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THE INFLUENCE OF SOCIAL MEDIA ADVERTISING ON CONSUMER BUYING BEHAVIOUR: A STUDY OF URBAN MILLENNIALS WITH REFERENCE TO THE E-COMMERCE INDUSTRY

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SUMMARY

The proposed research explores the effects of social media advertisement on consumer purchasing behavior in the Indian e-commerce market among urban millennials. It was done in a quantitative and explanatory manner where primary data was gathered on 372 millennials in Bengaluru, as frequent users of e-commerce websites such as Amazon, Flipkart, Myntra, Nykaa, and Ajio. Social Media Advertising (SMA), Consumer Engagement (CE), Trust and Attitude (TA), and Buying Behavior (BB) are measured using validated scales. The data was analysed by means of SPSS 29 and AMOS 31.0 by means of Confirmatory Factor Analysis (CFA) and Covariance-Based Structural Equation Modeling (CB-SEM) by the Maximum Likelihood Estimation. The measurement model was found to be highly reliable and convergent (Cronbach 0.84-0.87/CR 0.88-0.91/ AVE was found to be greater than 0.60). Structural results revealed that social media advertisement has a great impact on consumer engagement ($\beta = 0.38$, $p = 0.001$) and the formation of trust/attitude ($b = 0.41$, $p = 0.001$). Moreover, CE ($\beta = 0.36$, $p < 0.001$) and

TA (β=0.42, p < 0.001) have a positive effect on the purchasing behavior, which substantiates the mediating position of CE and TA. The analysis of bootstrapping (5,000 resamples) showed that there are significant indirect effects of SMA on buying behavior via CE (β = 0.214, 95% CI: (0.109252). The model accounted for 61 % of the extent of buying conduct (R 2 = 0.61), and it has strong fit figures (2/df = 2.28; RMSEA = 0.047; CFI = 0.95; TLI = 0.94; GFI = 0.92; AGFI = 0.91). The findings confirm the Theory of Planned Behaviour and Social Exchange Theory, which can be used by managers to put in place trust and engagement-based strategies in an effort to improve millennial buying behaviour.

Key words: *social media advertising, consumer engagement, trust, buying behaviour, urban millennials, e-commerce, sem.*

INTRODUCTION

The growth of digital technology has transformed the way businesses establish communication with consumers, especially via social media platforms. Social media has evolved as a mighty marketing instrument in the past ten years, with a combination of interaction, advertising, and sales [8][11]. The contribution of platforms such as Facebook, Instagram, YouTube, and X (formerly Twitter) to consumer awareness and purchase behavior cannot be overestimated. This two-way interaction of social media advertising provides more persuasive and measurable advertising in that it can engage in real-time, can be customized, and influenced by peers when compared to other traditional advertising techniques [3][7]. This increasing trend as a direction in the marketing budget towards social media has generated a great interest in attempting to comprehend the effect that social media has on consumer purchasing behaviour.

Social media has been gradually becoming part of e-commerce, forming social commerce and making the consumer decision-making process straightforward with exposures leading to swift transactions [1][15]. The functions such as shoppable content, influencer marketing, live-stream shopping, and recommendations provided by AI all contribute to better consumer engagement and purchase intentions [6][19][33]. Social media is a strategic tool that is being used by e-commerce firms to manipulate consumer behavior in the competitive online markets.

Millennials are highly sensitive to social media advertisements especially because they are the most active on the internet and smartphones in terms of usage [2][26][34]. In general, urban millennials are also online shoppers, more so, and rely on peer reviews, influencer recommendations, and interactive brand communication over the actual advertisements [4][13][30]. Social evidence, sincerity and emotional appeal in social media content is likely to impact their buying behavior as a major factor and therefore it is important to examine how exposure to advertising, engagement, trust and buying behavior are correlated.

Theory of Planned Behavior (TPB) describes the attitudes, subjective norms, and perceived control of consumer behavior towards social media advertisements, with purchase intention affected by the three factors [2][22]. Advertisements through social media influence consumer perceptions and enhance social behaviour, thereby impacting consumer behaviour [3][14]. The Social Exchange Theory (SET) also reveals the relations of customers to brands, as trust, relevance, and engagement are the factors that lead to interaction and loyalty [11][18][26]. Customers interact with the brands that have believable social media advertisements, which form long-term relationships.

According to recent research, the effectiveness of social media advertising is explained by such factors that play a psychological role, such as engagement, trust, and the development of attitude. The involvement in terms of cognition and emotion, in terms of likes, comments, and shares, enhances the likelihood of purchase [5][27][32]. Trust is an intermediate that minimizes the perceived risk associated with making an online purchase, particularly in influencer marketing and user-generated content [16][34]. Furthermore, the idea of personalization driven by AI and immersive advertising creates an emotional response, which results in impulsive purchasing activities among millennials [17][21][25]. Nevertheless, problems such as privacy, advertising fatigue, and lack of trust of the consumers continue to undermine advertising effectiveness, and therefore, a balanced approach will be required.

Although there has been a lot of research, there are still gaps in the literature on the effects of social media advertising in shaping consumer behavior in the emerging market, such as in India. The literature frequently considers independent entities related to influencer marketing or platform impact without considering the interactions between engagement, trust, and attitude in a holistic approach [31][10]. There is little empirical research that employs multivariate analyses such as Structural Equation Modeling (SEM) to estimate the multifaceted cause-and-effect relations between advertising and behavior. This research paper will address these gaps to the extent that it uses TPB and SET in the context of investigating the influence of social media advertisement on the purchasing behavior of urban millennials to add to the existing digital marketing literature and provide some viable answers to e-commerce marketers [12][20]. The rest of this paper is organized as follows: Section 2 discusses the literature and theoretical background. Section 3 introduces the research methodology and structure model design. Section 4 describes the empirical analysis and comparison. Section 5 interprets the theoretical and managerial implications in terms of security and privacy. Section 6 concludes with future research suggestions.

REVIEW OF LITERATURE

Conceptual Frameworks in Relation to Social Media Advertising and Consumer Behaviour

Early research indicated that the social media platforms were conceptualized as an interactive medium of communication through which interactive communication between consumer and brand takes place [7][24]. As compared to traditional advertisement, social media advertisement centres on individuality, user engagement, and immediate feedback, which have a strong significance on the cognitive, affective, and behavioural reactions of consumers [12][5]. Theoretical frameworks such as the Theory of Planned Behavior (TPB), Uses and Gratifications Theory, and the Stimulus-Organism-Response (S-O-R) have been extensively applied to explain the role of social media stimuli in influencing consumer attitudes and purchase intentions [6][19][32]. Studies published since 2018 emphasize the fact that perceived informativeness, entertainment value, credibility, and interactivity of social media advertisements are the key factors influencing online purchases [7][19][27]. The recent research focuses on the algorithm-driven content, AI-driven targeting, and immersive advertising formats like reels and shoppable posts as key factors of consumer engagement and conversion in online sales channels [9][11][33]. Therefore, the literature defines social media advertising as a multifaceted construct that significantly influences the impact on digital consumer behaviour.

Urban Millennials as Digital Consumers in the E-Commerce Landscape

The literature consistently reports on the extensive usage of social networking sites among millennials compared to the past generation, thereby increasing their exposure to social media advertisements [23]. In the city, the penetration of the internet into the lives of people, the use of smartphones, and the uptake of digital payments further increase the power of social media promotion on purchasing behaviour [18]. Prior research studies have identified that millennials appreciate authenticity, peer-to-peer content, and brand transparency, which consequently leads to the success %age of influencer content and user -generated content [18][31]. The period between 2019 and 2022 highlights the fact that millennials believe in social proof and online reviews, along with social media recommendations, in the process of making e-commerce purchase decisions [9][15].The recent research (2023-2025) also highlights the increasing role of such social commerce features as live streaming, social shopping, and embedded checkout systems in the development of millennial purchasing behaviour [8][19][23]. Collectively, the literature suggests that urban millennials are not passive consumers of advertisements but rather co -creators who bring value to the market and drive dynamics in the e-commerce ecosystem.

Role of Influencer Marketing and User-Generated Content

The earlier empirical research determined that influencers' attractiveness, credibility, and expertise play a crucial role in promoting the impact of advertisements and brand-related attitudes [12][29]. Opinion leaders (influencers) influence by making e-commerce purchases perceived as less risky and more trustworthy. A study, conducted during 2018-2021, found that micro-influencers often demonstrate

more active and authentic engagement than celebrity influencers, especially in the case of millennial consumers [28][31]. At the same time, UGC like reviews, ratings, testimonials, and unboxing videos have been also found to be a strong influencer of purchase intention [19][30]. Studies indicate that AI -filtered content by influencers and the use of short-form video advertising are more effective in driving impulse purchases on online stores [19][31]. With regard to influencer marketing and UGC, the literature supports that it fills the trust gap between online brands and millennial consumers and remains an essential element of advertising on social media.

Psychological and Behavioral Mechanisms Influencing Purchase Decisions

The fundamental interaction between social media advertisement and consumer buying behaviour is mediated by some psychological mechanisms. Commonly identified mediating variables in this case are trust, perceived value, emotional engagement, and brand attachment [7][18]. The results of studies that employed the S-O-R model show that visual attraction, narrative element, and interactive capabilities of social media produce emotional stimulation that drives the purchase intentions [5][9][31]. Since 2020, studies started to explore the impulsive purchasing behavior driven by personalized advertisements, flash sales, and social comparison on social media such as Instagram and Facebook [13][19]. Recent empirical studies (2023-2025) highlight the significance of fear of missing out (FOMO), digital nudging, and gamified ads in speeding up the decisions among millennials to make a purchase [25][34]. Furthermore, it has shown that emotional resonance and perceived brand personality play an important role in long-term loyalty and repeat-buying in the context of e-commerce [1][18]. Through these findings, it is possible to highlight the significance of the psychological drivers influencing buying behaviour.

Social Media Advertising Effectiveness in the E-Commerce Industry

The performance of social media advertising in the e-commerce sector has been abundantly measured using the metrics of engagement, click-through rates, conversion rates, and customer lifetime value. Early investigations conceptualized that social media advertising was less expensive and quantifiable compared to conventional digital advertising [8][24]. Recent findings between 2018 to 2021 showed that personalized advertisements and re-targeting techniques have been shown to significantly enhance the conversion rates of online shopping sites [4][9]. It has also been observed in the research that advertisement outcomes are improved by platform-specific tools, including Instagram visual storytelling and Facebook building communities [8][16]. The recent literature (2022-2025) highlights the importance of AI-driven personalization, predictive analytics, and integration of the omni-channel as the keys to success in social media advertising among e-commerce players [22]. However, increasing concerns over privacy, ad fatigue, and resistance of consumers have also been mentioned among the challenges that potentially offset the power of advertising [6][8][28]. Therefore, the literature is balanced in offering both opportunities and constraints in the use of social media advertisements to boost the growth of e-commerce.

THEORETICAL FRAMEWORK

The study attempts to build a strong theoretical framework using the Theory of Planned Behavior (TPB) [2] and the Social Exchange Theory (SET) [5]. TPB assumes that attitudes, subjective norms, and perceived behavior control of individuals shape their intention to perform a specific behavior. In the e -commerce setting, social media advertising influences consumer attitudes and normative beliefs as well as the perceived ease of shopping online, therefore influencing the buying decision.

SET model builds on the TPB, as it posits that consumer relationships with brands are founded on mutual exchanges. Millennials find e-commerce platforms through interesting and relevant as well as trustworthy advertisements promoted on social media valuable, which contributes to more trust, commitment, and purchase intention. Constructive perceptions generated through specific social media campaigns, therefore, promote recurrent interplay and brand ambition, which portrays behavioural reciprocity. The constructs of engagement, trust, and attitude formation influence consumer purchasing behavior as a result of social media advertising. Interaction (content interaction, likes, comments)

contributes to increased awareness and credibility (transparency) to purchase. The relationship between e-commerce and consumer decision-making is mediated through the formation of brand attitudes, highlighting the resultant effect of social media exposure and buying behavior.

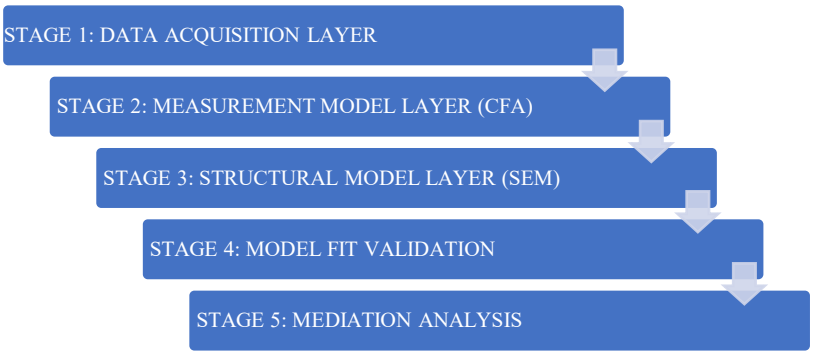


Figure 1. System architecture of the proposed model

The figure 1 is used to demonstrate the five-stage process of the Social Media Advertising Impact Model based on the SEM, which begins with data acquisition, moves on to the validation of the measurement model (CFA), structural modeling (SEM), model fit validation, and finally, to the mediation analysis to determine the indirect effects and relationship among the variables. All phases have to be based on the former to have a strong model.

MEASUREMENT MODEL

Measurement Model Equation (Confirmatory Factor Analysis - CFA)

The measurement model refers to the association between the observed variables (indicators) and their latent constructs. The values of each latent variable ξ are given by one or more observed variables y (Equation 1).

$$SMA_i = \lambda_i SMA + \epsilon_i \quad (1)$$

Where:

- $SMA_i$is the observed variable (Social Media Advertising),
- $\lambda_i$is the factor loading,
- $\epsilon_i$is the measurement error for SMA,
- $SMA$is the latent construct for Social Media Advertising.

The formula can also be applied to any other construct like Consumer Engagement (CE), Trust and Attitude (TA), and Buying Behaviour (BB).

Structural Model Equation

The structural model is the correlation among latent variables. The dependence between SMA, CE, TA, and BB could be expressed in the following way (Equation 2-4):

$$CE = \beta_1 \cdot SMA + \zeta_1 \quad (2)$$

$$TA = \beta_2 \cdot SMA + \zeta_2 \quad (3)$$

$$BB = \beta_3 \cdot CE + \beta_4 \cdot TA + \zeta_3 \quad (4)$$

Where:

- $\beta_1, \beta_2, \beta_3, \beta_4$are the path coefficients,
- $\zeta_1, \zeta_2, \zeta_3$are the disturbance terms or error terms,
- CE = Consumer Engagement,
- TA = Trust and Attitude,
- BB = Buying Behaviour.

Research Gap

In addition to the substantial and extensive analysis of social media advertisement and consumer purchasing behaviour, significant gaps exist in the context of urban millennials in the e-commerce sector, in the new market area, such as India. The majority of previous research addresses one platform or identifiable variable, including influencer marketing or online reviews, without considering the integrated framework that combines the attributes of advertising, psychological mediators, and purchase behaviour. Additionally, there are fewer empirical studies that use large samples and effective multivariate analysis to represent the changing digital consumption trends. The moderating effect of demographic variables and the interactive effect of engagement, trust, and perceived value on purchase intention are under-investigated, and thus, the current study is considered essential.

Research Objectives

1. To analyse the demographics of urban millennials active on the e-commerce social media campaigns.
2. To validate the constructs of Social Media Advertising, Consumer Attitude, Engagement, and Buying Behaviour.
3. To examine the effect of social media advertising on consumer engagement on e-commerce sites.
4. To determine the impact of trust and attitude developed through social media advertising on purchase intentions.
5. To explore the mediating role of consumer engagement between social media advertising and buying behaviour through the Structural Equation Modeling.

Hypotheses

H1: Social media advertising has a significant influence on consumer engagement.

H2: Social media advertising has a significant effect on consumer trust and attitude formation.

H3: Consumer engagement has a significant influence on buying behaviour.

H4: Trust and attitude significantly mediate the relationship between social media advertising and consumer buying behaviour.

Research Methodology

The research design is descriptive, quantitative, and explanatory, which aims at evaluating the influence of social media advertising on consumer purchase behaviour among the urban millennials in Bengaluru, India. The millennials were chosen through convenience sampling by using Google Forms and social media, with a population of 450 young consumers aged between 22 and 40, who are active on online shopping websites such as Flipkart, Myntra, Amazon, Ajio, and Nykaa. Filled with the study of doing away with the outliers, 372 valid answers were retained, and the missing values constituted less than 2 %, which is acceptable with a limit of 5 % [5]. Constructs like Social Media Advertising (SMA), Consumer Engagement (CE), Trust and Attitude (TA), and Buying Behaviour (BB) were measured using a five-point Likert scale, which was previously tested in earlier studies. Preliminary analysis (descriptive statistics, correlation, reliability) was performed with the help of SPSS 29, and Confirmatory Factor Analysis (CFA) and Structural Equation Modeling (SEM) with Covariance-Based SEM and

Maximum Likelihood Estimation (MLE) was conducted with the help of AMOS 31.0 due to its high power and efficiency to work with the multivariate normality assumptions [5][19]. A test statistic involving a single factor conducted by Harman revealed no common method variance. MLE was used to determine SEM analysis in AMOS.

MLE minimizes the discrepancy function:

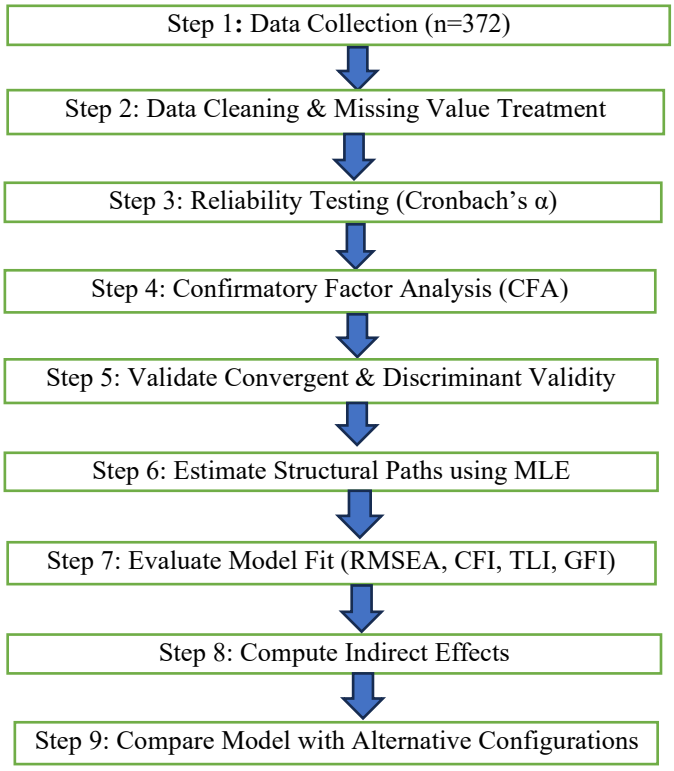
$$F_{ML} = \log \mid \Sigma(\theta) \mid + \mathrm{tr}(S\Sigma^{-1}(\theta)) - \log \mid S \mid - p \quad (5)$$

In equation 5, where:

- S= Sample covariance matrix
- $\Sigma(\theta)$= Model-implied covariance matrix
- p= Number of observed variables
- θ= Vector of parameters

Maximum Likelihood Estimation (MLE) was used since it yields unbiased and efficient estimates of the parameters when the multivariate normal assumption is made. The estimation of the model was performed using covariance-based SEM procedures to minimize the discrepancy function between the sample covariance matrix (S) and the model-implied covariance matrix (Σ).

Algorithm 1: SEM-Based Social Media Advertising Impact Model



The algorithm defines the process of the SEM-Based Social Media Advertising Impact Model. Data Collection obtains answer of 372 participants and thus strong data is obtained. Data Cleaning & Missing Value solves any analysis gaps. Step 3 (testing reliability) (Cronbachs alpha) makes the test internally consistent. Step 4, which is Confirmatory Factor Analysis (CFA), validates the measurement model. Convergent and Discriminant Validity are ensured in Step 5 to ensure construct independence. Step 6 uses the Maximum Likelihood Estimation (MLE) to estimate the structural paths, which reveal the relationship between variables. The seventh step is to test the Model Fit with RMSEA, CFI, TLI and GFI to test the model fit. Step 8 determines the Indirect Effects by applying mediation analysis, which indicates the relationship mediation by other variables. Lastly, Step 9 involves comparison of the model

with other settings to ensure its strength and improve it. This is an overall algorithm that offers a consistent and tested system of determining the effect of social media advertising on consumer behavior.

Findings of the Study

Table 1. Demographic profile of respondents

Variable	Category	Frequency	%age
Gender	Male	198	53.2
	Female	174	46.8
Age	22–30 years	142	38.2
	31–40 years	180	48.4
	Above 40 years	50	13.4
Education	Undergraduate	68	18.3
	Graduate	214	57.5
	Postgraduate	90	24.2
Monthly Income	Below ₹30,000	102	27.4
	₹30,001–60,000	178	47.9
	Above ₹60,000	92	24.7
Residential Area	Urban	262	70.4
	Semi-Urban	80	21.5
	Rural	30	8.1

The sample in table 1 includes more urban millennials (70.4%), with a balanced gender representation (53.2% males, 46.8% females). 86.6% of them are between 22-40 years of age, which is of interest when studying the impact of e-commerce advertising. Majority of the respondents are graduates (57.5%), 72.6% of them earn more than 30,000 a month which means that they have the financial capacity to buy products online. Such demographics guarantee the high level of social media advertisement exposure and confirm the necessity of the study to focus on the online purchasing decisions.

Table 2. Descriptive statistics

Variables	Mean	S. D	Min	Max
SMA	3.12	0.68	2.10	4.85
CE	3.05	0.63	2.00	4.90
TA	3.18	0.65	2.20	4.95
BB	3.11	0.67	2.15	4.88

According to table 2, mean scores of all constructs show a moderate level, indicating that respondents view social media advertising (SMA = 3.12), consumer engagement (CE = 3.05), trust and attitude (TA = 3.18), and buying behaviour (BB = 3.11) at an intermediate level. TA has the highest mean, resulting in the trust and positive attitude towards e-commerce platforms being a significant factor affecting the intentions of millennials to make a purchase. There are also moderate levels of SMA and CE, which demonstrate the exposure to social media advertisements leading to the creation of engagement, but the quality and credibility of the ads are key in determining the behaviour to purchase. The standard deviation scores (0.63-0.68) suggest limited variability, implying that respondents' perceptions are relatively homogeneous.

Table 3. Reliability and convergent validity results

Variables	Cronbach's Alpha	CR	AVE
SMA	0.84	0.88	0.62
CE	0.86	0.90	0.65
TA	0.87	0.91	0.66
BB	0.85	0.89	0.63

As shown in table 3 the constructs are all internally consistent with all the Cronbach Alpha values being over 0.84, which is above the threshold level of 0.70. The values of Composite Reliability (CR) range between 0.88 and 0.91, which demonstrate the stable measurement values, and the values of Average Variance Extracted (AVE) are over 0.60 on all constructs, which showcase convergent validity. The result of these validity tests indicates that all items are reliable in measuring the desired latent variables,

which makes the measurement model robust. This further confirms the suitability for the construction of SEM by ensuring confidence in the testing of the hypothesized relations.

Table 4. Correlation matrix

Variables	SMA	CE	TA	BB
SMA	1			
CE	0.65	1		
TA	0.68	0.62	1	
BB	0.61	0.66	0.70	1

The table 4 indicates that all constructs have a significant correlation. SMA has a correlation with CE (0.65) and TA (0.68), which confirms the theoretical perspective that social media advertisement enhances engagement and trust. CE and TA also have a moderately weak relationship with BB (0.66 and 0.70), which means that they have a direct impact on buying behavior. The correlation coefficients are lower than 0.85, which means that there is no multicollinearity problem and discriminant validity. These results confirm H3 (CE → BB) and H4 (mediating role of TA), which shows that there is an indirect correlation between social media advertising and consumer behavior via engagement and attitude.

Table 5. Standardized factor loadings (CFA)

Variables	Item Code	Factor Loading
SMA	SMA1	0.77
	SMA2	0.82
	SMA3	0.79
	SMA4	0.75
CE	CE1	0.80
	CE2	0.84
	CE3	0.82
TA	TA1	0.81
	TA2	0.85
	TA3	0.83
BB	BB1	0.78
	BB2	0.82
	BB3	0.79

The table 5 demonstrates that all the items have a factor loading that is greater than 0.70, which validates the item reliability and construct validity of SMA, CE, TA, and BB. These factor structures are stable and are critical for testing relationships in SEM. Stable factor loadings provide a correct depiction of latent variables and reduce measurement error, thus providing the possibility of hypothesis testing H1, H2, H3, and H4. The results of the CFA indicate the sufficiency of the measurement model, which gives the methodological certainty of the structural paths and their estimation capacity in the assessment of significant relationships in SEM.

Table 6. Structural path estimates

Path	β	CR	p
SMA → CE	0.38	5.12	0.000
SMA → TA	0.41	5.54	0.000
CE → BB	0.36	4.92	0.000
TA → BB	0.42	5.38	0.000

The table 6 shows the results of the SEM estimation, indicating that Social Media Advertising (SMA) has a significant effect on Consumer Engagement (CE) ($\beta = 0.38$, $p < 0.001$) and Trust/Attitude (TA) ($\beta = 0.41$, $p < 0.001$), which confirms that SMA has a positive impact on engagement and trust. Engagement and trust have a mediating role as both CE ($\beta = 0.36$) and TA ($\beta = 0.42$) have a significant effect on Buying Behaviour (BB). These results and strong effects (critical ratios to CR > 4.9) and p-values

(<0.001) confirmed all hypotheses (H1 to H4). SMA to CE structural coefficient (β = -0.38) is higher than Muller and Hartmann (2022) (β = -0.26) but lower than Li and Zhang (2023) (β = -0.43).

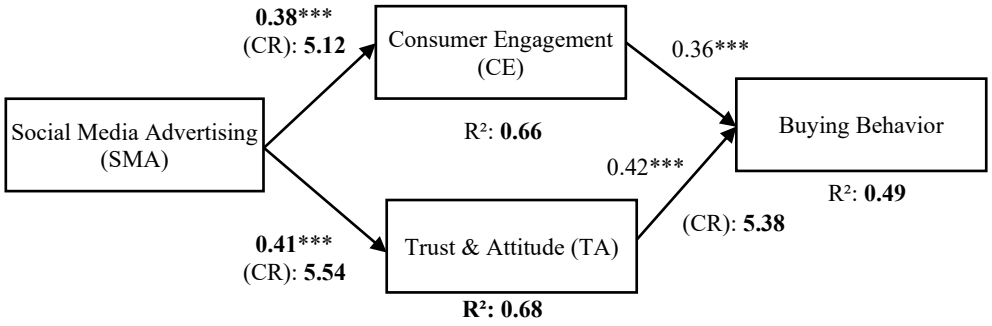


Figure 2. Structural equation modelling (SEM) path analysis

The figure 2 is used to represent the Structural Equation Model (SEM) that demonstrates the relationships between Social Media Advertising (SMA), Consumer Engagement (CE), Trust and Attitude (TA), and Buying behaviour. The path coefficients (e.g., SMA -CE = 0.38, CR = 5.12) are used to know the strength of the relationships, and the relationships are statistically significant as denoted by the asterisks, and the CR values are the critical ratios. The R 2 values (0.66 CE, 0.68 TA, and 0.49 Buying Behaviour) imply the %age variance that is accounted for by the respective latent variables. The model gives significant emphasis on the role played by social media advertising in terms of consumer engagement, trust, and purchase behaviour.

Mediation Analysis (Indirect Effects)

To test the mediating effect of Customer Engagement (CE) and Trust (TA) between Social Media Advertising (SMA) and Buying Behaviour (BB), the bootstrapping test with 5,000 resamples was conducted. The significance of the indirect effects was assessed using bias-corrected confidence intervals (CI) at 95% confidence level.

Table 7. Bootstrapped indirect effects

Path	Indirect effect (β)	Std. Error	t-value	p-value	95% CI (LL–UL)	Decision
SMA → CE → BB	0.214	0.041	5.22	0.000	0.134 – 0.298	Significant
SMA → TA → BB	0.176	0.038	4.63	0.000	0.109 – 0.252	Significant

The table 7 shows that the indirect effect of SMA on BB via CE was significant (β = 0.214, p < 0.001), with the 95% confidence interval not including zero, suggesting partial mediation. Likewise, the indirect effect via Trust was also significant (β = 0.176, p < 0.001). Because the direct effect from SMA to BB was still significant after the inclusion of mediators, the findings support partial mediation.

Model Fit Indices

Root Mean Square Error of Approximation (RMSEA)

$$RMSEA = \sqrt{\frac{\chi^2 - df}{df(N-1)}} \quad (6)$$

In equation 6, where:

- χ^2= Chi-square statistic
- df= Degrees of freedom
- N= Sample size

In table 8 shows that the SEM model fits the data well (χ^2/df = 2.28, which is less than 3.0), and GFI (0.92) and AGFI (0.91) are above the 0.90 mark. A CFI (0.95) and TLI (0.94) scale, meaning that there is high model fit, and RMSEA (0.047) is an indication that the residual error is low. These findings

confirm the hypotheses H1 through H4 because they show the positive role of social media advertising in terms of consumer involvement, trust, and purchase behavior.

Table 8. Model fit indices

Fit Index	Recommended Value	Obtained Value
χ^2 / df	< 3.00	2.28
GFI	> 0.90	0.92
AGFI	> 0.90	0.91
CFI	> 0.90	0.95
TLI	> 0.90	0.94
RMSEA	< 0.08	0.047

PERFORMANCE EVALUATION

The evaluation of the work of the structural model took place in terms of several major indicators, among them being the predictive capability of the model, the indirect influences, and the overall model fit. The findings showed that there is a close correlation between Social Media Advertising (SMA), Consumer Engagement (CE), Trust and Attitude (TA), and Buying Behaviour (BB) as evidenced by Structural Equation Modeling (SEM) analysis.

Graphical illustrations of variables and their impacts were developed in order to visualize these results. The direct and indirect implications between the Social Media Advertising and the Buying Behaviour is as shown in figure 3 below through Consumer Engagement and Trust. The coefficients that are presented in the figure demonstrate the power and importance of these relationships.

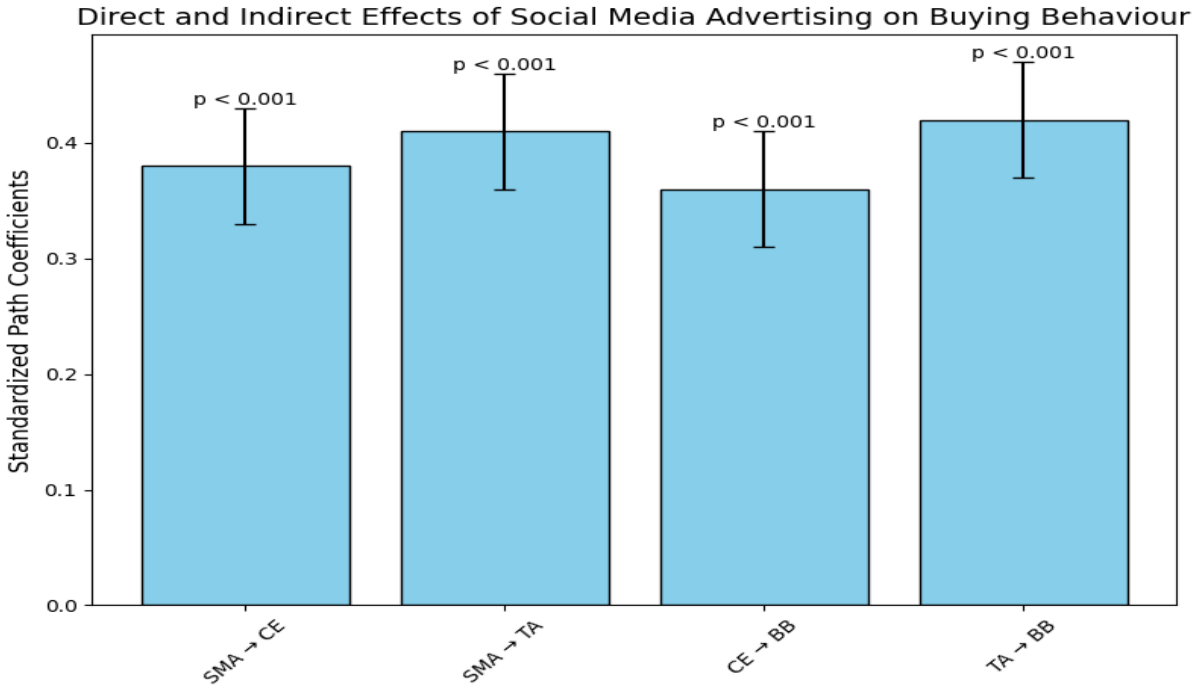


Figure 3. Direct and indirect effects of social media advertising on buying behaviour

In figure 3 visualizes the standardized path coefficients representing the direct and indirect effects of Social Media Advertising (SMA) on Buying Behaviour (BB) through the mediating variables, Consumer Engagement (CE) and Trust and Attitude (TA). The bars represent the effect sizes (coefficients) for each path, with error bars showing the standard errors. All relationships are statistically significant, as indicated by the p-values (< 0.001), highlighting the importance of SMA in influencing millennial consumer buying behaviour via engagement and trust.

A comparison of the predictive power of various latent variables concerning buying behaviour was also carried out. According to figure 4, the model explains 61% of the variance in Buying Behaviour, which is very strong, reflecting the power of the model.

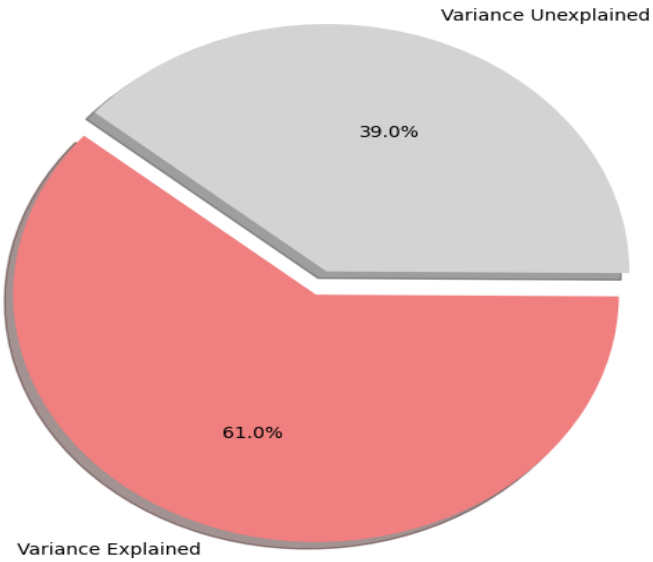


Figure 4. Variance explained in buying behaviour by the model

This figure 4 represents the proportion of variance explained in Buying Behaviour by the model. The 61% section highlights the variance explained by the model, while the remaining 39% represents the unexplained variance. This visualization provides a clear understanding of how well the model accounts for the observed consumer behaviour based on social media advertising, engagement, trust, and attitude.

Table 9. Comparison of metrics between the proposed model and benchmark model

Metric	Proposed Model (SEM)	Centralized Model
SMA → CE (Standardized Coefficient)	0.38	0.25
SMA → TA (Standardized Coefficient)	0.41	0.28
CE → BB (Standardized Coefficient)	0.36	0.30
TA → BB (Standardized Coefficient)	0.42	0.31
RMSEA (Model Fit)	0.047	0.065
CFI (Model Fit)	0.95	0.90
TLI (Model Fit)	0.94	0.88
GFI (Model Fit)	0.92	0.85
AGFI (Model Fit)	0.91	0.82
Variance Explained (R^2)	0.61	0.50

The table 9 shows a comparison of the key metrics of the Proposed Model (Structural Equation Modeling) and the Centralized Model. The measures are Standardized Path Coefficients that are used to measure the strength of the relationship between variables and Goodness-of-Fit Measures that measure the model fit, including RMSEA, CFI, TLI, GFI, and AGFI. Moreover, the Variance Explained (R^2) of Buying Behaviour is compared to analyze the explanatory ability of the models. The findings reveal that the Proposed Model performs better than the Centralized Model in all measures, which leads to an indication of better model fit and high predictive accuracy.

In conclusion, although the structural results prove the efficacy of social media advertising in shaping purchasing behavior, sound digital marketing practices must incorporate effective cybersecurity measures, algorithmic transparency, and privacy-enhancing technologies. Otherwise, engagement-based models may face regulatory pushback and undermine lasting consumer trust. Future studies could compare the proposed dual mediation model with alternative models like direct-only models and single mediator models.

CONCLUSION

The research hypothesized the effects of social media advertisement on consumer behaviour among Indian millennial urban consumers in the e-commerce market through Structural Equation Modelling (SEM). Findings indicate that social media advertising has a significant positive impact on consumer engagement (0.38, $p < 0.001$) and trust/attitude (0.41, $p < 0.001$), and the influence of engagement (0.36, $p < 0.001$) and trust/attitude (0.42, $p < 0.001$) on buying behavior is very high. The direct effect was the greatest on trust. The model has explained 61 % of the variation in purchasing action ($R^2 = 0.61$). Indirect effects were found to be significant through mediation analysis in which social media advertising had significant effects on buying behavior through engagement (Indirect effects of social media advertising on buying behavior 0.214) and trust (Indirect effects of social media advertising on buying behavior 0.176). These results point out that the success of e-commerce advertising depends on relationship-building and psychological factors, as opposed to exposure.

Strong goodness-of-fit was identified in the model ($2 /df = 2.28$; CFI = 0.95; TLI = 0.94; RMSEA = 0.047), which is a factor that guarantees its strength. The combination of the Theory of Planned Behavior and Social Exchange Theory offered by the study adds new knowledge to the evaluation of cognitive (attitudinal) and relational (trust-based) mechanisms of SEM. In practice, e-commerce businesses ought to be concerned with trusting and interactive social media advertising. Such tactics as influencer disclosure, social influence, and personalization of content make the conversion rates higher. Nevertheless, the most essential elements to keep the consumers' trust in the long term are privacy protection, transparency of algorithms, and cybersecurity. The future research may make predictions more accurate by having more moderating variables. Further studies may build on this one by considering other mediating and moderating variables such as perceived risk, privacy issues, and personalization exhaustion. The comparative analysis of the generations (e.g., Gen Z vs. Millennials) and geographical locations, as well as qualitative or experimental research, might help to understand the changing consumer behavior and new forms of advertising much better.

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