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AI-driven Marketing and Confectionery Consumption

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Abstract

This study examined the influence of artificial intelligence (AI) driven marketing technologies on confectionery consumption among Business Education undergraduates in public universities in Cross River State, Nigeria. Specifically, it investigated the predictive effects of personalized marketing, voice assisted shopping and smart shopping on students' consumption behaviour. A predictive correlational research design was employed to explore relationships between variables and predict consumption patterns. The population comprised 920 undergraduates in levels 200 to 400 during the 2024/2025 academic session from the University of Calabar and the University of Cross River State. Using Taro Yamane's formula, a sample of 279 respondents was selected and stratified random sampling ensured proportional representation across study levels. Data were collected through a structured and validated questionnaire titled "Artificial Intelligence and Consumption of Confectionery Products among Business Education Undergraduates (AICCPBEU)", which contained closed-ended and Likert-scale items. Descriptive statistics, including mean and standard deviation, were used to address the research questions, while simple linear regression tested the hypotheses at a 0.05 significance level. Results indicated that all three AI driven marketing strategies significantly influenced confectionery consumption. Personalized marketing had the strongest predictive effect (β = 0.553), followed by smart shopping (β = 0.518) and voice assisted shopping (β = 0.487). Respondents also expressed positive perceptions of AI based marketing strategies. The study concluded that AI driven marketing technologies significantly shape confectionery consumption by enhancing convenience, personalization and consumer engagement. It recommended that confectionery companies adopt personalized digital marketing tools to improve targeted promotions and stimulate higher purchasing among undergraduates.

Keywords: Artificial Intelligence, Business Education, Confectionery Consumption, Personalized Marketing, Smart Shopping, Voice Assisted Shopping.

Introduction

The rapid advancement of artificial intelligence (AI) technologies has significantly transformed how consumers access information, made purchasing decisions and interact with digital retail environments (1). AI driven systems increasingly shape consumer behaviour through tools such as personalized marketing, predictive analytics, chatbots, recommendation engines and voice assisted shopping platforms. Across global retail sectors, particularly in food, beverages and other fast moving consumer goods, AI enabled marketing strategies are widely used to influence consumer preferences and enhance product visibility (2). Confectionery products, including chocolates, sweets, biscuits and candies, are especially responsive to these technologies because AI tools stimulate cravings, deliver timely reminders and provide personalized offers when

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consumers are most receptive (3). These products are widely consumed by university students due to their affordability, accessibility and sensory appeal, making students an important target group for AI based marketing interventions. In developing economies such as Nigeria, rapid digital penetration has increased students' exposure to AI powered marketing tools embedded in social media platforms, electronic commerce websites, mobile applications and digital payment systems (4). University students represent one of the most technologically engaged demographic groups and their frequent interaction with smartphones, online shopping platforms and social media algorithms places them at the centre of AI mediated consumption environments (5). In Cross River State, students in public universities regularly encounter digital marketing systems where AI influences the products they see, evaluate and purchase. The growing affordability of smartphones, improved internet connectivity and the expansion of digital payment platforms have intensified students' exposure to algorithm driven marketing messages, making them highly responsive to personalized digital content (6).

Despite the increasing global adoption of AI driven marketing strategies, empirical research examining their influence on confectionery consumption among university students in Nigeria remains limited, particularly among Business Education undergraduates. Most existing studies focus on the effectiveness of AI enabled personalization in increasing purchase intentions and improving consumer engagement. However, emerging studies also highlight challenges associated with AI marketing, including privacy concerns, perceived intrusiveness, algorithm fatigue and declining trust in automated systems (7). These mixed findings highlight the need for context specific research, particularly in emerging digital markets such as Nigeria, where technological adoption, regulatory environments and consumer awareness differ from those in more developed economies (8).

Three AI driven marketing strategies are particularly relevant to students' consumption behaviour: personalized marketing, voice assisted shopping and smart shopping technologies. Personalized marketing uses consumer data such as browsing history, demographics and past purchases to tailor advertisements and product recommendations to individual users. This approach increases the relevance of marketing messages, enhances consumer engagement and often stimulates impulse purchases, particularly for hedonic products such as confectionery (9). Voice assisted shopping enables consumers to search for and purchase products through voice commands using digital assistants embedded in smartphones and smart devices. By simplifying the purchasing process and reducing decision making effort, voice assisted shopping can facilitate both routine and spontaneous purchases. Smart shopping technologies also contribute to digital consumer experiences through tools such as mobile coupons; AI based recommendation systems, digital payment platforms and automated price comparison systems that enhance convenience, speed and personalization in the purchasing process (10). These features are commonly associated with impulse buying behavior, particularly for low involvement products such as confectionery. For Business Education undergraduates, familiarity with digital tools, electronic commerce platforms and business processes may further strengthen their engagement with these smart shopping ecosystems (11). Understanding AI driven marketing effects on confectionery consumption informs consumer behaviour theory and marketing practice (12, 13).

This study is grounded in an integrated theoretical perspective combining the Technology Acceptance Model and Consumer Behaviour Theory. The Technology Acceptance Model explains that perceived usefulness and perceived ease of use influence the adoption and use of technological innovations. In the context of this study, artificial intelligence driven tools such as personalized marketing systems, voice assisted shopping and smart shopping technologies represent digital innovations whose adoption by students may depend on how useful and easy they perceive these technologies to be in facilitating purchasing decisions (14). For example, students may adopt voice assisted shopping because it simplifies product searches and provides relevant suggestions, which may increase confectionery purchases. The Technology Acceptance Model therefore explains the technological determinants of artificial intelligence adoption in consumer purchasing behavior (15).

Consumer Behaviour Theory complements this perspective by emphasizing that consumption decisions are influenced by psychological, emotional, social and situational factors, particularly for hedonic and low involvement products such as confectionery (16, 17). Factors such as impulsivity, habit formation, peer influence and emotional triggers shape students' purchasing choices in artificial intelligence mediated environments. Algorithm driven recommendations and targeted advertisements can activate these behavioural drivers and encourage spontaneous or habitual purchases among students (18, 19).

By integrating the Technology Acceptance Model and Consumer Behaviour Theory, the study provides a comprehensive framework for understanding how technological attributes, including perceived usefulness and perceived ease of use and consumer psychology, including motivation, habits and situational triggers, jointly influence confectionery consumption (20, 21). This framework informs the development of the research hypotheses and guides the interpretation of how personalized marketing, voice assisted shopping and smart shopping technologies influence students' purchasing behaviour.

Although artificial intelligence driven marketing is increasingly studied, limited empirical evidence exists on its influence on confectionery consumption among university students in Nigeria. This study therefore examines how personalized marketing, voice assisted shopping and smart shopping technologies influence confectionery consumption among Business Education undergraduates in public universities in Cross River State (22).

Methodology

This study adopted a predictive correlational research design to examine the relationships between the independent variables, personalized marketing, voice assisted shopping and smart shopping technologies and the dependent variable, confectionery consumption among Business Education undergraduates in public universities in Cross River State, Nigeria. The study was conducted in Cross River State, located in the South geopolitical zone of Nigeria (approximate GPS coordinates 5.96° N, 8.33° E). The predictive correlational design is appropriate for determining the strength and direction of relationships among variables without manipulation and for estimating the extent to which predictor variables jointly explain variations in an outcome variable.

The population for the study comprised 920 Business Education undergraduates in the 200, 300 and 400 levels of the 2024-2025 academic sessions drawn from the University of Calabar and the University of Cross River State, Nigeria. These students were considered suitable for the study because of their academic exposure to marketing, consumer behaviour and digital media concepts, which positions them to meaningfully evaluate the influence of artificial intelligence driven marketing technologies.

A proportionate stratified random sampling technique was employed to ensure adequate representation across academic levels. The population was first stratified into three groups based on level of study, namely 200, 300 and 400 levels. The sample size for each stratum was then determined proportionately based on the relative size of each group within the population. From the total population of 920 students, a sample size of 279 respondents was calculated using Taro Yamane's formula to ensure statistical adequacy and manageability. Within each stratum, respondents were selected using simple random sampling to minimize selection bias.

Data were collected using a researcher developed structured questionnaire titled "Artificial Intelligence and Consumption of Confectionery Products among Business Education Undergraduates (AICCPBEU)". The instrument contained 15 items distributed across four constructs: personalized marketing, voice assisted shopping, smart shopping technologies and confectionery consumption. Responses were measured on a five point Likert scale ranging from Strongly Disagree (1) to Strongly Agree (5).

To ensure content validity, the instrument was subjected to expert review by three specialists, two from the Department of Business Education and one from the Department of Educational Foundations at the University of Calabar. Their suggestions regarding clarity, relevance and coverage of the constructs were incorporated into the final version of the questionnaire.

A pilot test was conducted using a sample outside the study area and the internal consistency of the instrument was determined using Cronbach alpha.

The reliability of the instrument was assessed using Cronbach alpha during a pilot test and the results indicated acceptable internal consistency across all constructs, confirming that the questionnaire was suitable for measuring the variables of interest. Ethical standards were strictly observed throughout the study. Participation was voluntary and respondents were fully informed about the purpose of the research. Informed consent was obtained from all participants and they were assured of the anonymity and confidentiality of the information provided. Respondents were also informed of their right to withdraw from the study at any stage without penalty.

Data collected were analysed using mean and standard deviation to address the research questions. To test the null hypotheses, multiple linear regression analysis was employed at the 0.05 level of significance to determine the joint and relative influence of personalized marketing, voice assisted shopping and smart shopping technologies on confectionery consumption. All statistical analyses were performed using SPSS version 25 to ensure accurate computation of descriptive and inferential statistics. Assumptions for multiple regression, including linearity, normality, homoscedasticity and absence of multicollinearity, were checked to ensure the validity of the results.

Results

The descriptive statistics indicate that respondents generally agreed that personalized marketing influences their confectionery consumption. Mean scores ranged from 3.55 to 3.71 on a five-point Likert scale, suggesting a positive perception of AI-driven adverts, social media recommendations and tailored promotional messages. The cluster mean of 3.62 (SD = 0.85) reflects overall agreement among Business Education undergraduates.

The relatively low standard deviations (0.79–0.90) indicate limited variability in responses, suggesting a consistent perception among respondents regarding the influence of personalized marketing. The mean score above the criterion value of 2.50 indicates that respondents perceive personalized marketing as influential in their confectionery consumption behaviour, as shown in Table 1.

Table 1: Mean and Standard Deviation between Personalized Marketing and the Consumption of Confectionery Products among Business Education Undergraduates in Public Universities of Cross River State, Nigeria (N = 279)

Personalized Marketing	$\overline{X}$	**SD**	**Remark**
Artificial intelligence based personalized adverts influence my decision to buy confectionery products.	3.65	.82	Agree
Promotional messages tailored to my preferences encourage me to buy confectioneries.	3.58	.87	Agree
Social media platforms recommend confectionery products based on my browsing behaviour.	3.71	.79	Agree
Social media platforms recommend confectionery products based on my browsing behaviour.	3.55	.90	Agree
Personalized product recommendations increase my frequency of confectionery consumption.	3.61	.86	Agree
Cluster mean	**3.62**	**.848**	

Note: $\overline{X}$ = Mean, SD = Standard Deviation

The mean scores for voice-activated marketing items ranged from 3.42 to 3.51, indicating general agreement among respondents. The cluster mean of 3.48 (SD = 0.90) suggests that voice-activated technologies are perceived to positively influence confectionery consumption. The standard deviations, all below 1.00, indicate relatively homogeneous responses. The overall mean exceeding the benchmark of 2.50 implies that respondents perceive voice-activated shopping as a relevant factor in their confectionery purchasing behaviour, as depicted in Table 2.

Table 2: Mean and Standard Deviation between Voice-activated Marketing and the Consumption of Confectionery Products among Business Education undergraduates in Public Universities of Cross River State, Nigeria (N = 279)

Voice activated Marketing	$\overline{X}$	**SD**	**Remark**
I use voice assistants (e.g., Google Assistant, Siri, Alexa) to search for confectionery products.	3.42	.91	Agree
Voice-activated systems make it easier for me to discover new confectionery products.	3.51	.88	Agree
I am influenced to buy confectionery items suggested by voice-activated device.	3.49	.93	Agree
Voice shopping helps me purchase confectionery products more conveniently.	3.47	.90	Agree
The use of voice-activated technology increases my likelihood of buying confectionery.	3.50	.89	Agree
Cluster mean	**3.48**	**.902**	

Note: $\overline{X}$ = Mean, SD = Standard Deviation

The descriptive statistics on smart shopping and its influence on confectionery consumption among Business Education undergraduates reveal a generally positive perception and impact of smart shopping technologies on purchasing behaviour. Table 3 presents responses to five items assessing the role of smart shopping apps, AI-driven shopping platforms and other smart shopping tools in shaping the consumption of confectionery products. Respondents generally agreed with all items, with mean scores ranging from 3.52 to 3.59 on a five-point Likert scale, indicating that smart shopping technologies play a significant role in their confectionery purchasing decisions. The overall cluster mean of 3.55 (SD = 0.868) reflects consistent agreement across all items, demonstrating that smart shopping is perceived as an effective tool in facilitating informed, convenient and frequent confectionery purchases among respondents.

The relatively low standard deviations (all below 0.90) suggest limited variability in responses, indicating that most respondents share similar perceptions regarding the benefits of smart shopping technologies. This consistency reinforces the conclusion that smart shopping has a reliable and positive influence on confectionery consumption among the sampled population. The overall mean of 3.55, which is above the benchmark of 2.50, indicates that respondents perceive smart shopping as significantly influencing their confectionery consumption, as shown in Table 3.

Table 3: Mean and Standard Deviation between Smart Shopping and the Consumption of Confectionery Products Among Business Education Undergraduates in Public Universities of Cross River State, Nigeria **(**N = 279)

Smart shopping	$\overline{X}$	**SD**	**Remark**
Smart shopping apps help me compare confectionery product prices easily.	3.59	.86	Agree
AI-driven shopping platforms suggest confectionery products based on my previous purchases.	3.52	.88	Agree
I rely on smart shopping tools to find discounts and offers on confectionery products.	3.57	.84	Agree
Smart shopping features influence my decision to buy certain confectionery products.	3.54	.87	Agree
Smart shopping technologies increase my frequency of confectionery product purchases.	3.53	.89	Agree
Cluster mean	3.55	.868	

Note: $\overline{X}$ = Mean, SD = Standard Deviation

The regression analysis revealed that personalized marketing significantly predicts confectionery consumption, $F(1, 277) = 81.673$, $p < .001$. The model explains approximately 26.2% of the variance in confectionery consumption ($R^2 = .262$), indicating a moderate explanatory effect.

Since the p-value is less than the 0.05 level of significance, the null hypothesis ($H0_1$) is rejected. This implies that personalized marketing has a statistically significant influence on confectionery consumption among Business Education undergraduates in public universities in Cross River State, as described in Table 4.

Table 4: Simple Linear Regression Analysis

Source of variation	Sum of Squares	Df	Mean Square	F	Sig.
Regression	1890.432	1	1890.432	81.673	000
Residual	6419.568	277	23.178		
Total	8310.000	278			

Note: *Significant at P< 0.05

Hypothesis One

$H0_1$: Personalized marketing has no significant influence on confectionery consumption among Business Education undergraduates.

Hypothesis Two

$H0_2$: Voice-activated marketing has no significant influence on confectionery consumption among Business Education undergraduates.

The regression results indicate that voice-activated marketing significantly predicts confectionery consumption, F (1, 277) = 72.197, p < .001. The model accounts for approximately 20.7% of the variance in confectionery consumption.

Given that the p-value is less than 0.05, the null hypothesis ($H0_2$) is rejected. This finding indicates that voice-activated marketing has a statistically significant influence on confectionery consumption among the respondents, as shown in Table 5.

Table 5: Simple Linear Regression Analysis

Source of variation	Sum of Squares	Df	Mean Square	F	Sig.
Regression	1815.274	1	1815.274	72.197	000
Residual	6964.726	277	25.146		
Total	8779.999	278			

Note: *Significant at P< 0.05

Hypothesis Three

$H0_3$: Smart shopping has no significant influence on confectionery consumption among Business Education undergraduates.

The regression analysis shows that smart shopping significantly predicts confectionery consumption, F (1, 277) = 58.912, p < .001. The model explains approximately 17.5% of the variance in confectionery consumption. Since the p-value is below the 0.05 threshold, the null hypothesis ($H0_3$) is rejected. This indicates that smart shopping has a statistically significant influence on confectionery consumption among the sampled undergraduates, as depicted in Table 6.

Table 6: Simple Linear Regression Analysis

Source of variation	Sum of Squares	Df	Mean Square	F	Sig.
Regression	1674.532	1	1674.532	58.912	000
Residual	7874.467	277	28.431		
Total	9548.999	278			

Note: *Significant at P< 0.05

Discussion

The findings of this study revealed that personalized marketing, voice activated marketing and smart shopping significantly influence confectionery consumption among Business Education undergraduates (23, 24). These results are consistent with contemporary digital marketing theories, which emphasize that technology driven engagement plays a critical role in shaping consumer behaviour in fast moving consumer goods sectors (25).

Personalized marketing emerged as a strong predictor of confectionery consumption. Strategies such as tailored product recommendations, individualized promotions and customized digital advertisements increase students' likelihood of purchasing confectionery products (16). This supports previous studies indicating that personalization enhances message relevance, improves consumer engagement and stimulates impulse buying in low involvement product categories (22, 26). Additionally, personalization reduces information overload and directs consumer attention toward preferred products (27), while studies in Nigeria have demonstrated its significant impact on snack and confectionery purchases among young adults (28).

Voice activated marketing also significantly predicted confectionery consumption. This

indicates that students increasingly rely on technologies such as Google Assistant, Siri and Alexa to search for, compare and select products (29, 30). Nigerian consumers, particularly digitally savvy students, are gradually adopting voice technologies for routine shopping tasks (31), highlighting their growing relevance in retail strategy.

Smart shopping technologies, including mobile applications, automated price comparison tools, digital loyalty systems and AI enabled assistants, also positively influenced confectionery consumption (32, 33). These tools enhance convenience, cost efficiency and real time purchasing opportunities, motivating students to buy more frequently. Both global and Nigerian studies confirm that smart shopping ecosystems increase purchase intention and actual buying behaviour (34), emphasizing the importance for confectionery brands to integrate AI driven digital tools to strengthen market performance.

Conclusion

The findings of this study demonstrate that artificial intelligence mediated digital marketing strategies significantly influence consumer behaviour among Business Education undergraduates in public universities in Cross River State, Nigeria. Specifically, personalized marketing, voice activated shopping and smart shopping technologies were found to shape confectionery consumption, with personalized marketing emerging as the strongest predictor. These results highlight the growing role of intelligent digital systems in guiding student purchasing decisions.

The study supports the combined explanatory power of the Technology Acceptance Model and Consumer Behaviour Theory, showing that both technological perceptions, such as usefulness and ease of use and behavioral stimuli, such as impulse tendencies and situational triggers, jointly affect consumption behaviour in AI mediated environments. Empirically, the study contributes context specific evidence from Nigeria, addressing the limited research on AI driven food marketing among university students.

Practically, the findings suggest that confectionery marketers can increase engagement through ethically deployed AI personalization, voice commerce and smart shopping features, while policymakers and university administrators should consider potential health and consumer protection implications.

Limitations include the cross-sectional design, focus on a single academic discipline and region and reliance on self-reported data. Future research should adopt longitudinal or mixed methods designs, expand sampling across disciplines and regions and explore moderating factors such as digital literacy, privacy concerns and health awareness.

Therefore, AI enabled marketing is reshaping confectionery consumption among Nigerian undergraduates, underscoring the need for strategies that balance marketing effectiveness with responsible consumer protection.

Abbreviations

AI: Artificial Intelligence, AICCPBEU: Artificial Intelligence and Consumption of Confectionery Products among Business Education Undergraduates, CBT: Consumer Behaviour Theory, TAM: Technology Acceptance Model.

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Author Contributions

Okute, Agnes Lawrence: conceptualization, Kolo Isaac: conceptualization, Patrick Awok Mbum: conceptualization, Mbaze-Ebock Vivian Arrey: conceptualization, Jayne Iquo Owan: result analysis, writing- review, editing, Agbor Judith Ari-Tano Tawo-Oben: result analysis, writing- review, editing, Nnenna Eme Ukandu: conceptualization, Esther Frank Apejoye-Okezie: conceptualization, Sarah Okpa Josiah: data collection, conduct the study, Iwuchukwu Goodluck Ndubuisi: data collection, conduct the study, Ibok Bassey Ekpenyong: data collection, conduct the study, Ele Augustine Augustine: data collection, conduct the study, Lawal Suleiman Gbenga: result analysis, writing-review, editing ,Awah Catherine Icheni Andorshiye: result analysis, writing- review, editing, Francis Idiege Ahakiri: result analysis, writing- review, editing, Agaku Deun Doris: result

analysis, writing- review, editing, James Runyi Daniel: data collection, conduct the study. All authors critically reviewed the manuscript.

Conflict of Interest

The authors have no conflicts of interest to declare.

Data Availability

The datasets generated and analyzed during the current study are available from the corresponding author on reasonable request. Interested researchers can contact the corresponding author to access the data while ensuring confidentiality and ethical use.

Declaration of Generative AI and AI-Assisted Technologies

The authors declare that they did not use AI-assisted tools (ChatGPT, OpenAI) during the writing process.

Ethics Approval

Informed consent was obtained from all participants involved in the survey and individuals below the age of 18 were not included in the study.

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