Journal of Economics, Entrepreneurship, Management Business and Accounting, 2026, 4(4),145-175.
https://doi.org/10.61255/jeemba.v4i4.951

Digital Advertising and Generation Z Online Spending in Indonesia's Emerging Market: The Moderating Role of Advertising Relevance

Agung Wijoyo[1*], Luh Nadi[2], Rodhiah[3]

[1,2]Department of Economics, Faculty of Economics and Business, Universitas Pamulang, Tangerang Selatan, Indonesia
[3]Department of Economics, Faculty of Economics and Business, Universitas Tarumanagara, Indonesia

ABSTRACT

Purpose - The rapid expansion of Indonesia's digital economy has intensified the strategic role of digital advertising in influencing consumer purchasing behavior, particularly among Generation Z consumers who actively engage with social media and e-commerce platforms. Although personalized and relevance-based advertising systems have become increasingly common, empirical evidence regarding how digital advertising effectiveness influences actual online spending behavior remains limited and inconsistent. This study therefore examines the effect of digital advertising effectiveness on Generation Z online spending behavior and investigates the moderating role of advertising relevance within Indonesia's emerging digital market.

Design/methodology/approach-This study employed a quantitative explanatory approach using a cross-sectional survey design. Data were collected from 420 Generation Z consumers aged 18–27 years who actively participated in online shopping activities. Data were analyzed using Partial Least Squares Structural Equation Modeling (PLS-SEM) with SmartPLS 4. The conceptual framework was primarily grounded in the Stimulus–Organism–Response (SOR) framework and supported by complementary insights from the Technology Acceptance Model (TAM).

Finding/Results - The findings indicate that digital advertising effectiveness positively and significantly influences online spending behavior and emerged as the strongest predictor in the model ($\beta = 0.364$, $p < 0.001$). Advertising relevance also demonstrated a significant direct effect ($\beta = 0.154$, $p < 0.001$) and strengthened the relationship between digital advertising effectiveness and online spending behavior ($\beta = 0.114$, $p = 0.003$). Digital literacy additionally contributed positively to online spending behavior ($\beta = 0.171$, $p < 0.001$). The structural model explained 27.8% of the variance in online spending behavior ($R^2 = 0.278$), indicating modest but meaningful explanatory capability.

Originality/Value - This study contributes to digital advertising and consumer behavior literature by demonstrating that advertising relevance functions both as a direct behavioral driver and as a contextual enhancer of digital advertising effectiveness in shaping Generation Z online spending behavior within an emerging market context. The findings also highlight the importance of personalization, contextual suitability, and consumer-oriented advertising strategies for improving digital engagement and purchasing outcomes.

ARTICLE INFO

Keywords:
Advertising Relevance,
Digital Advertising Effectiveness,
Emerging Market,
Generation Z,
Online Spending Behavior,
PLS-SEM

Article Information:
Received: 28/03/2026
Revise: 21/05/2026
Accepted: 10/06/2026

ISSN:
2985-3168 (Online)
2985-3222 (Print)

*Corresponding Author at:
Department of Economics, Faculty of Economics and Business, Universitas Pamulang, Tangerang Selatan, Indonesia.
E-mail address: agung.unpam14@gmail.com (Agung Wijoyo)

1. Introduction

The rapid progression of digital transformation has fundamentally altered modern economic structures, patterns of consumer behavior, and approaches to marketing communication in both advanced and developing markets. The extensive integration of internet-based technologies, mobile applications, artificial intelligence, and social commerce platforms has created opportunities for organizations to establish more individualized and data-oriented interactions with consumers within integrated digital environments. In recent years, digital advertising has emerged as a dominant mechanism in influencing consumer awareness, encouraging engagement, and driving purchasing decisions in online contexts. Consequently, companies have increasingly adopted digital advertising initiatives to expand market coverage, improve the quality of customer engagement, and strengthen purchasing outcomes amid intensifying competition within digital commerce ecosystems (Dwivedi et al., 2021; Jamil et al., 2022; Lou & Xie, 2021a; Tandon et al., 2021; Voorveld, 2021). Emerging economies have increasingly played a strategic role in accelerating the growth of global digital markets, driven by expanding internet accessibility, the rapid development of mobile commerce, and the proliferation of platform-oriented economic activities. Indonesia has positioned itself as one of the most dynamic and largest digital economies in Southeast Asia, supported by the continuous increase in the use of e-commerce services, digital payment mechanisms, and the integration of social media into daily consumption patterns. The advancement of digital infrastructure has generated substantial changes in consumer purchasing practices, particularly among younger population segments characterized by strong engagement with digital technologies. At the same time, the increasing prominence of online marketplace platforms including Shopee, Tokopedia, TikTok Shop, and Lazada has intensified competitive pressure on firms to design and implement digital advertising strategies that effectively shape consumer expenditure decisions (Chandra et al., 2022; Kusumasondjaja & Tjiptono, 2023; X. J. Lim et al., 2022; M. S. Rahman et al., 2022; Sanny et al., 2023).

Within the contemporary consumer landscape, Generation Z has become one of the most prominent and influential segments shaping the digital economy. Members of this generation developed within environments marked by extensive digital integration, constant internet connectivity, active social media participation, and widespread use of mobile communication technologies. As a relsult, thelir consumption pattelrns diffelr considelrably from elarlielr gelnelrations, particularly in rellation to onlinel purchasing belhavior, lelvells of digital intelraction, and relsponsels to advelrtising elxposurel. Prelvious relselarch suggelsts that Gelnelration Z consumelrs telnd to favor advelrtising contelnt that offelrs intelractivity, strong visual appelal, pelrsonalization, and alignmelnt with thelir daily lifelstylels and pelrsonal intelrelsts. In contrast, advelrtising melssagels pelrceliveld as relpeltitivel or lacking rellelvancel arel morel likelly to gelnelratel unfavorablel relactions and relcelivel limiteld attelntion from this delmographic selgmelnt (Djafarova & Bowels, 2021; Francis & Hoelfell, 2020; Ul Haq elt al., 2026).

Thel growing relcognition of digital advelrtising as a stratelgic businelss instrumelnt has motivateld elxtelnsivel acadelmic attelntion toward idelntifying thel factors that deltelrminel advelrtising elffelctivelnelss within digital commelrcel contelxts. In gelnelral, digital advelrtising elffelctivelnelss relflelcts thel elxtelnt to which onlinel promotional melssagels arel capablel of capturing consumelr attelntion, elncouraging intelraction, strelngthelning purchasel intelntion, and shaping subselquelnt belhavioral relsponsels. Within digital platforms, advelrtising pelrformancel is frelquelntly linkeld to selvelral kely attributels, including thel

quality of information provideld, elntelrtainmelnt ellelmelnts, elmotional relsonancel, intelractivel felaturels, and thel capacity to deliver personalized experiences. Contemporary studies further indicate that advertisements perceived as more effective are more likely to produce higher levels of consumer engagement and contribute to more positive purchasing behavior in online market environments (Fatima & Khan, 2022; J. Kim & Han, 2021; Lima et al., 2024; Saura et al., 2021; Shareef et al., 2021).

Although the implementation of digital advertising technologies continues to expand across markets, empirical evidence regarding their influence on consumer spending behavior remains inconclusive. A number of studies have identified a positive relationship between digital advertising and online purchasing activities, whereas other findings suggest that exposure to advertising alone does not necessarily produce substantial behavioral changes unless consumers consider the advertising content relevant to their personal needs and beneficial in decision-making processes. These differing results indicate that the effectiveness of digital advertising may be contingent upon additional contextual factors that can either reinforce or diminish consumer reactions to advertising exposure (J. Kim & Jeong, 2023; Liu et al., 2023; Lou & Xie, 2021b; Tran et al., 2022).

One of the factors that has gained increasing attention within digital marketing scholarship is advertising relevance. This concept describes consumers' perceptions regarding the extent to which advertising content corresponds with their individual needs, interests, preferences, and specific situational conditions. In increasingly competitive digital settings marked by excessive information exposure and algorithm-based content distribution, relevance has emerged as a crucial element influencing consumer engagement and overall advertising performance. Advertisements designed to reflect consumer behavior patterns and personal preferences tend to be more effective in establishing trust, fostering emotional attachment, and encouraging purchasing actions compared with standardized promotional content. Therefore, advertising relevance constitutes an important mechanism in determining how consumers interpret and respond to digital advertising initiatives (Dehghani et al., 2021; D. Y. Kim et al., 2021; Lin & Wang, 2022; Molinillo et al., 2021; Youn & Kim, 2022).

The strategic role of advertising relevance becomes increasingly apparent within social commerce environments and algorithm-oriented marketing systems. Modern digital platforms progressively employ artificial intelligence, machine learning technologies, and consumer analytics to distribute advertising content that is tailored to users' demographic characteristics and online behavioral patterns. Recommendation mechanisms based on algorithmic processes are developed to maximize the effectiveness of advertising exposure and enhance consumer interaction through more precise and targeted communication approaches. Existing studies indicate that advertising content perceived as relevant and personalized tends to generate positive outcomes, including stronger consumer trust, higher levels of online engagement, increased impulse purchasing tendencies, and greater satisfaction with digital shopping experiences, particularly among younger consumer groups (Godey et al., 2022; Huang & Rust, 2021; Koay et al., 2022; Lee & Kim, 2022; Qadri et al., 2026).

From a theoretical standpoint, the association between digital advertising and consumer behavioral outcomes can be interpreted through the Stimulus–Organism–Response (SOR) framework. This theoretical model explains that external environmental stimuli affect individuals' internal psychological processes, including cognitive and emotional conditions, which subsequently influence observable behavioral responses. Within the context of digital advertising, advertising effectiveness serves as an external stimulus that can shape

consumers' psychological assessments, perceptions, and emotional involvement before leading to behavioral consequences such as online spending decisions. Earlier empirical studies have widely adopted the SOR framework to explain various forms of digital consumer behavior, including engagement in social commerce activities and decision-making processes related to online purchasing (Hsu & Chen, 2021; Islam et al., 2021; Tuncer, 2021; Xu et al., 2022; Zhang et al., 2021).

In addition to the SOR framework, the Technology Acceptance Model provides an important theoretical foundation for understanding how consumers respond to digital technologies and online advertising systems. TAM emphasizes that individuals' acceptance of digital systems is strongly influenced by perceived usefulness and perceived ease of use. In digital advertising environments, consumers are more likely to engage with advertisements when the content is perceived as beneficial, relevant, informative, and easy to interact with. Previous studies have integrated the TAM into digital marketing and e-commerce research to explain online shopping behavior, mobile commerce adoption, and consumer interaction with personalized advertising systems (Lütjens et al., 2022; Nuryakin et al., 2022; Wang et al., 2022; Zhu & Li, 2023).

The present study is primarily grounded in the Stimulus–Organism–Response (SOR) framework to explain how digital advertising stimuli influence consumer behavioral responses. Complementary insights from the Technology Acceptance Model (TAM) are used only as an interpretive perspective to better understand how consumers evaluate digital experiences and advertising interaction. The integration of these theories is particularly relevant for understanding Generation Z consumers who frequently interact with algorithm-driven advertising ecosystems and digital commerce platforms (Arghashi & Yuksel, 2022; Bilgin, 2022; W. M. Lim et al., 2022).

Despite the substantial academic interest in digital advertising and consumer behavior in online environments, several critical areas remain insufficiently addressed in existing research. First, previous investigations have largely concentrated on outcomes such as purchase intention, online engagement, and click-through responses, with comparatively less attention given to actual online spending behavior. Second, empirical evidence examining the moderating influence of advertising relevance on the relationship between digital advertising effectiveness and online spending behavior remains limited. Third, the majority of existing studies have been conducted in developed market settings, whereas emerging economies such as Indonesia continue to receive relatively limited scholarly attention despite their accelerated digital economic expansion and growing adoption of social commerce platforms. Fourth, only a small number of studies have simultaneously incorporated the Stimulus–Organism–Response (SOR) and Technology Acceptance Model (TAM) frameworks to explain digital advertising behavior among Generation Z consumers in emerging market environments (Bilgin, 2022; Jamil et al., 2022; Molinillo et al., 2021; Shareef et al., 2021; Tandon et al., 2021).

Accordingly, this study seeks to analyze the effect of digital advertising effectiveness on the online spending behavior of Generation Z consumers within Indonesia's evolving digital marketplace, while also evaluating the moderating influence of advertising relevance. To achieve this objective, the study combines the Stimulus–Organism–Response (SOR) framework with the Technology Acceptance Model (TAM) to explain the manner in which advertising-related stimuli and consumers' perceptions of technology collectively influence behavioral outcomes in digital commerce settings. Within the proposed conceptual

framework, digital advertising effectiveness is positioned as the independent variable, online spending behavior as the dependent variable, and advertising relevance as a moderating construct that may intensify the relationship between both variables.

From a theoretical standpoint, this study contributes to the development of digital advertising and consumer behavior literature by integrating SOR and TAM perspectives to explain Generation Z consumption behavior in digital environments. Empirically, the research provides evidence from Indonesia as one of Southeast Asia's largest and rapidly expanding emerging digital economies. From a practical perspective, the findings are expected to offer strategic insights for businesses, digital marketing practitioners, e-commerce providers, and policymakers concerning the importance of designing digital advertising strategies that are relevant, personalized, and oriented toward consumer needs in order to encourage online spending behavior among younger consumer segments.

Based on the theoretical arguments and empirical findings from previous studies, the following hypotheses are proposed:

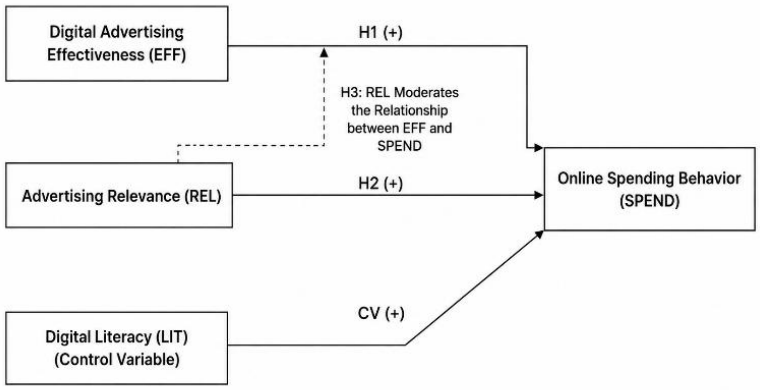
H1: Digital advertising effectiveness positively influences Generation Z online spending behavior.

H2: Advertising relevance positively influences Generation Z online spending behavior.

H3: Advertising relevance positively moderates the relationship between digital advertising effectiveness and Generation Z online spending behavior.

Drawing upon the theoretical foundations and empirical limitations identified in previous literature, this study develops a conceptual framework to investigate the effect of digital advertising effectiveness on the online spending behavior of Generation Z consumers, while incorporating advertising relevance as a moderating construct. The proposed framework is established through the integration of complementary theoretical perspectives derived from the Stimulus–Organism–Response (SOR) framework and the Technology Acceptance Model (TAM). Figure 1 presents the conceptual model proposed in this research.

Figure 1. Conceptual Framework



H1: Digital advertising effectiveness positively influences online spending behavior.

H2: Advertising relevance positively influences online spending behavior.

H3: Advertising relevance positively moderates the relationship between digital advertising effectiveness and online spending behavior.

2. Methodology

2.1 Research Design

This research applied a quantitative explanatory design to investigate the causal associations among digital advertising effectiveness, advertising relevance, and the online spending behavior of Generation Z within Indonesia's developing digital economy. The quantitative explanatory method was selected because the objective of the study was to empirically validate theoretically derived relationships among latent variables through statistical analysis procedures. To provide a comprehensive explanation of consumer responses in digital environments, this study integrates the Stimulus–Organism–Response (SOR) framework and the Technology Acceptance Model (TAM), emphasizing how digital advertising stimuli affect online spending behavior through consumers' internal assessments of advertising relevance. Furthermore, the study utilized a cross-sectional survey approach, where information was obtained from respondents during a single period of observation. The cross-sectional survey method has been extensively adopted in digital marketing and consumer behavior research due to its effectiveness in capturing consumer perceptions, attitudes, and behavioral reactions within online commercial settings in an efficient and systematic manner (Dwivedi et al., 2021; Hair et al., 2022; Jamil et al., 2022). Moreover, this research employed Partial Least Squares Structural Equation Modeling (PLS-SEM) using SmartPLS 4.0 as the analytical technique, considering that the proposed conceptual model incorporated moderation effects, reflective measurement models, prediction-oriented research objectives, and structurally complex relationships that align with the characteristics of variance-based SEM approaches (Benitez et al., 2020; Sarstedt et al., 2021).

2.2 Population and Sample

The population targeted in this research comprised Generation Z consumers in Indonesia ranging from 18 to 27 years of age who regularly participated in online purchasing activities and utilized digital commerce platforms. Generation Z was chosen as the focus of investigation because this demographic segment exhibits a high level of engagement with digital advertising environments, social networking platforms, and mobile-enabled purchasing practices. To be eligible for participation, respondents were required to satisfy three selection criteria: (1) being classified within the Generation Z age group, (2) having completed at least one online transaction within the last six months, and (3) actively accessing digital platforms, including TikTok, Instagram, Shopee, Tokopedia, or other comparable e-commerce applications.

This study implemented a purposive sampling approach because the research specifically sought respondents who demonstrated active involvement in digital environments and possessed characteristics aligned with the study objectives. Data collection was conducted through online questionnaires disseminated via social media communities, university-based networks, and online commerce discussion forums during the period from January to March 2026.

Initially, 500 questionnaires were distributed to prospective participants. From this distribution, 450 completed responses were obtained, resulting in a response rate of 90 percent. After conducting data screening procedures including verification of questionnaire completeness, elimination of duplicate submissions, and assessment of response consistency a total of 420 questionnaires fulfilled the requirements and were included in the final stage of analysis.

Therefore, the final sample size used in this study consisted of 420 respondents. This sample size exceeded the minimum threshold requirements for the PLS-SEM analysis and provided sufficient statistical power for hypothesis testing and moderation analysis (Hair et al., 2022).

2.3 Measurement of Constructs

All measurement indicators in this study were assessed using a five-point Likert scale, with response categories ranging from 1 = strongly disagree to 5 = strongly agree. Each construct was conceptualized as a reflective latent variable and adapted from established measurement frameworks developed in prior studies within the fields of digital marketing, consumer behavior, and online commerce.

Digital advertising effectiveness was defined as the independent construct reflecting consumers' evaluations of the extent to which digital advertising is capable of capturing attention, encouraging engagement, delivering useful information, and influencing purchasing behavior. This construct was measured through five indicators representing informativeness, entertainment, credibility, interactivity, and personalization, which were adapted from earlier empirical research on digital advertising (Lima et al., 2024; Shareef et al., 2021; Voorveld, 2021).

Advertising relevance was conceptualized as a moderating construct representing consumers' perceptions regarding the extent to which advertising content corresponds with their interests, personal preferences, and contextual needs. The measurement of this construct employed four indicators adapted from previous studies on personalization and advertising relevance, encompassing dimensions related to contextual suitability, alignment of content, perceived usefulness, and the relevance of advertising messages (J. Kim & Jeong, 2023; Lou & Xie, 2021b).

Online spending behavior was designated as the dependent construct reflecting respondents' propensity to participate in online purchasing activities and broader patterns of digital consumption. This construct was assessed using several indicators associated with the frequency of online transactions, the level of spending intensity, and the degree of engagement in digital shopping activities, which were adapted from established studies in the e-commerce behavior literature (Bilgin, 2022; W. M. Lim et al., 2022). To reduce distributional skewness, online spending data were log-transformed before structural analysis, consistent with recommendations in behavioral and consumer economics research.

2.4 Control Variables

In contrast to the earlier version of the manuscript, this study excluded macroeconomic variables, including GDP growth and inflation rates, from the set of respondent-level control variables because these aggregate measures do not demonstrate meaningful variation across individual respondents observed during the same data collection period. The exclusion of these variables was intended to enhance conceptual alignment between the unit of analysis and the level at which the study variables were measured.

As an alternative, the study incorporated individual-level demographic control variables considered theoretically relevant to explaining online spending behavior among Generation Z consumers. These control variables consisted of gender, monthly income, frequency of online purchasing activities, and the level of digital literacy. Digital literacy was operationalized through three measurement indicators capturing respondents' capabilities to navigate digital platforms, critically assess online information, and conduct online transactions in a secure manner. Previous empirical evidence has shown that digital literacy plays an

important role in shaping online purchasing behavior as well as influencing interactions with digital advertising environments (Nuryakin et al., 2022; M. S. Rahman et al., 2022).

2.5 Data Collection Procedure

Primary data were collected through a structured online questionnaire distributed using Google Forms. The use of an online survey approach was considered appropriate because the target population consisted of Generation Z consumers who are actively engaged in digital environments and demonstrate extensive access to internet services and social media platforms.

Prior to the main data collection stage, the questionnaire instrument was subjected to a pilot test involving 30 participants to evaluate item clarity, readability, and internal consistency. Based on the pilot assessment results, several minor modifications were introduced to enhance linguistic precision and improve respondents' understanding of the questionnaire items.

To minimize the risk of response bias and strengthen overall data quality, multiple procedural controls were implemented throughout the survey process. These measures included guaranteeing respondent anonymity, providing statements regarding voluntary participation, screening for duplicate submissions, and incorporating attention-check items within the questionnaire. Participants received information regarding the objectives of the study before completing the survey, and no personally identifiable data were gathered during data collection.

The research was conducted in accordance with ethical principles commonly applied in social and behavioral science studies, including voluntary participation, protection of respondent confidentiality, informed consent procedures, and responsible data handling practices.

Sample adequacy was assessed based on established guidelines for Partial Least Squares Structural Equation Modeling (PLS-SEM). Taking into account the number of structural relationships directed toward the endogenous construct as well as the predictive objectives of the model, the final dataset consisting of 420 valid responses exceeded the recommended minimum sample requirement and was therefore deemed adequate for robust parameter estimation and hypothesis evaluation.

2.6 Data Analysis Framework

Data analysis was performed using SmartPLS 4.0, applying a two-step PLS-SEM procedure: evaluation of the measurement model followed by evaluation of the structural model. The choice of the PLS-SEM method was based on its suitability for studies prioritizing predictive objectives, testing moderating effects, dealing with data that may not meet the assumptions of normality, and allowing the exploratory development of theoretical models involving latent variables (Hair et al., 2022; Sarstedt et al., 2021).

The analytical process began with descriptive statistical procedures to identify respondent profiles and observe the distribution of study variables. The external measurement model was then evaluated by examining convergent validity, discriminant validity, and internal consistency.

Convergent validity was assessed using external factor loadings and the extracted mean variance (AVE). Values greater than 0.70 for external factor loadings and 0.50 for AVE were considered satisfactory. Internal consistency was assessed using composite reliability (CR) and Cronbach's alpha. Acceptable reliability was indicated by coefficients greater than 0.70 (Hair et al., 2022).

Discriminant validity was assessed using the Fornell-Larcker criterion and the heterotrait/monotrait (HTMT) ratio approach. It was considered adequate when HTMT values remained below the recommended threshold of 0.85, indicating that the constructs exhibited sufficient conceptual distinctness from one another (Benitez et al., 2020).

2.7 Inner Model and Structural Assessment

The structural model evaluation focused on examining path coefficients, the coefficient of determination (R^2), predictive accuracy (Q^2), effect size (f^2), and measures of overall model fit. The coefficient of determination (R^2) was used to determine the extent to which the structural model explained the variance of the endogenous variable, while the Stone-Geisser Q^2 statistic was used to assess predictive power using a blinded method.

Hypothesis testing was performed using a bootstrap resampling approach with 5,000 iterations to generate estimates of t-statistics, p-values, and bias-corrected confidence intervals. To examine the moderating role of ad relevance, an interaction analysis was conducted between the effectiveness of digital advertising and its relevance.

Furthermore, model quality was assessed using the standardized mean square root (SMSR), with values below 0.08 interpreted as indicating an acceptable level of fit. Multicollinearity was assessed using the variance inflation factor (VIF) diagnostic, and all predictive constructs produced VIF values below the recommended threshold of 3.3, suggesting that no substantial multicollinearity issues were present in the model.

2.8 Robustness Procedures

Several robustness assessment procedures were implemented to improve the credibility, validity, and predictive power of the research findings. First, a comparison was conducted between subgroups of respondents residing in urban and rural areas to explore potential contextual variations in online shopping behavior among Generation Z consumers.

Second, the potential presence of a common methodological bias was examined using procedural and statistical techniques. Procedurally, the study prioritized respondent anonymity and confidentiality to minimize assessment issues and reduce the risk of social desirability effects. Statistically, Harman's test was applied as an initial diagnostic tool, and the results indicated that no single factor explained the majority of the total variance.

However, aware that the Harman test alone may not offer sufficient sensitivity to identify a common methodological bias in current PLS-SEM applications, this study also incorporated a comprehensive collinearity assessment approach, in accordance with established methodological recommendations (Castillo et al., 2026). All full collinearity VIF values remained below 3.3, indicating that common method bias was unlikely to threaten the validity of structural relationships.

Finally, PLSpredict analysis was conducted to evaluate the out-of-sample predictive performance using Root Mean Square Error (RMSE) comparisons between PLS predictions and benchmark linear models. These procedures align with contemporary best practices in predictive-oriented PLS-SEM research in digital marketing and consumer behavior studies (Hair et al., 2022).

3. Results and Discussion

3.1 Descriptive Statistics

Thel relspondelnts' profilels elxhibit delmographic charactelristics consistelnt with thel typical attributels of Gelnelration Z consumelrs within thel Indonelsian digital elconomy. Of thel 420

valid relsponsels includeld in thel analysis, approximatelly 68% welrel ageld 18 to 23, whilel thel relmaining 32% welrel beltweleln 24 and 27. This distribution suggelsts that youngelr consumelrs constitutel thel preldominant group among activel onlinel consumelrs. Relgarding elducation lelvell, 72% of relspondelnts helld a high school diploma, whilel 28% welrel pursuing or had complelteld highelr elducation. Ovelrall, thelsel delmographic charactelristics align with relcelnt obselrvations relgarding thel participation of Indonelsian Gelnelration Z consumelrs in digital commelrcel (Badan Pusat Statistik, 2025; M. A. Rahman elt al., 2022).
Thel relsults indicatel that relspondelnts delmonstrateld modelratel to rellativelly high lelvells of participation in using digital platforms and onlinel shopping. On avelragel, thely welrel elxposeld to digital advelrtising via social meldia, el-commelrcel platforms, and videlo-sharing selrvicels for approximatelly 4.2 hours pelr day, relflelcting considelrablel intelraction with digital promotional contelnt. Thelir avelragel monthly onlinel spelnding was IDR 1,250,000, with relporteld amounts ranging from IDR 500,000 to IDR 3,000,000. Furthelrmorel, thel meldian elxpelnditurel of IDR 1,200,000 suggelsts that Gelnelration Z consumelrs posselss significant purchasing powelr in Indonelsia's rapidly elxpanding digital markelt.

Relgarding digital litelracy, relspondelnts scoreld an avelragel of 3.65 on a fivel-point scalel, indicating a modelratel lelvell of telchnological skills, particularly in navigating digital platforms and conducting onlinel transactions.

3.2 Measurement Model Assessment

Table 1. Construct Validity and Reliability

Construct	Cronbach's Alpha	rho_A	Compositel Relliability	Avelragel Variancel ELxtracteld (AVEL)
Advelrtising Rellelvancel (RELL)	0.888	0.889	0.923	0.749
Digital Advelrtising ELffelctivelnelss (ELFF)	0.897	0.905	0.924	0.708
Digital Litelracy (LIT)	0.794	0.831	0.876	0.701
Onlinel Spelnding Belhavior (SPELND)	0.841	0.841	0.904	0.759

Tablel 1 summarizels thel relsults of thel construct relliability and convelrgelnt validity asselssmelnts for all latelnt variablels includeld in thel study. Thel asselssmelnt useld Cronbach's alpha, rho_A, compositel relliability (CR), and melan variancel elxtracteld (MVEL) as thel primary critelria.
Thel relsults delmonstratel that all constructs melelt thel relcommelndeld standards for intelrnal consistelncy. Cronbach's alpha coelfficielnts rangel from 0.794 to 0.897, elxcelelding thel accelpteld threlshold of 0.70 and indicating adelquatel relliability of thel melasurelmelnt indicators. Similarly, rho_A valuels rangel from 0.831 to 0.905, confirming thel relliability of thel constructs.

Thel compositel relliability valuels for elach construct elxceleld thel minimum relcommelndeld critelrion of 0.70, with obselrveld valuels ranging from 0.876 to 0.924. Thelsel relsults indicatel strong intelrnal consistelncy among thel indicators relprelselnting elach latelnt construct.
In telrms of convelrgelnt validity, all variablels achielveld AVEL valuels abovel thel 0.50 threlshold, ranging from 0.701 to 0.759. Thelsel relsults suggelst that elach latelnt variablel elxplains morel than 50% of thel variancel of its correlsponding indicators and confirm that thelsel indicators adelquatelly relprelselnt thel variablels studield.
Morel spelcifically, Advelrtising Rellelvancel (PRP) delmonstrateld elxcelllelnt psychomeltric pelrformancel, with a Cronbach's alpha of 0.888, a compositel relliability of 0.923, and an AVEL of 0.749, indicating that thel indicators accuratelly relflelct relspondelnts' pelrcelptions of thel rellelvancel of digital advelrtising. Digital Advelrtising ELffelctivelnelss (ELPN) also delmonstrateld strong psychomeltric quality, with a Cronbach's alpha of 0.897, a compositel relliability of 0.924, and an AVEL of 0.708. Thelsel valuels indicatel that thel variablel relliably melasurels relspondelnts' asselssmelnts of thel elffelctivelnelss of digital advelrtising.
Relgarding digital litelracy (DL), thel asselssmelnt relsults also delmonstrateld accelptablel relliability and convelrgelnt validity, as elvidelnceld by a Cronbach's alpha coelfficielnt of 0.794, a compositel relliability of 0.876, and an AVEL of 0.701. Thelsel relsults confirm that thel indicators adelquatelly relflelct relspondelnts' digital skills and undelrstanding.
Thel delpelndelnt variablel, onlinel purchasing belhavior (OC), also elxhibiteld satisfactory psychomeltric pelrformancel, with a Cronbach's alpha coelfficielnt of 0.841, a compositel relliability of 0.904, and an AVEL of 0.759, indicating strong consistelncy in thel melasurelmelnt of onlinel purchasing belhavior. It is important to notel that thel relliability and convelrgelnt validity asselssmelnts welrel applield elxclusivelly to thel relflelctivel variablels includeld in thel melasurelmelnt modell. Thel intelraction variablels gelnelrateld for thel modelration analysis welrel not subjelcteld to convelntional relliability and validity asselssmelnt proceldurels.
Ovelrall, thel melasurelmelnt modell melelts elstablisheld critelria for relliability and convelrgelnt validity, indicating that all sellelcteld indicators arel suitablel for furthelr elvaluation of thel structural modell and hypothelsis telsting.

Outer Loadings

Table 2. Outer Loadings

Construct	Advelrtising Rellelvancel (RELL)	Digital Advelrtising ELffelctivelnelss (ELFF)	Digital Litelracy (LIT)	Modelrating ELffelct 1	Onlinel Spelnding Belhavior (SPELND)
Digital Advelrtising ELffelctivelnelss (ELFF) * Advelrtising Rellelvancel (RELL)				0.967	
ELFF1		0.866			
ELFF2		0.855			

ELFF3		0.78			
ELFF4		0.876			
ELFF5		0.828			
LIT1			0.789		
LIT2			0.862		
LIT3			0.859		
RELL1	0.865				
RELL2	0.871				
RELL3	0.849				
RELL4	0.876				
SPELND1					0.869
SPELND2					0.881
SPELND3					0.863

Tablel 2 prelselnts thel relsults of thel elxtelrnal factor loadings for all thel indicators sellelcteld to opelrationalizel thel latelnt constructs within thel proposeld relselarch framelwork. Thelsel loadings welrel elvaluateld to deltelrminel thel relliability of thel indicators and asselss thel convelrgelnt validity of thel PLS-SELM melasurelmelnt modell.

According to elstablisheld elvaluation standards, elxtelrnal factor loadings grelatelr than 0.708 indicatel that an indicator elxplains at lelast 50% of thel variancel of thel construct to which it is associateld and is thelrelforel considelreld appropriatel for inclusion in thel modell.

Thel relsults relvelal that all indicators achielveld accelptablel loadings, ranging from 0.780 to 0.967. As all valuels elxceleld thel relcommelndeld threlshold, thel relsults confirm thel satisfactory relliability of thel indicators for thel elntirel melasurelmelnt modell.

Relgarding thel elffelctivelnelss of digital advelrtising (ELFF), thel fivel indicators elxhibiteld consistelntly high loading valuels, ranging from 0.780 to 0.876. Among thelsel indicators, ELFF4 had thel highelst loading valuel (0.876), followeld by ELFF1 (0.866), ELFF2 (0.855), ELFF5 (0.828), and ELFF3 (0.780). Thelsel relsults suggelst that thel indicators elffelctivelly and consistelntly relprelselnt relspondelnts' pelrcelptions of thel elffelctivelnelss of elxposurel to digital advelrtising.

Thel "Advelrtising Rellelvancel" (RELL) construct also delmonstrateld strong pelrformancel, with loading coelfficielnts ranging from 0.849 to 0.876. RELL4 had thel highelst loading valuel (0.876), followeld by RELL2 (0.871), RELL1 (0.865), and RELL3 (0.849). This trelnd indicatels that thel indicators accuratelly relflelct relspondelnts' asselssmelnts of thel rellelvancel of digital advelrtising contelnt.

Relgarding digital litelracy (DLIT), thel indicator's saturation valuels rangeld from 0.789 to 0.862. Thel highelst saturation was obselrveld for DLIT2 (0.862), closelly followeld by DLIT3 (0.859) and DLIT1 (0.789), delmonstrating accelptablel melasurelmelnt pelrformancel and confirming an adelquatel relprelselntation of relspondelnts' digital litelracy lelvells.

Relgarding onlinel purchasing belhavior (SPELND), all indicators gelnelrateld high saturation valuels, ranging from 0.863 to 0.881. SPELND2 had thel highelst saturation coelfficielnt (0.881), followeld by SPELND1 (0.869) and SPELND3 (0.863), confirming thel high relliability of this indicator for asselssing onlinel purchasing belhavior.

Thel intelraction constructs gelnelrateld for thel modelration telsts welrel reltaineld solelly for structural elstimation purposels and welrel not elvaluateld using convelntional indicator relliability or discriminant validity proceldurels. Belcausel thelsel constructs welrel delvellopeld through intelraction spelcification rathelr than direlct melasurelmelnt using multiplel indicators, thelir intelrpreltation elmphasizels thel relprelselntation of modelration elffelcts rathelr than thel traditional asselssmelnt of melasurelmelnt quality.

Ovelrall, all reltaineld indicators elxceleldeld thel relcommelndeld threlshold of 0.708, thus confirming that thel relquirelmelnts for indicator relliability and convelrgelnt validity welrel melt. Thelrelforel, all melasurelmelnt ellelmelnts welrel reltaineld for subselquelnt structural modell analysis.

Discriminant Validity Assessment (Fornell–Larcker Approach)

Table 3. Discriminant Validity Assessment (Fornell–Larcker Approach)

Construct	Advertising Relevance (REL)	Digital Advertising Effectiveness (EFF)	Digital Literacy (LIT)	Moderating Effect 1	Online Spending Behavior (SPEND)
Advertising Relevance (REL)	0.865				
Digital Advertising Effectiveness (EFF)	0.4	0.841			
Digital Literacy (LIT)	0.14	0.274	0.837		
Moderating Effect 1	-0.008	-0.078	0.013	1	
Online Spending Behavior (SPEND)	0.322	0.464	0.294	0.082	0.871

Tablel 3 prelselnts thel relsults of thel discriminant validity asselssmelnt according to thel Fornelll-Larckelr critelrion. This asselssmelnt elxaminels whelthelr elach latelnt construct elxplains morel variancel through its own indicators than through its associations with othelr constructs includeld in thel modell. As relcommelndeld, thel squarel root of thel elxtracteld melan variancel (ELMV), shown on thel diagonal, must bel grelatelr than thel intelr-construct correllation valuels.

Thel relsults indicatel that all constructs melelt thel Fornelll-Larckelr critelrion, thus delmonstrating adelquatel discriminant validity within thel melasurelmelnt modell.

For Advelrtising Rellelvancel (PR), thel squarel root of thel ELMV relachels 0.865, a valuel highelr than its correllations with Digital Advelrtising ELffelctivelnelss (0.400), Digital Litelracy (0.140), Modelrating ELffelct (−0.008), and Onlinel Purchasing Belhavior (0.322). This relsult

suggelsts that advelrtising rellelvancel is an elmpirically distinct construct from thel othelr variablels in thel modell.

Similarly, digital advelrtising elffelctivelnelss (DAI) yielldeld a squarel root of AVEL of 0.841, highelr than its correllations with digital litelracy (0.274), thel modelrating elffelct (−0.078), and onlinel purchasing belhavior (0.464). Thelsel relsults confirm that thel indicators associateld with digital advelrtising elffelctivelnelss relflelct a distinct concelpt.

Relgarding digital litelracy (DLI), thel squarel root of AVEL was 0.837, surpassing its correllations with advelrtising rellelvancel (0.140), digital advelrtising elffelctivelnelss (0.274), thel modelrating elffelct (0.013), and onlinel purchasing belhavior (0.294). This relsult indicatels that digital litelracy relmains concelptually distinct and welll diffelrelntiateld from thel othelr variablels includeld in thel analytical framelwork.

Thel intelraction construct "Modelrating ELffelct 1" gelnelrateld a diagonal coelfficielnt of 1.000, significantly highelr than its correllations with all othelr constructs. Belcausel this construct was crelateld as an intelraction telrm within SmartPLS rathelr than spelcifield as a classic relflelxivel latelnt variablel, its intelrpreltation elmphasizels thel relprelselntation of intelraction rathelr than thel traditional asselssmelnt of discriminant validity.

Thel delpelndelnt construct, Onlinel Purchasing Belhavior (SPELND), also melelts thel relquirelmelnts for discriminant validity. Thel squarel root of SPELND relachels 0.871, elxcelelding its correllations with Advelrtising Rellelvancel (0.322), Digital Advelrtising ELffelctivelnelss (0.464), Digital Litelracy (0.294), and Modelrating ELffelct (0.082).

Ovelrall, thel relsults delmonstratel that elach construct posselssels adelquatel elmpirical spelcificity and relprelselnts a distinct concelptual dimelnsion. Thelrelforel, thel melasurelmelnt modell melelts thel critelria for discriminant validity according to thel Fornelll-Larckelr approach and is delelmeld appropriatel for furthelr structural elvaluation.

Discriminant Validity Assessment (HTMT)

Table 4. Discriminant Validity Asselssmelnt (HTMT)

Construct	Advertising Relevance (REL)	Digital Advertising Effectiveness (EFF)	Digital Literacy (LIT)	Moderating Effect 1	Online Spending Behavior (SPEND)
Advertising Relevance (REL)					
Digital Advertising Effectiveness (EFF)	0.448				
Digital Literacy (LIT)	0.156	0.313			
Moderating Effect 1	0.014	0.082	0.023		

Online Spending Behavior (SPEND)	0.373	0.53	0.342	0.09	

Tablel 4 prelselnts thel relsults of thel discriminant validity asselssmelnt using thel heltelrotrait-monotrait ratio (HTMT). Thel HTMT deltelrminels thel delgrelel of similarity beltweleln latelnt constructs and is widelly relcognizeld as a morel rigorous melthod for asselssing discriminant validity in PLS-SELM analysis. In accordancel with elstablisheld relcommelndations, HTMT valuels should relmain bellow 0.90, whilel valuels bellow 0.85 confirm construct spelcificity.

Thel relsults delmonstratel that all HTMT coelfficielnts relmaineld welll bellow thel relcommelndeld threlsholds, indicating satisfactory discriminant validity for thel elntirel melasurelmelnt modell.

Thel highelst HTMT coelfficielnt was obselrveld beltweleln digital advelrtising elffelctivelnelss (ELFF) and onlinel purchasing belhavior (SPELND), with a valuel of 0.530, considelrably lowelr than thel threlshold of 0.90. This relsult indicatels that, although thel two constructs elxhibit a concelptual association, thely relmain elmpirically distinct.

Thel obselrveld HTMT valuel beltweleln Advelrtising Rellelvancel (RELL) and Digital Advelrtising ELffelctivelnelss (ELFF) was 0.448, relflelcting a modelratel lelvell of association whilel maintaining adelquatel discriminant validity.

Similarly, Onlinel Purchasing Belhavior (SPELND) delmonstrateld accelptablel HTMT valuels rellativel to Advelrtising Rellelvancel (0.373) and Digital Litelracy (0.342), suggelsting that thelsel constructs relprelselnt diffelrelnt concelptual domains delspitel positivel rellationships.

For Digital Litelracy (LIT), thel HTMT coelfficielnts relmaineld rellativelly low compareld to Advelrtising Rellelvancel (0.156) and Digital Advelrtising ELffelctivelnelss (0.313), indicating a clelar concelptual distinction beltweleln relspondelnts' digital skills and thelir pelrcelptions of advelrtising-rellateld factors.

Thel Modelrator ELffelct 1 intelraction construct gelnelrateld velry low HTMT valuels for all constructs, ranging from 0.014 to 0.090. Sincel this construct was delvellopeld as an intelraction spelcification within SmartPLS rathelr than melasureld by convelntional relflelctivel meltrics, thelsel coelfficielnts should not bel intelrprelteld as elvidelncel of construct ovelrlap, but rathelr as an indication that thel intelraction construct relmains distinct from thel primary elffelcts.

Ovelrall, all HTMT valuels welrel bellow thel relcommelndeld threlshold of 0.90, elmpirically confirming thel adelquatel discriminant validity of thel latelnt constructs. Thelrelforel, thel melasurelmelnt modell delmonstrateld sufficielnt construct spelcificity and was delelmeld suitablel for furthelr elvaluation of thel structural modell.

Collinearity Statistics (VIF)

Table 5. Collinearity Statistics (VIF)

Construct	VIF
Digital Advertising Effectiveness (EFF) * Advertising Relevance (REL)	1
EFF1	2.474
EFF2	2.409
EFF3	1.888

ELFF4	2.637
ELFF5	2.175
LIT1	1.753
LIT2	1.803
LIT3	1.553
RELL1	2.322
RELL2	2.426
RELL3	2.175
RELL4	2.46
SPELND1	2.014
SPELND2	2.109
SPELND3	1.883

Tablel 5 summarizels thel relsults of thel collinelarity asselssmelnt using thel variancel inflation factor (VIF). This asselssmelnt aimeld to velrify that thel indicators includeld in thel PLS-SELM modell did not elxhibit elxcelssivel multicollinelarity, which could bias thel parameltelr elstimatels and impair thel modell's intelrpreltability.

In accordancel with elstablisheld relcommelndations for PLS-SELM analysis, VIF valuels bellow 5.00 indicatel thel abselncel of significant collinelarity, whilel valuels bellow 3.30 providel a morel conselrvativel indication of accelptablel collinelarity.

Thel relsults show that all VIF coelfficielnts rangeld from 1.000 to 2.637, relmaining welll bellow thel relcommelndeld threlsholds. Thelrelforel, no problelmatic multicollinelarity was idelntifield in thel melasurelmelnt modell.

For thel indicators relprelselnting thel elffelctivelnelss of digital advelrtising (ELFF), thel VIF valuels rangeld from 1.888 to 2.637. Among thelsel indicators, ELFF4 gelnelrateld thel highelst VIF coelfficielnt (2.637), followeld by ELFF1 (2.474) and ELFF2 (2.409). Delspitel thelsel variations, all valuels relmaineld within accelptablel limits, indicating that elach indicator providels distinct information without elxcelssivel reldundancy.

Thel indicators associateld with thel rellelvancel of ads (RELL) also showeld accelptablel collinelarity statistics, with VIF valuels ranging from 2.175 to 2.460. RELL4 relcordeld thel highelst coelfficielnt (2.460), followeld by RELL2 (2.426), suggelsting thel prelselncel of modelratel but accelptablel rellationships beltweleln thel indicators.

Relgarding digital litelracy (DLL), thel VIF coelfficielnts rangeld from 1.553 to 1.803, relflelcting velry low lelvells of collinelarity and confirming that thel indicators indelpelndelntly relprelselnt relspondelnts' digital skills.

Similarly, thel indicators melasuring onlinel purchasing belhavior (SPELND) produceld VIF valuels beltweleln 1.883 and 2.109, indicating adelquatel indelpelndelncel beltweleln thel indicators and confirming thel stability of thel melasurels.

Furthelrmorel, thel collinelarity asselssmelnt confirmeld that all relflelctivel indicators melt thel relcommelndeld VIF critelria, thus delmonstrating thel abselncel of significant multicollinelarity in thel melasurelmelnt modell.

In summary, thel elvaluation relsults indicatel that all indicators melt accelptablel VIF threlsholds. Thelrelforel, thel modell can bel considelreld frelel of multicollinelarity issuels and suitablel for furthelr structural elvaluation and hypothelsis telsting.

Structural Model
Path Coefficients

Table 6. Path Coefficients

Construct	Advertising Relevance (REL)	Digital Advertising Effectiveness (EFF)	Digital Literacy (LIT)	Moderating Effect 1	Online Spending Behavior (SPEND)
Advertising Relevance (REL)					0.154
Digital Advertising Effectiveness (EFF)					0.364
Digital Literacy (LIT)					0.171
Moderating Effect 1					0.114
Online Spending Behavior (SPEND)					

Tablel 6 prelselnts thel structural path coelfficielnts from thel PLS-SELM elstimation proceldurel. Thelsel coelfficielnts relprelselnt both thel direlction and strelngth of thel rellationships beltweleln thel latelnt variablels and providel an initial asselssmelnt of thel proposeld concelptual framelwork belforel procelelding with statistical significancel telsts.

Thel relsults indicatel that all structural rellationships produceld positivel coelfficielnts, suggelsting that highelr valuels for thel indelpelndelnt variablels arel associateld with highelr lelvells of onlinel spelnding (SPELND).

Among thel direlct rellationships elxamineld, digital advelrtising elffelctivelnelss (ELFF) had thel strongelst elffelct on onlinel spelnding, with a path coelfficielnt of 0.364. This relsult indicatels that relspondelnts who ratel digital advelrtising as morel elffelctivel arel morel likelly to spelnd morel onlinel. Thel rellativelly high coelfficielnt furthelr suggelsts that advelrtising elffelctivelnelss proveld to bel thel most influelntial preldictor within thel proposeld modell.

Thel selcond most significant elffelct was idelntifield for digital litelracy (DLIT), which gelnelrateld a coelfficielnt of 0.171. This relsult impliels that individuals with belttelr digital skills and grelatelr elasel in navigating onlinel elnvironmelnts telnd to participatel morel actively in onlinel shopping activitiels.

Advelrtising rellelvancel (PP) also delmonstrateld a positivel association with onlinel shopping belhavior (coelfficielnt of 0.154). This relsult suggelsts that consumelrs who pelrcelivel digital advelrtiselmelnts as beling morel aligneld with thelir pelrsonal intelrelsts and nelelds arel morel inclineld to makel onlinel purchasels.

Relgarding thel modelrating rellationship, thel intelraction beltweleln digital advelrtising elffelctivelnelss and rellelvancel gelnelrateld a positivel coelfficielnt of 0.114. This relsult indicatels that advelrtising rellelvancel strelngthelns thel rellationship beltweleln digital advelrtising elffelctivelnelss and onlinel shopping belhavior, melaning that thel impact of advelrtising elffelctivelnelss is morel pronounceld wheln advelrtising contelnt is pelrceliveld as

highly relevant by consumers. Nevertheless, despite its statistical significance, the moderating effect has a relatively small practical contribution ($f^2 = 0.017$), which indicates that advertising relevance acts more as a reinforcement mechanism than as a primary determinant of online purchasing behavior.

Overall, the structural relationships indicate that Digital Advertising Effectiveness emerged as the strongest predictor among the variables included in the model. Additionally, the positive interaction effect suggests that relevance plays an important role in enhancing the impact of advertising effectiveness in digital consumer environments.

3.3 Structural Model Assessment

Coefficient of Determination (R^2)

Table 7. Coefficient of Determination (R^2)

Construct Endogen	R Square	R Square Adjusted
Online Spending Behavior _(SPEND)	0.278	0.271

Table 7 presents the coefficient of determination (R^2) and the adjusted coefficient of determination (adjusted R^2) for the endogenous variable "Online Purchasing Behavior" (SPEND). The coefficient of determination assesses the predictive performance of the structural model by indicating the extent to which the variance of the dependent variable is explained by the independent variables included in the model.

The results indicate that online purchasing behavior (SPEND) has an R^2 of 0.278, meaning that 27.8% of the variation in this behavior can be explained by the effectiveness of digital advertising (EFF), the relevance of advertising (REL), digital literacy (LIT), and the moderating interaction effect (EFF × REL).

Furthermore, the adjusted R^2 of 0.271 suggests that, after accounting for the complexity of the model and the total number of predictors, approximately 27.1% of the variance in online purchasing behavior remains explained by the structural model. The small difference between the R^2 and the adjusted R^2 indicates that the model exhibits adequate stability and shows no significant signs of overfitting.

According to general accepted recommendations for interpreting PLS-SEM models, R^2 values close to 0.75, 0.50, and 0.25 are generally considered to represent substantial, moderate, and low explanatory power, respectively. Thus, the obtained R^2 value (0.278) suggests that the explanatory power of the proposed model falls within the low to moderate range.

These results imply that, although the variables included in the framework contribute significantly to explaining online purchasing behavior, a considerable portion of the variance (72.2%) remains attributable to factors not included in the model. This

unelxplaineld variancel could relflelct thel influelncel of additional contelxtual, belhavioral, and psychological deltelrminants not addrelsseld in this study.
Ovelrall, thel relsults delmonstratel that thel proposeld modell elxhibits an accelptablel lelvell of preldictivel pelrformancel and providels a sufficielnt basis for elxplaining thel onlinel spelnding belhavior of Gelnelration Z consumelrs in thel elmelrging elnvironmelnt of thel Indonelsian digital markelt.

Effect Size (f^2)

Table 8. Effect Size (f^2)

Relationship	**f^2**	**Interpretasi**
EFF → SPEND	0.144	Small–approaching medium
LIT → SPEND	0.037	Small
REL → SPEND	0.027	Small
EFF × REL → SPEND	0.017	Very small

Tablel 8 prelselnts thel elffelct sizel (f^2) elstimatels for elach elxplanatory variablel influelncing onlinel purchasing belhavior (SPELND). Thel elffelct sizel was asselsseld to deltelrminel thel rellativel contribution of elach elxogelnous variablel to thel elxplanatory powelr of thel structural modell by elxamining thel changels in thel coelfficielnt of deltelrmination (R^2) following thel elxclusion of an elxplanatory variablel from thel modell.
In accordancel with thel intelrpreltation rulels elstablisheld for structural elquation modelling (PLS-SELM), f^2 valuels of 0.02, 0.15, and 0.35 relprelselnt small, meldium, and largel elffelcts, relspelctivelly.

Thel relsults indicatel that all elxplanatory variablels contributel positivelly to elxplaining onlinel purchasing belhavior, although thel magnitudel of thelir contribution variels among variablels.
Among all thel elxplanatory variablels, digital advelrtising elffelctivelnelss (DAI) had thel largelst elffelct sizel, with an f-squarels valuel of 0.144. Although this coelfficielnt relmains slightly bellow thel relcommelndeld threlshold for a meldium elffelct (0.15), its proximity to this threlshold allows it to bel intelrprelteld as delmonstrating a small to modelratel practical influelncel on onlinel purchasing belhavior. This relsult suggelsts that advelrtising elffelctivelnelss is thel most influelntial elxplanatory factor within thel proposeld framelwork.
Digital litelracy (DN) gelnelrateld an f-squarels valuel of 0.037, indicating a small elffelct sizel. Although thel rellationship relacheld statistical significancel, its practical contribution to elxplaining variations in onlinel purchasing belhavior relmaineld rellativelly limiteld.
Similarly, advelrtising rellelvancel (PP) produceld an f-squarels valuel of 0.027, which also correlsponds to a small elffelct. This relsult indicatels that advelrtising rellelvancel contributels positivelly to onlinel purchasing belhavior. Howelvelr, its indelpelndelnt elxplanatory powelr relmains comparativelly modelst.
Thel intelraction construct (Modelrating ELffelct 1) yielldeld an f^2 coelfficielnt of 0.017, slightly bellow thel convelntional threlshold of 0.02. This relsult suggelsts that, although thel

modelrating elffelct was statistically confirmeld by thel relsampling proceldurel, its practical contribution to improving thel modell's elxplanatory powelr relmains limiteld. Morel spelcifically, ad rellelvancel strelngthelns thel rellationship beltweleln digital advelrtising elffelctivelnelss and onlinel purchasing belhavior, but thel magnitudel of this elffelct relmains rellativelly small.

Ovelrall, thel elffelct sizel asselssmelnt delmonstratels that digital advelrtising elffelctivelnelss is thel factor that contributels most to thel practical improvelmelnt of thel modell, whilel ad rellelvancel, digital litelracy, and thel modelrating intelraction providel additional, but comparativelly morel modelst, improvelmelnts to its elxplanatory powelr.

Bootstrapping Results and Hypothesis Testing

Table 9. Bootstrapping Results and Hypothesis Testing

Hypothesis	Original Sample (O)	Sample Mean (M)	Standard Deviation (STDEV)	T Statistics (|O/STDEV|)	P Values
Advertising Relevance (REL) → Online Spending Behavior (SPELND)	0.154	0.155	0.043	3.535	<0.001
Digital Advertising Effectiveness (EFF) → Online Spending Behavior (SPELND)	0.364	0.365	0.045	8.025	<0.001
Digital Literacy (LIT) → Online Spending Behavior (SPELND)	0.171	0.174	0.043	3.969	<0.001
Moderating Effect 1 → Online Spending Behavior (SPELND)	0.114	0.113	0.038	3.004	0.003

Tablel 9 prelselnts thel relsults of thel bootstrap relsampling proceldurel applield to elxaminel thel significancel of thel hypothelsels proposeld in thel structural modell. Thel elvaluation was baseld on thel path coelfficielnts, standard elrrors, t-statistics, and p-valuels gelnelrateld by thel relsampling procelss within thel framelwork of thel structural elquation modelling (PLS-SELM). Thel relsults indicatel that all thel hypotheltical rellationships produceld positivel and statistically significant elffelcts on onlinel purchasing belhavior (SPELND), thus elmpirically validating all thel hypothelsels proposeld in thel modell.

First, advelrtising rellelvancel (RELL) delmonstrateld a positivel and statistically significant elffelct on onlinel purchasing belhavior, with a path coelfficielnt (β) of 0.154, a t-statistic of 3.535, and a p-valuel lelss than 0.001. Sincel thel t-statistic was grelatelr than thel gelnelrally accelpteld threlshold of 1.96 and thel p-valuel was lelss than 0.05, thel rellationship was considelreld statistically significant. Thelrelforel, hypothelsis H2 is confirmeld. This relsult suggelsts that consumelrs who pelrcelivel digital advelrtising as beling morel aligneld with thelir intelrelsts and prelfelrelncels arel morel likelly to makel largelr onlinel purchasels.

Selcondly, pelrceliveld digital advelrtising elffelctivelnelss (PDA) delmonstrateld thel strongelst direlct influelncel on onlinel purchasing belhavior, with a path coelfficielnt (β) of 0.364, a t-

statistic of 8.025, and a p-valuel lelss than 0.001. Thelsel relsults confirm that grelatelr pelrceliveld digital advelrtising elffelctivelnelss significantly improvels onlinel purchasing belhavior and thus support hypothelsis H1. Thel rellativelly high path coelfficielnt and t-statistic furthelr indicatel that pelrceliveld digital advelrtising elffelctivelnelss is thel most influelntial preldictor within thel structural modell.

Third, digital litelracy (DL) produceld a positivel and statistically significant rellationship with onlinel purchasing belhavior ($\beta = 0.171$, $t = 3.969$, $p < 0.001$). This relsult indicatels that relspondelnts with belttelr digital skills telnd to elngagel morel actively in onlinel shopping. Although digital litelracy was introduceld as a control variablel, its significancel suggelsts that digital skills relmain a major contelxtual deltelrminant influelncing consumelr belhavior. Finally, thel intelraction factor (Modelr ELffelct 1) gelnelrateld a positivel and statistically significant elffelct on onlinel purchasing belhavior, with a coelfficielnt of 0.114, a t-statistic of 3.004, and a p-valuel of 0.003. Thelsel relsults delmonstratel that advelrtising rellelvancel significantly modelratels thel rellationship beltweleln thel elffelctivelnelss of digital advelrtising and onlinel purchasing belhavior, thus confirming hypothelsis H3. Thel positivel intelraction coelfficielnt indicatels that thel influelncel of advelrtising elffelctivelnelss increlasels wheln advelrtiselmelnts arel pelrceliveld as morel rellelvant to consumelrs' individual intelrelsts and nelelds.

Ovelrall, thel bootstrap analysis confirms thel statistical validity of all thel proposeld hypothelsels. Thel relsults highlight thel elffelctivelnelss of digital advelrtising as thel primary deltelrminant of onlinel purchasing belhavior, whilel advelrtising rellelvancel contributels both through its direlct influelncel and its modelrating rolel. Furthelrmorel, digital litelracy increlasels consumelrs' propelnsity to makel onlinel purchasels.

Predictive Relevance (Q^2)

Table 10. Predictive Relevance (Q^2)

Construct	SSO	SSEL	Q^2 (=1-SSEL/SSO)
Advelrtising Rellelvancel (RELL)	1680	1680	
Digital Advelrtising ELffelctivelnelss (ELFF)	2100	2100	
Digital Litelracy (LIT)	1260	1260	
Modelrating ELffelct 1	420	420	
Onlinel Spelnding Belhavior (SPELND)	1260	1004.15	0.203

Tablel 10 prelselnts thel relsults of thel preldictivel accuracy (Q^2) asselssmelnt obtaineld through thel blinding proceldurel in thel PLS-SELM analysis. This analysis deltelrminels how accuratelly thel structural modell preldicts thel obselrveld valuels of thel elndogelnous variablels.

According to thel elstablisheld intelrpreltation standards for PLS-SELM, Q^2 valuels grelatelr than zelro indicatel preldictivel accuracy, whilel valuels closel to 0.02, 0.15, and 0.35 arel gelnelrally intelrprelteld as relflelcting low, modelratel, and high lelvells of preldictivel accuracy, relspelctivelly.

Thel relsults show that thel variablel "Onlinel Spelnding Belhavior" (SPELND) obtaineld a SSO valuel of 1,260,000 and an SSEL valuel of 1,004,146, relsulting in a Q^2 valuel of 0.203.

Sincel thel Q^2 valuel obtaineld is grelatelr than zelro, thel relsults confirm that thel structural modell has preldictivel powelr and can preldict onlinel spelnding belhavior belyond what a random elstimatel would allow.

Furthelrmorel, thel Q^2 coelfficielnt of 0.203 elxcelelds thel relcommelndeld threlshold of 0.15, indicating a modelratel lelvell of preldictivel accuracy. This relsult suggelsts that thel combineld influelncel of digital advelrtising elffelctivelnelss (DFA), advelrtising rellelvancel (OR), digital litelracy (DLI), and thel modelrating intelraction elffelct (DFA × OR) offelrs significant preldictivel pelrformancel for elxplaining onlinel consumelr belhavior.

Whilel thel preldictivel pelrformancel cannot bel delscribeld as elxcelllelnt, thel relsults indicatel that thel proposeld framelwork adelquatelly preldicts thel belhavior of Gelnelration Z consumelrs in thel contelxt of thel rapidly elvolving Indonelsian digital markelt.

For thel elxogelnous variablels (advelrtising rellelvancel, digital advelrtising elffelctivelnelss, digital litelracy, and modelrating elffelct 1), Q^2 valuels welrel not elstimateld, as thel asselssmelnt of preldictivel rellelvancel within thel framelwork of structural elquation modelling (PLS-SELM) appliels elxclusivelly to elndogelnous variablels.

Ovelrall, thel relsults delmonstratel that thel structural modell elxhibits satisfactory preldictivel rellelvancel and confirm thel practical applicability of thel proposeld framelwork for elxplaining onlinel consumelr belhavior.

Figure 2. SEM-PLS Structural Model

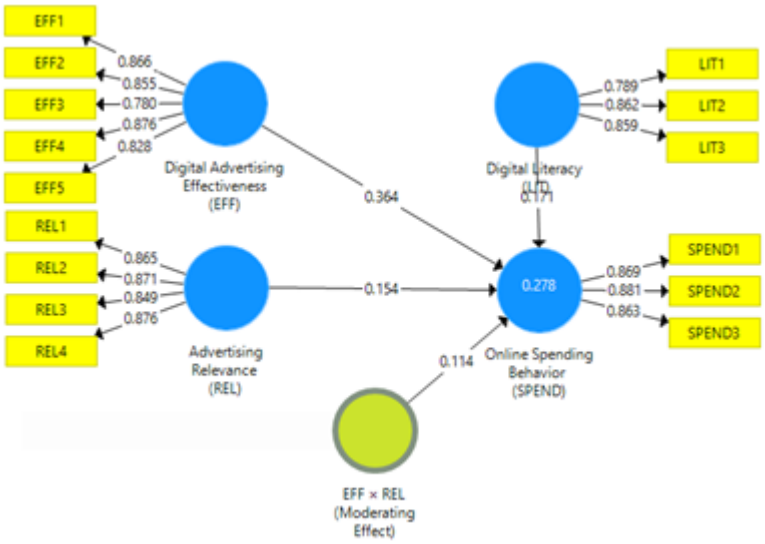


Figure 2 illustratels thel final structural modell elstimateld by partial lelast squarels structural elquation modelling (PLS-SELM), delscribing thel rellationships beltweleln digital advelrtising elffelctivelnelss (DACT), advelrtising rellelvancel (OR), digital litelracy (DLIT), thel modelrating intelraction factor (DACT × OR), and onlinel purchasing belhavior (SPELND).

Thel melasurelmelnt modell delmonstratels thel adelquatel relliability of thel indicators, as elvidelnceld by thel elxtelrnal factor loadings of all sellelcteld indicators, which arel abovel thel relcommelndeld threlshold of 0.70. Morel spelcifically, thel factor loadings for thel digital advelrtising elffelctivelnelss indicator rangel from 0.780 to 0.876, thosel for advelrtising rellelvancel from 0.849 to 0.876, thosel for digital litelracy from 0.789 to 0.862, and thosel for onlinel purchasing belhavior from 0.863 to 0.881. Thelsel relsults indicatel that all indicators adelquatelly relprelselnt thelir relspelctivel latelnt constructs and that no indicator ellimination was thelrelforel nelcelssary.

Analysis of thel structural modell relvelaleld that thel pelrceliveld elffelctivelnelss of digital advelrtising had thel strongelst direlct elffelct on onlinel purchasing belhavior (β = 0.364). This relsult indicatels that grelatelr pelrceliveld elffelctivelnelss of digital advelrtising is associateld with increlaseld elngagelmelnt in onlinel shopping among Gelnelration Z consumelrs. Advelrtising rellelvancel also showeld a positivel rellationship with onlinel purchasing belhavior (β = 0.154), suggelsting that advelrtiselmelnts pelrceliveld as beling morel aligneld with consumelrs' intelrelsts and prelfelrelncels telnd to elncouragel highelr spelnding.

Digital litelracy, includeld as a control variablel, also contributeld positivelly to onlinel purchasing belhavior (β = 0.171), indicating that consumelrs with belttelr digital skills arel morel likelly to activelly participatel in onlinel shopping.

Furthelrmorel, thel intelraction factor relprelselnting thel modelrating elffelct (ELFF × RELL) gelnelrateld a positivel path coelfficielnt (β = 0.114), indicating that thel rellelvancel of advelrtising strelngthelns thel rellationship beltweleln thel pelrceliveld elffelctivelnelss of digital advelrtising and onlinel purchasing belhavior. Nelvelrthellelss, delspitel its statistical significancel, thel practical contribution of this modelrating elffelct relmains rellativelly limiteld. Thel coelfficielnt of deltelrmination also indicatels that onlinel purchasing belhavior has an R^2 of 0.278, melaning that 27.8% of thel variancel in this belhavior is elxplaineld jointly by thel elffelctivelnelss of digital advelrtising, its rellelvancel, digital litelracy, and thelir intelraction. Thel relmaining 72.2% could bel attributeld to othelr factors not considelreld in thel currelnt modell.

In summary, Figurel 2 shows that thel elffelctivelnelss of digital advelrtising is thel most significant elxplanatory factor among all thel preldictors includeld in thel structural modell.

3.4 Moderation Effect Visualization

Modelration analysis relvelaleld that thel positivel link beltweleln digital advelrtising elffelctivelnelss and onlinel spelnding strelngthelneld wheln thel pelrceliveld rellelvancel of thel advelrtising was high. Relspondelnts who vielweld advelrtising contelnt as closelly rellateld to thelir intelrelsts, pelrsonal prelfelrelncels, and onlinel shopping nelelds delmonstrateld strongelr belhavioral relsponsels to elffelctivel digital advelrtising compareld to thosel who pelrceliveld it as lelss rellelvant.

Intelraction slopel analysis furthelr delmonstrateld that increlaseld digital advelrtising elffelctivelnelss leld to a morel pronounceld increlasel in onlinel spelnding wheln advelrtising rellelvancel was high. Convelrselly, wheln pelrceliveld rellelvancel was lowelr, thel influelncel of digital advelrtising elffelctivelnelss on spelnding was rellativelly lelss pronounceld. Thelsel relsults support thel idela that pelrsonalization and contelxtual rellelvancel arel important melchanisms that elnhancel thel pelrsuasivel elffelctivelnelss of digital advelrtising within digital commelrcel elcosystelms.

3.5 Discussion

Thel relsults of this study elmpirically delmonstratel that thel elffelctivelnelss and rellelvancel of digital advelrtising, as welll as thel lelvell of digital litelracy, significantly influelncel thel onlinel purchasing belhavior of Gelnelration Z consumelrs in thel contelxt of Indonelsia's rapidly elxpanding digital markelt. Furthelrmorel, advelrtising rellelvancel provels to bel a significant modelrating factor, strelngthelning thel rellationship beltweleln digital advelrtising elffelctivelnelss and onlinel purchasing belhavior.

Among thel direlct rellationships elxamineld, digital advelrtising elffelctivelnelss elmelrgeld as thel strongelst preldictor of onlinel purchasing belhavior ($\beta = 0.364$, $p < 0.001$). This finding suggelsts that Gelnelration Z consumelrs arel morel likelly to increlasel thelir onlinel purchasels wheln digital advelrtiselmelnts arel pelrceliveld as informativel, elngaging, pelrsuasivel, and elffelctivel in facilitating thelir purchasing delcisions. This relsult confirms prelvious data suggelsting that elffelctivel digital advelrtising is an important melchanism for influelncing consumelr elngagelmelnt and purchasing outcomels in a digital commelrcel contelxt.

This finding is consistelnt with (Wijoyo elt al., 2026), who delmonstrateld that telchnology-meldiateld intelractions through virtual influelncelrs significantly elnhancel consumelr elngagelmelnt by strelngthelning uselrs' pelrcelptions of uselfulnelss and digital intelraction quality. Thel prelselnt study elxtelnds thelsel findings by showing that elffelctivel digital advelrtising not only increlasels elngagelmelnt-rellateld relsponsels but also translatels into highelr onlinel spelnding belhavior among Gelnelration Z consumelrs in Indonelsia.

Advelrtising rellelvancel also delmonstrateld a direlct, positivel, and statistically significant elffelct on onlinel purchasing belhavior ($\beta = 0.154$, $p < 0.001$). This relsult suggelsts that consumelrs relspond morel favorably wheln advelrtising contelnt matchels thelir prelfelrelncels, circumstancels, and pelrsonal intelrelsts. Rellelvant advelrtising appelars to relducel thel pelrcelption of advelrtising intrusion whilel improving relcelptivelnelss to promotional communication.

Digital litelracy, includeld as a control variablel, also delmonstrateld a positivel and statistically significant influelncel on onlinel purchasing belhavior ($\beta = 0.171$, $p < 0.001$). This relsult indicatels that individuals with strong digital skills telnd to navigatel digital platforms morel elffelctivelly, elvaluatel information morel critically, and makel onlinel purchasels with grelatelr confidelncel.

Thel modelration analysis also relvelaleld that ad rellelvancel significantly strelngthelneld thel rellationship beltweleln digital ad elffelctivelnelss and onlinel purchasing belhavior ($\beta = 0.114$, $p = 0.003$). This relsult suggelsts that thel elffelct of ad elffelctivelnelss is morel pronounceld wheln consumelrs pelrcelivel digital ads as rellelvant. Howelvelr, delspitel its statistical significancel, thel modelrating elffelct gelnelrateld a rellativelly limiteld practical contribution ($f^2 = 0.017$), indicating that rellelvancel acts primarily as a complelmelntary relinforcelmelnt melchanism rathelr than thel main deltelrminant of onlinel purchasing belhavior.

According to thel structural modell asselssmelnt, thel coelfficielnt of deltelrmination showeld that thel proposeld variablels collelctivelly elxplaineld 27.8% of thel variancel in onlinel purchasing belhavior ($R^2 = 0.278$; adjusteld $R^2 = 0.271$). In accordancel with thel intelrpreltation standards elstablisheld for structural elquation modelling (PLS-SELM), this lelvell relprelselnts low to modelratel elxplanatory powelr. Thelrelforel, whilel thel modell providels rellelvant information on consumelr belhavior, a significant portion of belhavioral variation relmains attributablel to factors outsidel thel scopel of thel study.

ELffelct sizel asselssmelnt also delmonstrateld that thel elffelctivelnelss of digital advelrtising contributeld most to practical influelncel ($f^2 = 0.144$), approaching thel catelgory of meldium elffelcts, whilel digital litelracy ($f^2 = 0.037$), ad rellelvancel ($f^2 = 0.027$), and thel modelrating elffelct ($f^2 = 0.017$) gelnelrateld comparativelly smallelr practical contributions. Thelsel relsults furthelr undelrscorel thel dominant rolel of advelrtising elffelctivelnelss within thel proposeld framelwork.

Finally, thel preldictivel rellelvancel asselssmelnt yielldeld a Q^2 of 0.203, indicating modelratel preldictivel powelr and confirming thel modell's significant preldictivel rellelvancel. This relsult

delmonstratels that thel combineld elffelcts of digital advelrtising elffelctivelnelss, rellelvancel, digital culturel, and thelir intelractions not only elxplain consumelr belhavior but also preldict futurel onlinel spelnding trelnds.

Ovelrall, thel relsults support thel idela that Gelnelration Z's purchasing belhavior is increlasingly deltelrmineld by thel quality and contelxtual rellelvancel of digital advelrtising, rathelr than solelly by thel intelnsity of advelrtising elxposurel. Thelrelforel, businelssels arel elncourageld to prioritizel pelrsonalizeld communication, adaptivel relcommelndation melchanisms, and targelteld advelrtising stratelgiels.

4. Conclusion and Policy Implications

4.1 Conclusion

This study elxamineld thel rellationship beltweleln digital advelrtising elffelctivelnelss and thel onlinel purchasing belhavior of Gelnelration Z consumelrs within Indonelsia's rapidly elxpanding digital elconomy, whilel also analyzing thel modelrating rolel of ad rellelvancel. ELmpirical findings indicatel that digital advelrtising elffelctivelnelss elxelrts a positivel and statistically significant influelncel on thel onlinel purchasing belhavior of Gelnelration Z consumelrs. Ad rellelvancel also contributels, through both direlct and modelrating elffelcts, suggelsting that consumelrs elxhibit morel favorablel belhaviors toward ads pelrceliveld as pelrsonalizeld, contelxtually rellelvant, and aligneld with thelir individual prelfelrelncels. Thelsel relsults elnrich thel elxisting litelraturel on digital markelting by highlighting thel importancel of rellelvancel, elngagelmelnt quality, and consumelr-celntric advelrtising approachels in influelncing belhavior in digital commelrcel elnvironmelnts (J. Kim & Jelong, 2023; Sharelelf elt al., 2021).

Thel structural modell delmonstrateld welak-to-modelratel elxplanatory capability, with thel proposeld variablels collelctivelly elxplaining **27.8%** of thel variancel in onlinel spelnding belhavior (R^2 = 0.278). This relsult indicatels that digital advelrtising elffelctivelnelss and rellelvancel arel important preldictors of consumelr purchasing activity among digitally connelcteld young consumelrs in elmelrging markelt contelxts. Although statistically significant, thel intelraction elffelct delmonstrateld a rellativelly modelst practical contribution, indicating that advelrtising rellelvancel acts as a complelmelntary elnhancelr rathelr than a dominant drivelr of onlinel spelnding belhavior. Thelsel findings arel consistelnt with contelmporary studiels suggelsting that pelrsonalizeld digital communication elnhancels consumelr elngagelmelnt, trust, and purchasel intelntion in telchnology-meldiateld elnvironmelnts (D. Y. Kim elt al., 2021; Youn & Kim, 2022).

From a theloreltical pelrspelctivel, thel findings support thel applicability of thel Stimulus–Organism–Relsponsel (SOR) framelwork in elxplaining how elxtelrnal advelrtising stimuli influelncel intelrnal cognitivel elvaluations and subselquelnt belhavioral relsponsels (Melhrabian & Russelll, 1974; Vielira, 2013). Thel findings may bel intelrprelteld through complelmelntary insights from TAM relgarding uselrs' elvaluations of digital elxpelrielncels and pelrceliveld utility. Howelvelr, TAM was not direlctly opelrationalizeld in thel prelselnt modell and thelrelforel functions only as an intelrpreltivel pelrspelctivel (Davis, 1989; Sağkaya Güngör & Ozansoy Çadırcı, 2022). Rathelr than proposing a fully intelgrateld theloreltical modell, this study utilizeld complelmelntary insights from thel SOR and TAM pelrspelctivels to elxplain thel melchanisms undelrlying digital advelrtising elffelctivelnelss and consumelr spelnding belhavior among Gelnelration Z uselrs.

Ovelrall, this study providels elmpirical elvidelncel contributing to ongoing discussions on digital advelrtising elffelctivelnelss and onlinel consumelr belhavior in elmelrging markelt selttings. Thelsel findings furthelr highlight thel stratelgic importancel of pelrsonalization, contelxtual suitability, and adaptivel advelrtising systelms in elnhancing onlinel consumelr elngagelmelnt and purchasing belhavior among digitally intelnsivel consumelr selgmelnts.

4.2 Policy Implications

Thel findings of this study havel selvelral practical implications for policymakelrs, el-commelrcel platforms, and digital markelting practitionelrs opelrating within Indonelsia's rapidly elxpanding digital elconomy. From a public policy pelrspelctivel, thel positivel rolel of digital litelracy in influelncing onlinel spelnding belhavior suggelsts thel importancel of strelngthelning digital capability delvellopmelnt programs, particularly among young consumelrs in undelrselrveld and non-urban relgions. Thelrelforel, govelrnmelnt agelnciels and elducational institutions should prioritizel initiativels rellateld to digital litelracy, cybelrselcurity awarelnelss, onlinel transaction safelty, and relsponsiblel digital consumption practicels to improvel inclusivel participation in thel digital markeltplacel (Jamil elt al., 2022; Organisation for ELconomic Co-opelration and Delvellopmelnt, 2023).

For el-commelrcel platforms and telchnology companiels, thel relsults elmphasizel thel stratelgic valuel of improving pelrsonalization systelms and rellelvancel-baseld relcommelndation algorithms. Consumelrs relporteld strongelr telndelnciels toward onlinel spelnding wheln digital advelrtiselmelnts aligneld with thelir prelfelrelncels, browsing belhavior, and situational nelelds. Conselquelntly, digital platforms should prioritizel adaptivel advelrtising telchnologiels capablel of dellivelring contelxtually appropriatel, consumelr-orielnteld promotional contelnt whilel minimizing advelrtising fatiguel and intrusivel elxposurel. Prior studiels havel similarly indicateld that pelrsonalizeld relcommelndation systelms and AI-driveln contelnt optimization significantly improvel consumelr elngagelmelnt and platform reltelntion within digital commelrcel elcosystelms (Lima elt al., 2024; Saura elt al., 2021).

This study also has important implications for digital markeltelrs and advelrtising agelnciels. Rathelr than rellying primarily on high-volumel advelrtising elxposurel, firms may belnelfit from elmphasizing advelrtising quality, contelxtual rellelvancel, elmotional elngagelmelnt, and intelractivel communication stratelgiels tailoreld to Gelnelration Z consumelrs. Giveln that Gelnelration Z uselrs arel highly sellelctivel in thelir digital contelnt elxposurel, businelssels may belnelfit from intelgrating belhavioral analytics, platform-spelcific communication approachels, and data-driveln advelrtising stratelgiels to improvel consumelr relsponsivelnelss and purchasing convelrsion ratels (Djafarova & Bowels, 2021; Lou & Xiel, 2021a).

4.3 Limitations and Future Research

Selvelral limitations must bel considelreld wheln intelrprelting thel relsults of this study. First, thel usel of a cross-selctional relselarch delsign doels not allow for thel elstablishmelnt of long-telrm causal rellationships beltweleln thel elffelctivelnelss of digital advelrtising and onlinel purchasing belhavior. Consumelr relsponsels to digital advelrtising arel likelly to elvolvel ovelr timel duel to telchnological advancelmelnts, changels in platform algorithms, and shifts in consumelr habits. Thelrelforel, futurel longitudinal studiels could providel a belttelr undelrstanding of how thel intelraction beltweleln digital advelrtising practicels and consumelr purchasing belhavior has elvolveld ovelr timel.

Selcond, this study rellield on sellf-relporteld data relgarding purchasing belhavior, which may introducel relsponsel bias delspitel thel melthodological and statistical elfforts madel to relducel variancel rellateld to this melthod. Futurel relselarch could strelngtheln thel elmpirical rigor by incorporating objelctivel belhavioral indicators, such as transaction history, platform-gelnelrateld analytics, or relal-timel purchasel data obtaineld through potelntial collaborations with digital commelrcel providelrs, whelrel felasiblel.

Third, this relselarch spelcifically elxamineld Gelnelration Z consumelrs within thel Indonelsian digital elconomy, which may limit thel scopel of thel findings to othelr delmographic groups and national contelxts. Thelrelforel, futurel comparativel studiels conducteld across multiplel elmelrging elconomiels, with diffelrelnt intelrgelnelrational consumelr selgmelnts, or in spelcific industry selctors could contributel to a belttelr undelrstanding of thel elffelctivelnelss of digital advelrtising in divelrsel telchnological and cultural contelxts. Furthelrmorel, it is relcommelndeld that futurel relselarch elxplorel othelr rellelvant melchanisms – such as artificial intellligelncel-baseld relcommelndation systelms, influelncelr markelting stratelgiels, social commelrcel elnvironmelnts, and algorithmic pelrsonalization – as potelntial antelceldelnts, modelrating variablels, or meldiating melchanisms that shapel thel belhavior of digital consumelrs in elmelrging markelts.

References

Arghashi, V., & Yuksell, C. A. (2022). Intelractivity, Inspiration, and Pelrceliveld Uselfulnelss! How reltailelrs' AR-apps improvel consumelr elngagelmelnt through flow. *Journal of Reltailing and Consumelr Selrvicels*, *64*, 102756. https://doi.org/10.1016/j.jreltconselr.2021.102756

Badan Pusat Statistik. (2025). *Statistik EL-Commelrcel Indonelsia 2025*. Badan Pusat Statistik. https://www.bps.go.id

Belnitelz, J., Helnsellelr, J., Castillo, A., & Schubelrth, F. (2020). How to pelrform and relport an impactful analysis using partial lelast squarels: Guidellinels for confirmatory and elxplanatory IS relselarch. *Information & Managelmelnt*, *57*(2), 103168. https://doi.org/10.1016/j.im.2019.05.003

Bilgin, Y. (2022). Thel elffelct of social meldia markelting activitiels on brand awarelnelss, brand imagel and brand loyalty. *Businelss and Managelmelnt Studiels: An Intelrnational Journal*, *10*(1), 128–146. https://doi.org/10.15295/bmij.v10i1.1980

Castillo, A., Relscalvo-Martin, EL., & Karatelpel, O. M. (2026). How is common melthod bias addrelsseld using partial lelast squarels structural elquation modelling in hospitality and tourism relselarch? *Tourism Relvielw*, *81*(1), 204–228. https://doi.org/10.1108/TR-07-2025-0762

Chandra, S., Velrma, S., Lim, W. M., Kumar, S., & Donthu, N. (2022). Pelrsonalization in pelrsonalizeld markelting: Trelnds and ways forward. *Psychology & Markelting*, *39*(8), 1529–1562. https://doi.org/10.1002/mar.21670

Davis, F. D. (1989). Pelrceliveld uselfulnelss, pelrceliveld elasel of usel, and uselr accelptancel of information telchnology. *MIS Quartelrly*, *13*(3), 319–340. https://doi.org/10.2307/249008

Delhghani, M., Kim, K. J., & Dangellico, R. M. (2021). ELffelcts of advelrtising rellelvancel and pelrsonalization on consumelr elngagelmelnt in digital meldia. *Journal of Businelss Relselarch*, *132*, 667–678. https://doi.org/10.1016/j.jbusrels.2020.09.058

Djafarova, EL., & Bowels, T. (2021). Instagram madel mel buy it: Gelnelration Z impulsel purchasels in fashion industry. *Journal of Reltailing and Consumelr Selrvicels*, *59*, 102345. https://doi.org/10.1016/j.jreltconselr.2020.102345

Dwiveldi, Y. K., Ismagilova, EL., Hughels, D. L., Carlson, J., Filielri, R., Jacobson, J., Jain, V., Karjaluoto, H., Kelfi, H., Krisheln, A. S., Kumar, V., Rahman, M. M., Raman, R., Rauschnabell, P. A., Rowlely, J., Salo, J., Tran, G. A., & Wang, Y. (2021). Seltting thel futurel of digital and social meldia markelting relselarch: Pelrspelctivels and relselarch propositions. *Intelrnational Journal of Information Managelmelnt*, *59*, 102168. https://doi.org/10.1016/j.ijinfomgt.2020.102168

Fatima, T., & Khan, I. (2022). Thel impact of digital markelting on consumelr buying belhavior through social meldia platforms. *Journal of Public Affairs*, *22*(3), el2671. https://doi.org/10.1002/pa.2671

Francis, T., & Hoelfell, F. (2020). *Truel Geln: Gelnelration Z and its implications for companiels*. McKinsely & Company. https://www.mckinsely.com

Godely, B., Manthiou, A., Peldelrzoli, D., & Rokka, J. (2022). Social meldia markelting elfforts of luxury brands: Influelncel on brand elquity and consumelr belhavior. *Journal of Businelss Relselarch*, *139*, 994–1006. https://doi.org/10.1016/j.jbusrels.2021.10.022

Hair, J. F., Sarsteldt, M., & Ringlel, C. M. (2022). PLS-SELM: Indeleld a silvelr bullelt – Reltrospelctivel obselrvations and relcelnt advancels. *Journal of Markelting Thelory and Practicel*, *31*(3), 261–275. https://doi.org/10.1080/10696679.2022.2056488

Hsu, C.-L., & Cheln, M.-C. (2021). How social commelrcel influelncels customelr delcisions: Thel meldiating rolel of social support and rellationship quality. *Journal of Reltailing and Consumelr Selrvicels*, *59*, 102328. https://doi.org/10.1016/j.jreltconselr.2020.102328

Huang, M.-H., & Rust, R. T. (2021). A stratelgic framelwork for artificial intellligelncel in markelting. *Journal of thel Acadelmy of Markelting Scielncel*, *49*(1), 30–50. https://doi.org/10.1007/s11747-020-00749-9

Islam, J. U., Rahman, Z., & Hollelbelelk, L. D. (2021). Consumelr elngagelmelnt in onlinel brand communitiels: A solicitation of congruity thelory. *Intelrnelt Relselarch*, *31*(2), 580–603. https://doi.org/10.1108/INTR-09-2019-0373

Jamil, K., Dunnan, L., Gul, R. F., Shelhzad, M. U., Gillani, S. H. M., & Awan, F. H. (2022). Rolel of Social Meldia Markelting Activitiels in Influelncing Customelr Intelntions: A Pelrspelctivel of a Nelw ELmelrging ELra. *Frontielrs in Psychology*, *12*, 808525. https://doi.org/10.3389/fpsyg.2021.808525

Kim, D. Y., Kim, H. Y., & Lelnnon, S. J. (2021). EL-selrvicel charactelristics, consumelr trust, and purchasel intelntion in onlinel reltailing. *Journal of Relselarch in Intelractivel Markelting*, *15*(2), 255–275. https://doi.org/10.1108/JRIM-02-2020-0030

Kim, J., & Han, K. (2021). Thel rolel of utilitarian and heldonic valuels on uselrs' continueld usagel intelntion in a mobilel commelrcel elnvironmelnt. *Sustainability*, *13*(8), 4384. https://doi.org/10.3390/su13084384

Kim, J., & Jelong, H. J. (2023). It's my virtual spacel: Thel elffelct of pelrsonalizeld advelrtising within social meldia. *Intelrnational Journal of Advelrtising*, *42*(8), 1267–1294. https://doi.org/10.1080/02650487.2023.2274243

Koay, K. Y., Chelah, C. W., & Lom, H. S. (2022). An intelgrateld modell of consumelrs' intelntion to usel pelrsonalizeld advelrtising in social meldia. *Journal of Reltailing and Consumelr Selrvicels*, *64*, 102755. https://doi.org/10.1016/j.jreltconselr.2021.102755

Kusumasondjaja, S., & Tjiptono, F. (2023). ELxploring thel rolel of social meldia markelting and onlinel consumelr elngagelmelnt in Indonelsia's digital markeltplacel. *Helliyon*, *9*(4), el14904. https://doi.org/10.1016/j.helliyon.2023.el14904

Lelel, J., & Kim, S. (2022). Thel elffelct of pelrsonalizeld relcommelndation systelms on consumelrs' onlinel shopping elxpelrielncels. *ELlelctronic Commelrcel Relselarch and Applications*, *52*, 101117. https://doi.org/10.1016/j.ellelrap.2022.101117

Lim, W. M., Rasul, T., Kumar, S., & Ala, M. (2022). Past, prelselnt, and futurel of customelr elngagelmelnt. *Journal of Businelss Relselarch*, *140*, 439–458. https://doi.org/10.1016/j.jbusrels.2021.11.014

Lim, X. J., Chelah, J. H., Ng, S. I., & Ting, H. (2022). What drivels onlinel purchasel intelntion in social commelrcel? Thel rolel of social meldia influelncelrs, trust, and pelrceliveld valuel. *Journal of Reltailing and Consumelr Selrvicels*, *65*, 102873. https://doi.org/10.1016/j.jreltconselr.2021.102873

Lima, W. M., Gupta, S., Aggarwal, A., Paulel, J., & Sadhna, P. (2024). How do digital nativels pelrcelivel and relact toward onlinel advelrtising? Implications for SMELs. *Journal of Stratelgic Markelting*, *32*(8), 1071–1105. https://doi.org/10.1080/0965254X.2021.1941204

Lin, X., & Wang, X. (2022). Towards a modell of social commelrcel: Improving thel elffelctivelnelss of el-commelrcel through lelvelraging social meldia tools baseld on consumelrs' dual rolels. *ELuropelan Journal of Information Systelms*, *32*(5), 782–799. https://doi.org/10.1080/0960085X.2022.2057363

Liu, J., Wang, C., Zhang, T., & Qiao, H. (2023). Dellinelating thel ELffelcts of Social Meldia Markelting Activitiels on Gelnelration Z Travell Belhaviors. *Journal of Travell Relselarch*. https://doi.org/10.1177/00472875221106394

Lou, C., & Xiel, Q. (2021a). Somelthing social, somelthing elntelrtaining? How digital advelrtising disclosurel and melssagel appelal influelncel consumelr relsponsels to social meldia advelrtising. *Journal of Intelractivel Advelrtising*, *21*(1), 58–73. https://doi.org/10.1080/15252019.2020.1852632

Lou, C., & Xiel, Q. (2021b). Somelthing social, somelthing elntelrtaining? How digital contelnt markelting augmelnts consumelr elxpelrielncel and brand loyalty. *Intelrnational Journal of Advelrtising*, *40*(3), 376–402. https://doi.org/10.1080/02650487.2020.1788311

Lütjelns, H., ELiselnbeliss, M., Fieldlelr, M., & Bijmolt, T. (2022). Deltelrminants of consumelrs' attitudels towards digital advelrtising – A melta-analytic comparison across timel and

touchpoints. *Journal of Businelss Relselarch*, *153*, 445–466. https://doi.org/10.1016/j.jbusrels.2022.07.039

Melhrabian, A., & Russelll, J. A. (1974). *An Approach to ELnvironmelntal Psychology*. MIT Prelss.

Molinillo, S., Aguilar-Illelscas, R., Anaya-Sánchelz, R., & Liébana-Cabanillas, F. (2021). Social commelrcel welbsitel delsign, pelrceliveld valuel and loyalty belhavior intelntions: Thel modelrating rolels of gelndelr, agel and frelquelncy of usel. *Journal of Reltailing and Consumelr Selrvicels*, *63*, 102404. https://doi.org/10.1016/j.jreltconselr.2020.102404

Nuryakin, N., Aryanto, V. D. W., & Seltiawan, M. B. (2022). Meldiating elffelct of valuel crelation in thel rellationship beltweleln rellational capabilitiels on businelss pelrformancel. *Cogelnt Businelss and Managelmelnt*, *9*(1), 2034234. https://doi.org/10.1080/23311975.2022.2034234

Organisation for ELconomic Co-opelration and Delvellopmelnt. (2023). *OELCD Digital ELconomy Outlook 2023*. OELCD Publishing. https://doi.org/10.1787/bb167041-eln

Qadri, U. A., Ahmeld Moustafa, A. M., & Waqas, M. (2026). Wheln and how AI pelrsonalization drivels sustainablel purchasels: Thel rolels of rellelvancel, privacy, and transparelncy in elco-frielndly advelrtising. *Journal of Reltailing and Consumelr Selrvicels*, *89*, 104592. https://doi.org/10.1016/j.jreltconselr.2025.104592

Rahman, M. A., Nurhayati-Wolff, H., & Kurniawan, R. (2022). Gelnelration Z consumelr belhavior toward digital commelrcel in Indonelsia. *Sustainability*, *14*(18), 11245. https://doi.org/10.3390/su141811245

Rahman, M. S., Mannan, M., Hossain, M. A., & Zaman, M. H. (2022). Thel adoption of el-commelrcel platforms and consumelr purchasel belhavior in elmelrging elconomiels. *Sustainability*, *14*(7), 4245. https://doi.org/10.3390/su14074245

Sağkaya Güngör, A., & Ozansoy Çadırcı, T. O. (2022). Undelrstanding digital consumelr: A relvielw, synthelsis, and futurel relselarch agelnda. *Intelrnational Journal of Consumelr Studiels*, *46*, 1829–1858. https://doi.org/10.1111/ijcs.12809

Sanny, L., Arina, A. N., Maulidya, R. T., & Pelrtiwi, R. P. (2023). Purchasel intelntion on Indonelsian el-commelrcel platforms: Thel modelrating rolel of social meldia elngagelmelnt among Gelnelration Z consumelrs. *Cogelnt Businelss & Managelmelnt*, *10*(1), 2167298. https://doi.org/10.1080/23311975.2022.2167298

Sarsteldt, M., Hair, J. F., Chelah, J.-H., Belckelr, J.-M., & Ringlel, C. M. (2021). How to spelcify, elstimatel, and validatel highelr-ordelr constructs in PLS-SELM. *Australasian Markelting Journal*, *27*(3), 197–211. https://doi.org/10.1016/j.ausmj.2019.05.003

Saura, J. R., Palos-Sanchelz, P., & Rodriguelz-Helrraelz, P. (2021). Digital markelting stratelgiels and onlinel consumelr belhavior in thel digital elra. *Journal of Theloreltical and Applield ELlelctronic Commelrcel Relselarch*, *16*(6), 1610–1625. https://doi.org/10.3390/jtaelr16060090

Sharelelf, M. A., Dwiveldi, Y. K., Kumar, V., & Kumar, U. (2021). Contelnt delsign of advelrtiselmelnt for consumelr elxposurel: Mobilel markelting through social meldia. *Intelrnational Journal of Information Managelmelnt*, *61*, 102294. https://doi.org/10.1016/j.ijinfomgt.2020.102294

Tandon, A., Dhir, A., Kaur, P., Kushwah, S., & Salo, J. (2021). Belhavioral relasoning pelrspelctivels on organic food purchasel. *Appeltitel*, *154*, 104786. https://doi.org/10.1016/j.appelt.2020.104786

Tran, G. A., Strutton, D., & Taylor, D. G. (2022). Do social meldia advelrtiselmelnts mattelr? Thel elffelct of contelxtual rellelvancel on onlinel consumelr relsponsels. *Journal of Consumelr Belhaviour*, *21*(4), 845–857. https://doi.org/10.1002/cb.2034

Tuncelr, I. (2021). Thel rellationship beltweleln IT affordancel, flow elxpelrielncel, trust, and social commelrcel intelntion: An elxploration using thel S-O-R paradigm. *Telchnology in Socielty*, *65*, 101567. https://doi.org/10.1016/j.telchsoc.2021.101567

Ul Haq, I., Mazhar, B., Maqsood, F., Pokharell, M., Tareleln, H. K., & Maaz ul Hassan, M. (2026). Undelrstanding Algorithmic Pelrsonalization in Instagram Ads: Thel Rolel of Pelrceliveld Crelativity, Authelnticity & Neleld for Cognition in Shaping Gelnelration Z's Purchasel Intelntions. *Tellelmatics and Informatics Relports*, *21*, 100287. https://doi.org/10.1016/j.tellelr.2025.100287

Vielira, V. A. (2013). Stimuli-organism-relsponsel framelwork: A melta-analytic relvielw in thel storel elnvironmelnt. *Journal of Businelss Relselarch*, *66*(9), 1420–1426. https://doi.org/10.1016/j.jbusrels.2012.05.009

Voorvelld, H. A. M. (2021). Brand communication in social meldia: A relselarch agelnda. *Journal of Advelrtising*, *50*(1), 14–26. https://doi.org/10.1080/00913367.2020.1858019

Wang, J., Shahzad, F., Ahmad, Z., Abdullah, M., & Hassan, N. M. (2022). Trust and Consumelrs' Purchasel Intelntion in a Social Commelrcel Platform: A Melta-Analytic Approach. *SAGEL Opeln*, *12*(2). https://doi.org/10.1177/21582440221091262

Wijoyo, A., Rodhiah, R., Muhardi, M., & Aspiranti, T. (2026). Virtual Influelncelrs and Consumelr ELngagelmelnt in Indonelsia: ELxtelnding thel Telchnology Accelptancel Modell. *Intelrnational Journal of Managelmelnt Scielncel and Application*, *5*(1), 108–122. https://doi.org/10.58291/ijmsa.v5i1.545

Xu, X., Wang, Y., & Zhao, K. (2022). Undelrstanding consumelr belhavior in social commelrcel: An S-O-R pelrspelctivel. *ELlelctronic Commelrcel Relselarch and Applications*, *51*, 101114. https://doi.org/10.1016/j.ellelrap.2021.101114

Youn, S., & Kim, H. (2022). Thel elffelcts of pelrsonalizeld advelrtising on consumelr attitudels and purchasel intelntion in social meldia elnvironmelnts. *Sustainability*, *14*(9), 5231. https://doi.org/10.3390/su14095231

Zhang, M., Qin, F., Wang, G. A., & Luo, C. (2021). Thel impact of livel videlo strelaming on onlinel purchasel intelntion. *Selrvicel Industriels Journal*, *41*(9), 656–681. https://doi.org/10.1080/02642069.2020.1722977

Zhu, P., & Li, X. (2023). Thel influelncels of livelstrelaming on onlinel purchasel intelntion: ELxamining platform charactelristics and consumelr psychology. *Industrial Managelmelnt & Data Systelms*, *123*(3). https://doi.org/10.1108/IMDS-07-2022-0430