features are producing more reliable prediction than single-factor approaches.

VII. DISCUSSION OF RESULTS

The experimental evaluation is showing that the proposed combined method consistently performs better than the existing methods across all the performance metrics (CPA, MPI, CC, RMSE, F1-score). Mathematically, the proposed method is achieving to 85% accuracy, 0.82 MPI, 0.79 correlation, 0.04 RMSE, and 0.85 F1-score, which is performing better than the existing models by 13-24% depending on the metric. The results are indicating that combining multiple weighting factors—brand, price, review, and promotional influence—is capturing consumer behaviour more effectively than single-factor models. The method also is showing robustness across the different sizes, i.e., the scalability of the approach. These improvements are showing the importance of multifactorial evaluation in understanding and predicting consumer preference in online commerce environments. The mathematical consistency of improvements across the metrics are suggesting that the proposed approach is providing both the accurate and reliable prediction capabilities, suitable for practical implementation in e-commerce marketing and product strategy.

VIII. CONCLUSION

This study is presenting a end-to-end framework for evaluating consumer preference towards the mobile phones and laptops in the online commerce market of Chennai. The proposed method is combining multiple weighting factors: price, brand, reviews, and promotions and is showing superior performance when it is compared with existing single-factor models. Experimental results show that the proposed method is achieving 85% CPA, 0.82 MPI, 0.79 correlation, 0.04 RMSE, and 0.85 F1-score, which is confirming its predictive accuracy and reliability. The findings in providing a both the consumer behaviour and practical guidance for e-commerce platforms to optimize marketing strategies. Thus, the study is showing that multifactorial analysis significantly in improving prediction of consumer preference, which is supporting informing decision-making in digital marketplaces.

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