

A Structural Equation Model of Key Factors Influencing Consumer Purchase Decisions in the Online Cosmetics Industry of Shandong, China

แบบจำลองสมการโครงสร้างของปัจจัยสำคัญที่มีอิทธิพลต่อการตัดสินใจซื้อของผู้บริโภคในอุตสาหกรรม
เครื่องสำอางออนไลน์ของมณฑลซานตง ประเทศจีน

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Abstract

This study aims to investigate the direct and indirect effects of social media marketing, user engagement, online influencers, and purchase motivation on consumer purchase decisions in the online cosmetics industry of Shandong Province, China, while constructing an empirically validated model to optimize marketing strategies. Employing a quantitative research design, the study surveyed consumers through WeChat and Douyin and collected 502 valid questionnaires. The data were analyzed using SmartPLS 4.0 through structural equation modeling (SEM). The results indicate that social media marketing, user engagement, online influencers, and purchase motivation have significant positive effects on consumer purchase decisions. In addition, user engagement, online influencers, and purchase motivation play important mediating roles in the relationship between social media marketing and purchase decisions. The constructed structural relationship model was consistent with the empirical data, confirming the robustness and explanatory power of the research framework. Furthermore, the structural equation model demonstrated good reliability and validity, as indicated by Cronbach's Alpha values greater than 0.70, composite reliability (CR) values greater than 0.70, and average variance extracted (AVE) values greater than 0.50, along with a high level of model fit with the empirical data. The main contributions of this study are twofold. First, from a theoretical perspective, the study reveals the pathways through which social media marketing influences purchase decisions through the mediating roles of user engagement, online influencers, and purchase motivation. Second, from a practical perspective, the study provides specific marketing optimization strategies for practitioners in the online cosmetics industry in Shandong Province, China. These strategies can help enhance corporate competitiveness, improve consumer satisfaction, and strengthen marketing effectiveness in the digital market. Overall, this study offers empirical support for understanding consumer behavior and improving marketing effectiveness in the online cosmetics industry.

Keywords: Social Media Marketing, Social Media User Engagement, Online Influencers, Consumer Purchase Motivation, Consumer Purchase Decision, Online Cosmetics Industry

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บทคัดย่อ

การศึกษานี้มีวัตถุประสงค์เพื่อตรวจสอบผลกระทบทางตรงและทางอ้อมของการตลาดผ่านโซเชียลมีเดีย การมีส่วนร่วมของผู้ใช้ อินฟลูเอนเซอร์ออนไลน์ และแรงจูงใจในการซื้อที่มีต่อการตัดสินใจซื้อของผู้บริโภคในอุตสาหกรรมเครื่องสำอางออนไลน์ของมณฑลซานตง พร้อมทั้งสร้างแบบจำลองที่ได้รับการยืนยันทางการทดลองเพื่อปรับปรุงกลยุทธ์การตลาด โดยการวิจัยเชิงปริมาณ ทำการสำรวจผู้บริโภคผ่านแพลตฟอร์มได้แก่ WeChat และ Douyin จำนวน 502 ชุด วิเคราะห์ข้อมูลด้วยโปรแกรม SmartPLS 4.0 สำหรับการวิเคราะห์โมเดลสมการโครงสร้าง ผลการวิจัยพบว่า การตลาดผ่านโซเชียลมีเดีย การมีส่วนร่วมของผู้ใช้ อินฟลูเอนเซอร์ออนไลน์ และแรงจูงใจในการซื้อ มีอิทธิพลเชิงบวกต่อการตัดสินใจซื้ออย่างมีนัยสำคัญ การมีส่วนร่วมของผู้ใช้ อินฟลูเอนเซอร์ออนไลน์ และแรงจูงใจในการซื้อ ทำหน้าที่เป็นตัวกลางสำคัญระหว่างการตลาดผ่านโซเชียลมีเดียและการตัดสินใจซื้อ แบบจำลองความสัมพันธ์โครงสร้างที่สร้างขึ้นสอดคล้องกับข้อมูลเชิงประจักษ์ ยืนยันความแข็งแกร่งและอำนาจการอธิบายของกรอบการวิจัย แบบจำลองสมการโครงสร้างที่สร้างขึ้นในงานวิจัยนี้ได้รับการยืนยันว่ามีความเชื่อมั่นและความตรงที่ดี (Cronbach's Alpha > 0.70, CR > 0.70, AVE > 0.50) มีระดับความสอดคล้องของข้อมูลกับแบบจำลองสูง ผลงานหลักของงานวิจัยนี้มีดังนี้ 1) เชิงทฤษฎี เปิดเผยเส้นทางที่การตลาดสื่อสังคมออนไลน์ส่งผลต่อการตัดสินใจซื้อผ่านบทบาทตัวแปรส่งผ่านของการมีส่วนร่วมของผู้ใช้ ผู้ทรงอิทธิพลออนไลน์ และแรงจูงใจในการซื้อ และ 2) เชิงปฏิบัติ นำเสนอกลยุทธ์การปรับปรุงการตลาดที่เฉพาะเจาะจงสำหรับผู้ประกอบการในอุตสาหกรรมเครื่องสำอางออนไลน์ของมณฑลซานตง ประเทศจีน ช่วยเสริมสร้างขีดความสามารถในการแข่งขันขององค์กรและความพึงพอใจของผู้บริโภคในตลาดดิจิทัล การศึกษานี้เป็นแนวทางสำหรับการทำความเข้าใจพฤติกรรมผู้บริโภคและช่วยยกระดับประสิทธิภาพทางการตลาดในอุตสาหกรรมเครื่องสำอางออนไลน์ และการสนับสนุนเชิงประจักษ์สำหรับการปรับปรุงและเพิ่มประสิทธิภาพทางการตลาดในอุตสาหกรรมเครื่องสำอางออนไลน์

คำสำคัญ: การตลาดผ่านโซเชียลมีเดีย การมีส่วนร่วมของผู้ใช้โซเชียลมีเดีย อินฟลูเอนเซอร์ออนไลน์ แรงจูงใจในการซื้อของผู้บริโภค การตัดสินใจซื้อของผู้บริโภค อุตสาหกรรมเครื่องสำอางออนไลน์

Introduction

With the vigorous development of China's economy and the growing pursuit of beauty among consumers, the cosmetics industry is experiencing unprecedented prosperity, while the rise of social media and e-commerce has provided brand-new marketing channels for brands (Dudarenok, 2025). As an important economic province and cosmetics industry base in China, Shandong Province's online cosmetics market demonstrates strong growth momentum. As of 2023, the market size of China's cosmetics industry has exceeded 400 billion RMB, with online channels playing an increasingly dominant role (Zhou & Salleh Hudin, 2025). Shandong Province stands out as a pivotal hub in this sector, not only implementing the government's "Northern Beauty Valley" strategy but also commanding a significant share of the national production capacity. Recent data indicates that Shandong accounts for a substantial portion of domestic cosmetic output, serving as a critical base for renowned brands and fostering a robust supply chain ecosystem that drives the province's economic growth (Dudarenok, 2025). Against the backdrop where online channels occupy a dominant position in cosmetics sales, social media marketing, characterized by interactivity and authenticity, along with the profound influence of electronic word-of-mouth (eWOM), has become a critical tool for enterprises to influence consumer behavior through perceived value factors such as pleasure and trust. Consumers generally utilize mainstream platforms such as Douyin, Weibo, Xiaohongshu, and Bilibili to acquire information and are deeply influenced by word-of-mouth dissemination, which directly shapes their purchase decisions (Chuah et al., 2023). Therefore, conducting

in-depth research on the impact of key factors, such as social media marketing, on consumer purchase decisions in Shandong's online cosmetics market is of great significance for enterprises to formulate effective marketing strategies and enhance market competitiveness.

In the context of Shandong's online cosmetics industry, consumer purchase decisions are the behavioral outcome shaped by digital touchpoints such as social media ads, live streaming, and user-generated content (Wang et al., 2019). Stimulated by social media marketing, this decision involves consumers evaluating preferences and online information to form purchase intentions (Fahmy et al., 2024). The AISAS model, comprising Attention, Interest, Search, Action, and Sharing, helps explain how Shandong consumers move from initial exposure to online cosmetics content toward final purchase and word-of-mouth dissemination (Wissen & Anatan, 2023). Understanding how each antecedent factor (social media marketing, user engagement, online influencers, and purchase motivation) drives this process is critical for predicting consumer behavior in Shandong's online cosmetics market.

In Shandong's online cosmetics industry, social media marketing directly influences consumers' purchase decisions by enhancing entertainment value, customization, interactivity, eWOM, and trendiness (Chuah et al., 2023). For example, short videos and live streaming on Douyin and Xiaohongshu have become key drivers of purchase intent among Shandong consumers. Rather than defining each dimension in detail, this study focuses on how these five dimensions collectively operate within the Shandong market to stimulate purchase decisions. Social media marketing simplifies business-consumer dialogue and establishes emotional connections (Onamusi & Ayo, 2021; Jacob et al., 2020). Therefore, this study positions social media marketing as a primary exogenous variable that not only directly affects purchase decisions but also works through mediating mechanisms.

In the context of Shandong's online cosmetics industry, social media user engagement acts as a critical mediator that translates social media marketing efforts into actual purchase decisions (Kujur & Singh, 2020). When consumers actively participate in brand-related content, find the platform easy to use, and adapt to mobile commerce features, their likelihood of making a purchase increases significantly (Saoula et al., 2023; Ngo et al., 2025). Instead of exhaustively defining engagement, this study emphasizes how engagement behaviors-sparked by social media marketing-ultimately lead to stronger purchase decisions in the Shandong online cosmetics market. Social interactions and UGC/KOL recommendations enhance trust and engagement, while AI-driven interfaces and mobile payments optimize the shopping experience (Shui et al., 2025). Thus, social media user engagement is examined here as a pathway through which social media marketing exerts its influence.

This study defines online influencers as individuals with significant followings and expertise who create valuable content, leveraging credibility to influence followers' purchase decisions (Ki & Kim, 2019). Influencer marketing activates these individuals to shape audience attitudes and foster trust through interaction (Martínez-López et al., 2020). This study characterizes influencers through three dimensions: Source credibility or endorser credibility is a crucial factor in determining the persuasiveness of brand endorsements (Ao et al., 2023); Online influencers leverage their expertise to provide comprehensive product descriptions, enhancing the richness of product-related information, thereby strengthening trust in online shopping and reducing consumer risk (Chen, 2022); In influencer marketing, as influencers play roles similar to celebrities in brand endorsements, their credibility becomes a crucial determinant of the effectiveness of their endorsements (Lou & Kim, 2019). Consumers' behavioral control, emotion, and

attitude can encourage spontaneous purchases, stimulate purchase decisions, and increase consumer satisfaction (Wissen & Anatan, 2023).

Consumer purchase motivation is the intrinsic psychological driving force behind purchasing behavior. In the online cosmetics purchasing context-particularly in Shandong Province-consumers are often motivated by a combination of behavioral control, attitude, and emotion (Shimul et al., 2022; Widayat et al., 2023; Meng et al., 2021). These motivational factors are directly stimulated by social media marketing activities such as live streaming, personalized ads, and user-generated content. For example, when a consumer sees a Douyin video featuring a popular influencer using a foundation with a "flash sale" countdown, their emotional arousal increases, their perceived control over the purchase improves due to seamless mobile payment, and their overall attitude toward the product becomes positive. Thus, consumer purchase motivation is not merely a general psychological concept but a specific, actionable driver that mediates the effect of social media marketing on purchase decisions in Shandong's online cosmetics industry. This study therefore treats purchase motivation as a key mediating variable and explicitly links it to the online cosmetics purchasing environment.

Despite the growing body of literature on social media marketing and consumer behavior, several research gaps remain. First, limited empirical research has simultaneously examined the direct and indirect effects of social media marketing, user engagement, online influencers, and purchase motivation on consumer purchase decisions within a single integrated model, particularly in the context of China's online cosmetics industry. Second, while Shandong Province has emerged as a significant cosmetics production and consumption base in China, few studies have specifically investigated the online cosmetics purchasing behavior of Shandong consumers. Third, the mediating mechanisms through which social media marketing influences purchase decisions-particularly the comparative strength of different mediators- remain under-explored. Therefore, this study aims to fill these gaps by constructing and empirically testing a structural equation model that assesses both direct and mediated pathways, thereby providing a more comprehensive understanding of online cosmetics purchase decisions in Shandong, China.

Research objectives

1. To examine the direct effects of social media marketing, social media user engagement, online influencers, and consumer purchase motivation on consumer purchase decisions in the online cosmetics industry of Shandong Province, China.
2. To investigate the mediating roles of social media user engagement, online influencers, and consumer purchase motivation in the relationship between social media marketing and consumer purchase decisions within the online cosmetics industry of Shandong Province, China.
3. To develop an empirically validated model to enhance strategic marketing practices and consumer engagement within the online cosmetics industry of Shandong Province, China.

Conceptual framework

Based on existing literature, the conceptual framework of this study focuses on the factors influencing consumer purchase decisions in the cosmetics industry in Shandong, China. The research involves analyzing antecedent factors such as social media marketing, social media user engagement, online influencers, and consumer purchase motivation, and exploring their relationship with consumer purchase decisions. The

conceptual framework and the relationships between the latent variables of this study are presented in Figure 1. Therefore,

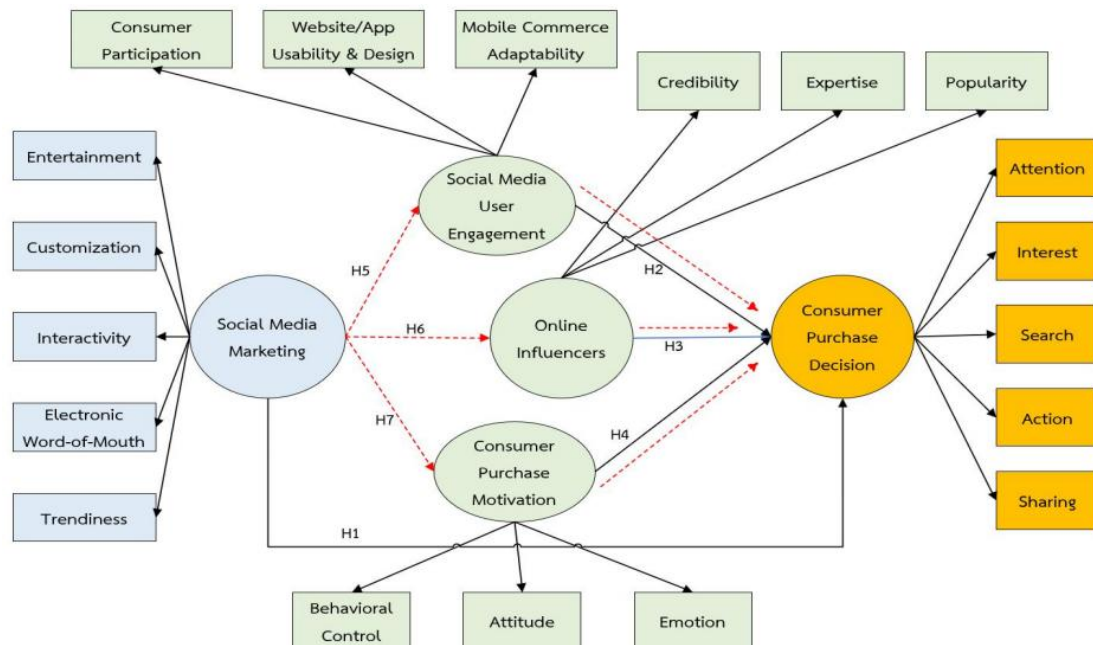


Figure 1 Conceptual Framework

Hypothesis 1: Social media marketing has a direct influence on consumer purchase decisions in the online cosmetics industry in Shandong Province, China.

Hypothesis 2: Social media user engagement has a direct influence on consumer purchase decisions in the online cosmetics industry in Shandong Province, China.

Hypothesis 3: Online influencers have a direct influence on consumer purchase decisions in the online cosmetics industry in Shandong Province, China.

Hypothesis 4: Consumer purchase motivation has a direct influence on consumer purchase decisions in the online cosmetics industry in Shandong Province, China.

Hypothesis 5: Social media user engagement mediates the relationship between social media marketing and consumer purchase decisions in the online cosmetics industry in Shandong Province, China.

Hypothesis 6: Online influencers mediate the relationship between social media marketing and consumer purchase decision in the online cosmetics industry in Shandong Province, China.

Hypothesis 7: Consumer purchase motivation mediates the relationship between social media marketing and consumer purchase decision in the online cosmetics industry in Shandong Province, China.

Research methodology

Population and sample

The quantitative phase targeted cosmetics consumers in Shandong Province, China, who had actually purchased cosmetics via social media platforms. The selection criteria for the target population were: (1) aged 18 years or above; (2) had purchased at least one cosmetic product through social media platforms within the past six months; (3) were able to recall and evaluate their purchase experience. The

survey focused on major platforms commonly used in the cosmetics purchasing funnel, such as Weibo, Xiaohongshu, Bilibili, and Douyin (Zhou & Salleh Hudin, 2025; Dudarenok, 2025). Because a complete sampling frame of eligible online cosmetics purchasers was not available, the study employed a purposive non-probability sampling approach with screening-based eligibility criteria to recruit qualified respondents. Specifically, purposive sampling was used to deliberately select individuals who met the above criteria and had active social media accounts, ensuring that only respondents with relevant purchasing experience were included. Sample size planning followed an empirical SEM guideline recommending 10-20 cases per observed variable (Schumacker & Lomax, 2016). With 19 observed variables, this rule-of-thumb indicates a minimum sample size of 380 cases (19 x 20). Because the proposed model includes mediated pathways and thus involves a more complex relational structure, additional guidance recommends using a larger sample in the range of 400-600 to support stable estimation and inference in SEM applications (Hair et al., 2019). To account for potential invalid questionnaires, incomplete responses, or low response rates that might prevent achieving the minimum 380 usable responses, the study inflated the target to 600 questionnaires. Accordingly, the study set a data-collection target of 600 completed questionnaires to ensure an adequate sample for the proposed SEM analysis. After screening and data quality checks, 502 questionnaires met the inclusion criteria and were retained for analysis. Thus, the valid response rate was 83.67%.

Research instrument and instrument quality

The study was designed as quantitative research, employing self-administered online and offline questionnaires as research instruments. The questionnaire, partially adapted from relevant theories and past literature, was segmented into five variables and used to collect primary data from the study sample.

The questionnaire consisted of six parts: demographic information, Social Media Marketing, Social Media User Engagement, Online Influencers, Consumer Purchase Motivation, and Consumer Purchase Decision. The questions asked respondents to indicate their level of agreement using a five-point Likert scale ranging from 1 = very dissatisfied to 5 = very satisfied.

We used the Rovinelli and Hambleton (1976) formula to calculate the Index of Item-Objective Congruence (IOC) values for the questionnaire. Based on feedback from three experts, the questionnaire was revised, reducing the number of questions from 100 to 94. Questions with scores below 0.5 were removed from the final questionnaire. This study employed a back-translation method to confirm the accuracy of the questionnaire's translation, evaluating translation quality by comparing the English version with the back-translated Chinese version (Brislin, 1970). The expert committee evaluated and approved the questionnaire's methodology, which was subsequently approved by the ethics committee on June 10, 2025. The reliability and convergent validity of the research instrument are reported in Table 3, which presents Cronbach's alpha, composite reliability (CR), and average variance extracted (AVE) for all constructs. All values exceeded the recommended thresholds (Cronbach's $\alpha > 0.70$, CR > 0.70, AVE > 0.50), indicating satisfactory internal consistency.

Data collecting

After obtaining approval from the ethics committee, the researcher collaborated with advisors to design, create, test, and maintain the questionnaire. The researcher distributed questionnaires to eligible participants both online and offline. Online distribution was conducted via the WeChat messaging platform

and the Douyin (TikTok) social media application, using the researchers' personal accounts as well as paid advertisements targeting Shandong Province. Offline distribution took place at cosmetics retail stores and university campuses in Jinan, Qingdao, Zibo, Zaozhuang, Dongying, Yantai, Weifang, Jining, Tai'an, Weihai, Rizhao, Linyi, Dezhou, Liaocheng, Binzhou, and Heze. This study employed a non-probability sampling method to collect data from participants, and the data collection lasted from March 2025 to April 2025 (two months), aiming to investigate the factors influencing consumer purchase decisions in the cosmetics industry in Shandong, China.

Data analysis

This study employed SmartPLS 4.0 for structural equation modeling (SEM) analysis. Descriptive statistics, including means, standard deviations, skewness, and kurtosis, were calculated to examine the distribution of the data. The reflective measurement model was assessed using outer loadings, Cronbach's alpha, composite reliability (CR), and average variance extracted (AVE). The structural model was evaluated through path coefficients (β), t-values, p-values, and R^2 values. Bootstrapping with 5,000 resamples was applied to test the significance of direct and indirect effects.

Research results

Table 1 provides an abbreviated list of the variables and their dimensions used in this study. The preliminary descriptive statistics and distributional characteristics of the observed variables are presented in Table 2, followed by the evaluation of the reflective measurement model in Table 3.

Table 1 Abbreviated list of variables and dimensions

Construct	Meaning	Item	Meaning
SMM	Social Media Marketing	ENT	Entertainment
		CUS	Customization
		INA	Interactivity
		EWOM	Electronic Word-of-Mouth
		TRE	Trendiness
SMUE	Social Media User Engagement	COP	Consumer Participation
		WUD	Website/App Usability & Design
		MCA	Mobile Commerce Adaptability
ONI	Online Influencers	CRE	Credibility
		EXP	Expertise
		POP	Popularity
CPM	Consumer Purchase Motivation	BRC	Behavioral Control
		ATI	Attitude
		EMO	Emotion
CPD	Consumer Purchase Decision in the Online Cosmetics Industry in Shandong Province, China.	ATE	Attention
		INR	Interest
		SEA	Search
		ACT	Action
		SHA	Sharing

Table 2 Preliminary Descriptive Statistics of Observed Variables

Variables	Min	Max	Skewness S.E.		Kurtosis		Mean	S.D.	C.V.%
			(Z)	S.E.	(Z)	S.E.			
ENT	1.6	5	-0.765	0.108	-0.232	0.215	3.672	0.828	22.55
CUS	1.6	5	-0.829	0.108	-0.065	0.215	3.714	0.81	21.81
INA	1.6	5	-0.71	0.108	-0.447	0.215	3.665	0.844	23.03
EWOM	1.6	5	-0.819	0.108	-0.313	0.215	3.676	0.841	22.88
TRE	1.6	5	-0.768	0.108	-0.308	0.215	3.705	0.809	21.84
COP	1.8	5	-0.762	0.108	-0.399	0.215	3.688	0.816	22.13
WUD	1.8	5	-0.66	0.108	-0.56	0.215	3.649	0.823	22.55
MCA	1.8	5	-0.684	0.108	-0.582	0.215	3.612	0.845	23.39
CRE	1.8	5	-0.886	0.108	-0.227	0.215	3.714	0.854	22.99
EXP	1.8	5	-0.72	0.108	-0.436	0.215	3.652	0.82	22.45
POP	1.8	5	-0.767	0.108	-0.367	0.215	3.706	0.834	22.50
BRC	1.8	5	-0.77	0.108	-0.369	0.215	3.667	0.828	22.58
ATI	1.8	5	-0.781	0.108	-0.339	0.215	3.681	0.818	22.22
EMO	1.57	5	-0.921	0.108	-0.218	0.215	3.581	0.872	24.35
ATE	1.6	5	-0.631	0.108	-0.61	0.215	3.583	0.894	24.95
INR	1.6	5	-0.672	0.108	-0.648	0.215	3.577	0.933	26.08
SEA	1.8	5	-0.611	0.108	-0.401	0.215	3.609	0.796	22.06
ACT	1.5	5	-0.711	0.108	-0.397	0.215	3.581	0.904	25.24
SHA	1.67	5	-0.608	0.108	-0.659	0.215	3.63	0.942	25.95

According to the results presented in Table 2, the preliminary distribution analysis indicates that the data for each variable approximately follow a normal distribution. The standardized skewness (Z-skew) values range from -0.921 to -0.608, and the standardized kurtosis (Z-kurtosis) values range from -0.659 to -0.065. These values are close to zero and fall within the acceptable threshold of -3 to +3, indicating that the variables exhibit no significant skewness or kurtosis issues. This meets the assumption of normality required for confirmatory factor analysis (CFA). In addition, the coefficients of variation (C.V.%) for all variables range from 21.81% to 26.08%, which is well below the commonly accepted threshold of 50%, suggesting that the data exhibit a reasonable degree of dispersion and a high level of consistency. In summary, the data demonstrate acceptable distribution characteristics and variability, making them suitable for subsequent structural equation modeling (SEM) analysis.

Table 3 Evaluation of the Reflective Measurement Model

Evaluation statistics	Outer Loading	Cronbach's Alpha	Composite Reliability	AVE
(Acceptable criteria)	(>0.70)	(>0.70)	(>0.60)	(> 0.50)
SMM		0.897	0.924	0.707
CUS	0.833			
ENT	0.844			
EWOM	0.856			
INA	0.837			
TRE	0.836			
SMUE		0.835	0.901	0.752
COP	0.855			
MCA	0.884			
WUD	0.863			
ONI		0.855	0.912	0.775
CRE	0.881			
EXP	0.829			
POP	0.868			
CPM		0.832	0.899	0.749
ATI	0.847			
BRC	0.857			
EMO	0.892			
CPD		0.896	0.923	0.706
ACT	0.857			
ATE	0.842			
INR	0.861			
SEA	0.821			
SHA	0.820			

Based on Table 3, the evaluation of the reflective measurement model for all primary and sub-latent variables in the model falls within acceptable criteria. Therefore, all observed variables are considered appropriate and reliable for use in the structural model for subsequent analysis.

Table 4 Path Coefficient Analysis (β Coefficients)

Relationship	Beta Value (β)	T statistics	P values
SMM -> CPD	0.236	3.771	0.000
SMUE -> CPD	0.138	2.362	0.018
ONI -> CPD	0.286	4.878	0.000
CPM -> CPD	0.305	5.559	0.000
SMM -> SMUE	0.724	25.742	0.000
SMM -> ONI	0.680	20.813	0.000
SMM -> CPM	0.716	24.008	0.000
SMM -> SMUE -> CPD	0.100	2.281	0.023
SMM -> ONI -> CPD	0.195	4.712	0.000
SMM -> CPM -> CPD	0.218	4.994	0.000

Based on Table 4, the path coefficients in the structural model show that the direct effects are statistically significant in the directions reported. Detailed explanations for each path are as follows:

1. Path from Social Media Marketing (SMM) to Consumer Purchase Decision in the online cosmetics industry in Shandong Province, China (CPD):

This path coefficient was 0.236, with a t-value of 3.771, exceeding the critical value of 2.58, and a p-value of 0.000. This indicates a positive, direct, and statistically significant relationship at the 0.01 level. This result is consistent with Hypothesis 1. The positive effect can be explained by the fact that social media marketing enhances brand visibility, provides entertaining and customized content, and fosters trust through interactivity and electronic word-of-mouth, all of which directly encourage consumers to make purchase decisions in the online cosmetics context (Chuah et al., 2023).

2. Path from Social Media User Engagement (SMUE) to Consumer Purchase Decision in the online cosmetics industry in Shandong Province, China (CPD):

This path coefficient was 0.138, with a t-value of 2.362, above the critical value of 1.96, and a p-value of 0.018. This indicates a positive, direct, and statistically significant relationship at the 0.05 level. This supports Hypothesis 2. The reason is that higher user engagement-such as active participation, seamless website/app usability, and mobile commerce adaptability-reduces cognitive effort and increases perceived control, leading to more favorable purchase decisions (Saoula et al., 2023; Ngo et al., 2025).

3. Path from Online Influencers (ONI) to Consumer Purchase Decision in the online cosmetics industry in Shandong Province, China (CPD):

This path coefficient was 0.286, with a t-value of 4.878, exceeding the critical value of 2.58, and a p-value of 0.000. This demonstrates a positive, direct, and statistically significant relationship at the 0.01 level. This is consistent with Hypothesis 3. Online influencers significantly contribute to purchase decisions because their credibility, expertise, and popularity reduce perceived risk and provide trustworthy product information, which is particularly important for experience-oriented products like cosmetics (Ao et al., 2023; Lou & Kim, 2019).

4. Path from Consumer Purchase Motivation (CPM) to Consumer Purchase Decision in the online cosmetics industry in Shandong Province, China (CPD):

This path coefficient was 0.305, with a t-value of 5.559, exceeding the critical value of 2.58, and a p-value of 0.000. This reflects a positive, direct, and statistically significant relationship at the 0.01 level. This supports Hypothesis 4. The strong effect occurs because purchase motivation-comprising behavioral control, positive attitude, and emotional arousal-directly drives consumers' intention to act. In the online cosmetics setting, convenient payment, favorable product reviews, and emotionally appealing content activate this motivation, leading to purchase decisions (Shimul et al., 2022; Meng et al., 2021).

Three indirect-effect paths were statistically significant. The details of each indirect path are presented below:

5. Path from Social Media Marketing (SMM) to Consumer Purchase Decision in the online cosmetics industry in Shandong Province, China (CPD), via Social Media User Engagement (SMUE):

This indirect path coefficient was 0.100, with a t-value of 2.281, exceeding the critical value of 1.96, and a p-value of 0.023. This supports Hypothesis 5. The mediation occurs because social media marketing first stimulates user engagement (e.g., participation and platform usability), which then transforms into purchase decisions. Without engagement, the effect of marketing stimuli remains superficial.

6. Path from Social Media Marketing (SMM) to Consumer Purchase Decision in the online cosmetics industry in Shandong Province, China (CPD), via Online Influencers (ONI):

This indirect path coefficient was 0.195, with a t-value of 4.712, exceeding the critical value of 2.58, and a p-value of 0.000. This supports Hypothesis 6. Online influencers serve as a credible intermediary: social media marketing strategies enhance influencer credibility and expertise, which in turn shape consumer purchase decisions, especially in the cosmetics industry where peer recommendations matter.

7. Path from Social Media Marketing (SMM) to Consumer Purchase Decision in the online cosmetics industry in Shandong Province, China (CPD), via Consumer Purchase Motivation (CPM):

This indirect path coefficient was 0.218, with a t-value of 4.994, exceeding the critical value of 2.58, and a p-value of 0.000. This supports Hypothesis 7. Purchase motivation acts as a psychological mechanism: social media marketing triggers consumers' behavioral control, attitude, and emotion, and these motivational states subsequently lead to purchase decisions. This indirect path had the largest coefficient among the three mediators, highlighting the central role of consumer motivation.

In summary, all seven hypotheses (H1–H7) are supported by the data, with direct and indirect effects all statistically significant and in the expected positive direction.

Table 5 Discriminant Validity Assessment Using Heterotrait-Monotrait Ratio of Correlations (HTMT)

	SMM	SMUE	ONI	CPM	CPD
SMUE	0.835				
ONI	0.777	0.767			
CPM	0.826	0.842	0.785		
CPD	0.835	0.818	0.843	0.879	

The HTMT correlation ratio test was conducted to assess discriminant validity by performing pairwise comparisons among latent variables. The criterion for adequate discriminant validity is that the HTMT ratio values must be below 0.90. Values exceeding 0.90 indicate a lack of discriminant validity. Based

on Table 5, all HTMT values were between 0.767 and 0.879, below the 0.90 threshold, confirming discriminant validity. The highest value was 0.879 (CPD & CPM). Other values include SMM-CPM (0.826), SMM-SMUE (0.835), CPD-SMM (0.835), CPM-SMUE (0.842), and ONI with others (0.767–0.843). The reflective measurement model confirmed that all five constructs (SMM, SMUE, ONI, CPM, CPD) had acceptable reliability and validity, supporting structural model analysis.

Table 6 Structural Model Fit Assessment

Fit Index	Value	Interpretation
SRMR	0.042	Acceptable (Below 0.10)
NFI	0.900	Acceptable (Above 0.80)

The evaluation of structural model fit was conducted using two key indices: The Standardized Root Mean Square Residual (SRMR), where a value below 0.10 indicates acceptable model fit. The Normed Fit Index (NFI), where a value above 0.80 is considered acceptable.

Based on Table 6, the structural model demonstrates a good fit. The Standardized Root Mean Square Residual (SRMR) is 0.042, which is below the acceptable threshold of 0.10, indicating low discrepancy between the observed and predicted correlations. The Normed Fit Index (NFI) is 0.900, exceeding the acceptable benchmark of 0.80, suggesting strong model fit. Therefore, the structural model is well-aligned with the empirical data.

Table 7 R-Square (R^2) and Adjusted R-Square Values

	R-square	R-square adjusted
SMUE	0.524	0.523
ONI	0.463	0.462
CPM	0.513	0.512
CPD	0.718	0.715

The coefficient of determination R^2 measures the variance explained in endogenous constructs. According to Hair et al. (2019), R^2 values of 0.02, 0.13, and ≥ 0.26 are considered low, moderate, and high, respectively. As shown in Table 6, Social Media User Engagement ($R^2 = 0.524$), Online Influencers ($R^2 = 0.463$), and Consumer Purchase Motivation ($R^2 = 0.513$) all indicate high predictive accuracy, with Social Media Marketing showing strong explanatory power for each. Furthermore, Consumer Purchase Decision ($R^2 = 0.718$) indicates that SMM, SMUE, ONI, and CPM together explain a substantial proportion of its variance.

Table 8 Summary of Hypothesis Testing Results

Hypothesis	Result
Hypothesis 1: Social media marketing has a direct influence on consumer purchase decisions in the online cosmetics industry in Shandong Province, China.	Accepted
Hypothesis 2: Social media user engagement has a direct influence on consumer purchase decisions in the online cosmetics industry in Shandong Province, China.	Accepted
Hypothesis 3: Online influencers have a direct influence on consumer purchase decisions in the online cosmetics industry in Shandong Province, China.	Accepted
Hypothesis 4: Consumer purchase motivation has a direct influence on consumer purchase decisions in the online cosmetics industry in Shandong Province, China.	Accepted
Hypothesis 5: Social media user engagement has a mediating effect on social media marketing and consumer purchase decision in the online cosmetics industry of Shandong, China.	Accepted
Hypothesis 6: Online influencers have a mediating effect on social media marketing and consumer purchase decision in the online cosmetics industry in Shandong Province, China.	Accepted
Hypothesis 7: Consumer purchase motivation has a mediating effect on social media marketing and consumer purchase decision in the online cosmetics industry in Shandong Province, China.	Accepted

Conclusion and discussion

The structural equation model (SEM) specification clearly distinguishes exogenous, mediating, and endogenous latent variables, with each operationalized through observed indicators, thereby strengthening construct clarity and model interpretability. The model designates Social Media Marketing (SMM) as the primary exogenous construct, measured through five dimensions: Entertainment, Customization, Interactivity, Electronic Word-of-Mouth, and Trendiness. It incorporates three mediating variables: Social Media User Engagement (measured through Consumer Participation, Website and App Usability and Design, and Mobile Commerce Adaptability), Online Influencers (measured through Credibility, Expertise, and Popularity), and Consumer Purchase Motivation (measured through Behavioral Control, Attitude, and Emotion). Consumer Purchase Decision (CPD) is specified as the endogenous outcome variable, modeled as an AISAS-based behavioral pathway comprising Attention, Interest, Search, Action, and Sharing.

The structural model explained 71.8% of the variance in consumer purchase decisions ($R^2 = 0.718$), indicating a moderate to high explanatory power. This suggests that the four antecedent variables-social media marketing, user engagement, online influencers, and purchase motivation-collectively account for more than half of the changes in consumers' purchase decisions in Shandong's online cosmetics market. The findings confirm that social media marketing exerts a significant positive direct effect on consumer purchase decisions, aligning closely with prior empirical research emphasizing the beneficial role of social media marketing in visually-driven and experience-oriented sectors such as the cosmetics industry. For instance, [Chuah et al. \(2023\)](#) highlighted the substantial impact of social media marketing activities on online purchase decisions in the cosmetics sector, a dynamic similarly observed in the Shandong market. However, path analysis reveals a more nuanced structural reality: although the direct effect is statistically significant, its magnitude is not the strongest among the antecedents examined. This indicates that within Shandong's

highly interactive digital cosmetics ecosystem (encompassing platforms such as Douyin and Xiaohongshu), social media marketing functions primarily as a foundational enabler and initial stimulus, maximizing its total effect through subsequent mediating pathways.

Specifically, all three mediation hypotheses are supported. First, the indirect effect via social media user engagement is positive and statistically significant. Consistent with prior research, this pattern suggests that social media marketing in the cosmetics industry achieves its greatest efficacy when it first activates engagement behaviors that carry consumers from exposure toward evaluation and purchase-related actions. [Shui et al. \(2025\)](#) similarly demonstrated the contribution of social media marketing to consumer engagement and brand-related outcomes, providing justification for interpreting engagement as a key transmission mechanism.

Second, in congruence with prior studies, [Lou and Kim \(2019\)](#) emphasize that influencer streamers' source characteristics shape consumer purchase decisions, which is directly relevant to the mediator logic tested herein. In the context of online cosmetics purchasing, online influencers affect decisions through several mechanisms: (1) credibility: consumers perceive influencers as more trustworthy than traditional advertisements; (2) expertise- influencers provide detailed product knowledge, ingredient analysis, and usage tutorials, reducing information asymmetry; (3) product reviews and demonstrations- authentic before-and-after videos or live try-ons build confidence; and (4) parasocial relationships- repeated interactions foster emotional bonds, making followers more receptive to purchase recommendations ([Martínez-López et al., 2020](#); [Ao et al., 2023](#)). The mediation hypothesis involving online influencers is supported in this study.

Third, consistent with prior studies, [Wissen and Anatan \(2023\)](#) emphasize that consumer purchase motivation influences consumer purchase decisions, which is directly relevant to the mediator logic tested herein. Specifically, in the online cosmetics purchasing environment, purchase motivation is triggered by: (1) emotion - visually appealing short videos, limited-time discounts, or celebrity endorsements evoke excitement and impulse buying; (2) beauty needs and confidence - consumers are motivated by the desire to enhance appearance or solve skin concerns, which cosmetic products promise to address; (3) purchase convenience - seamless mobile payment, fast delivery, and easy returns reduce friction; and (4) motivation stimulated by online content - user-generated reviews, influencer tutorials, and interactive live streams activate both hedonic and utilitarian drives ([Shimul et al., 2022](#); [Meng et al., 2021](#)). The mediation hypothesis involving consumer purchase motivation is supported in this study.

In summary, the indirect effects via social media user engagement, online influencers, and consumer purchase motivation are all positive and statistically significant, indicating that these three variables serve important partial mediating roles within the structural model. Among the three mediators, consumer purchase motivation (CPM) had the largest indirect effect ($\beta = 0.218$, $p < 0.001$), followed by online influencers (ONI, $\beta = 0.195$) and social media user engagement (SMUE, $\beta = 0.100$). This suggests that directly stimulating consumers' internal motivation (behavioral control, attitude, and emotion) is the most powerful pathway through which social media marketing influences purchase decisions in the online cosmetics industry.

For marketing strategy, this finding implies that cosmetics brands should prioritize content and features that activate purchase motivation, such as emotionally engaging storytelling, limited-time offers, and personalized product recommendations that enhance perceived control and positive attitudes. While

user engagement and influencer collaborations remain important, the strongest return on investment may come from motivational campaigns that directly appeal to consumers' desires and emotions.

Recommendations

Academic Contribution

This study makes several theoretical contributions. First, it extends the application of the AISAS model and the Stimulus-Organism-Response framework to the online cosmetics context by empirically validating that social media marketing (SMM) influences consumer purchase decisions both directly and indirectly through three mediators: social media user engagement (SMUE), online influencers (ONI), and consumer purchase motivation (CPM). Second, the study identifies the relative strength of these mediating pathways: consumer purchase motivation was found to be the strongest mediator ($\beta = 0.218$), followed by online influencers ($\beta = 0.195$) and social media user engagement ($\beta = 0.100$). This hierarchical mediation structure provides a refined theoretical understanding of how SMM converts into purchase decisions in a digitally mature market like Shandong, China. Third, the study offers a validated structural equation model with good explanatory power ($R^2 = 0.718$ for CPD), which can serve as a reference framework for future research on online consumer behavior in emerging economy contexts.

Practical Contribution

Based on the findings, the following practical recommendations are proposed for cosmetics brands and e-commerce platforms operating in Shandong's online cosmetics industry:

Social media marketing: Optimize strategies to integrate entertainment, customization, and interactivity; utilize short videos, live streaming, and personalized recommendations to enhance user experience and conversion rates; encourage user-generated content to build trust.

Social media user engagement: Improve platform design by incorporating AR/VR try-on features and seamless payment systems to boost adaptability; cultivate community sense and brand loyalty through interactive activities such as live Q&A sessions and reward programs.

Online influencers: Collaborate with credible KOLs (Key Opinion Leaders) and KOCs (Key Opinion Consumers) to create authentic content, emphasizing product expertise, honest reviews, and relatable demonstrations to strengthen consumer trust.

Consumer purchase motivation: Develop comprehensive motivational campaigns that address behavioral control (e.g., easy returns, multiple payment options), attitude (e.g., positive reviews, educational content about product benefits), and emotion (e.g., storytelling, limited-time offers, celebratory events).

Recommendation for future research

While this study provides robust empirical evidence, it has several limitations that suggest directions for future research, all contextualized within Shandong Province and China's online cosmetics industry:

Emerging technology integration - This study did not examine the impact of AI-driven recommendations, AR virtual try-ons, or blockchain traceability on consumer decisions. Future research should explore how these technologies, which are increasingly adopted by Shandong-based cosmetics platforms (e.g., Douyin's AI algorithms, Xiaohongshu's AR filters), influence consumer trust and purchase behavior. This recommendation stems from the finding that user engagement (especially mobile

commerce adaptability) was a significant but weaker mediator, suggesting that technological enhancements could strengthen this pathway.

Expanded moderating and mediating variables - The current model explained 71.8% of variance in purchase decisions, leaving room for additional factors. Future research should examine moderators such as demographic characteristics (age, income, urban vs. rural location within Shandong), cultural values (e.g., collectivism, face consciousness), and brand loyalty. Mediators like perceived value, trust, and social influence could also be integrated. This is justified by the partial mediation observed, indicating that other unmeasured mechanisms exist.

Consumer segmentation - This study used a broad sample of Shandong consumers. Future research should analyze generational cohorts (Gen Z, millennials) and involvement levels (high vs. low involvement buyers) separately, as their responses to social media marketing may differ. For example, younger consumers in Shandong's coastal cities (Qingdao, Yantai) might be more influenced by trendy short videos, while older consumers in inland cities (Linyi, Heze) may rely more on trusted influencers. This recommendation arises from the substantial direct effect of online influencers, which may vary by consumer segment.

Sustainability and ethical consumption - Green marketing and willingness to pay a premium for sustainable cosmetics were not addressed. Given China's national "carbon neutrality" goals and increasing environmental awareness among Shandong consumers (especially in urban centers like Jinan and Qingdao), future research should investigate how sustainability claims in social media marketing affect purchase motivation and decisions. This direction extends from the finding that purchase motivation is the strongest mediator, suggesting that appeals to ethical values could be a powerful motivational trigger.

These future research directions will deepen understanding of consumer purchase decisions in Shandong's online cosmetics industry and help refine the theoretical model proposed in this study.

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