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Comparing the Sobel Test and Bootstrapping in the Effect of Social Media Marketing on Purchase Intention

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Abstract

Marketing studies in Indonesia still frequently test mediation with the Sobel test, although the test assumes a normally distributed indirect effect and cannot evaluate moderated mediation. This study compares the Sobel test and percentile bootstrapping in testing brand trust as a mediator of the effect of social media marketing on purchase intention, and examines product involvement as a moderator of the brand trust–purchase intention path. An online survey of 200 followers of a brand's social media accounts was analyzed using PROCESS Models 4 and 14 with 5,000 bootstrap samples. Social media marketing increased brand trust (b = 0.593, p < .001) and purchase intention directly (b = 0.333, p < .001). In the full sample, both methods detected the indirect effect (Sobel z = 3.89; bootstrap 95% CI [0.090, 0.281]), but in random subsamples of 30 respondents the Sobel test detected it in only 19.0% of cases compared with 35.7% for bootstrapping. Product involvement strengthened the effect of brand trust on purchase intention (b = 0.250, p < .001), and the index of moderated mediation was significant (0.148, 95% CI [0.065, 0.227]). The indirect effect was not significant among consumers with low involvement. These findings support bootstrapping as the default test for indirect effects in marketing research, particularly for conditional process models.

Keywords: bootstrapping; brand trust; moderated mediation; product involvement; purchase intention; Sobel test

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INTRODUCTION

Social media has become the main channel through which brands communicate with Indonesian consumers. In October 2025, Indonesia had about 180 million social media user identities, equivalent to 62.9% of its population (Data Reportal, 2026). This reach has encouraged firms to shift marketing budgets toward content, interaction, and campaigns on social platforms, with the expectation that these activities will raise consumers' intention to buy.

Social media marketing (SMM) activities are commonly described through five dimensions: entertainment, interaction, trendiness, customization, and word of mouth (Kim & Ko, 2012). Within the Stimulus–Organism–Response (S-O-R) framework, these activities act as stimuli that shape consumers' internal states, such as trust in the brand, which in turn drive behavioral responses such as purchase intention (Mehrabian & Russell, 1974). Several studies support this chain: SMM increases brand trust, and brand trust increases purchase intention (Salhab et al., 2023).

The empirical evidence, however, is not consistent. A study of 403 coffee shop consumers in Indonesia found that brand trust neither affected purchase intention nor mediated the effect of SMM (Al-Faruq & Prasetio, 2026). Such inconsistency suggests a boundary condition that determines when trust actually translates into intention. Product involvement, the perceived relevance of a product to the consumer (Zaichkowsky, 1985), is a plausible candidate, yet its direction is contested. The Elaboration Likelihood Model implies that trust should matter more for highly involved consumers who process information carefully (Petty & Cacioppo, 1986), whereas Geng and Chen (2021) found the effect of trust on purchase intention to be stronger among consumers with low involvement.

Alongside this substantive question lies a methodological one. Many marketing studies still test mediation with the causal steps of Baron and Kenny (1986) supplemented by the Sobel (1982) test. The Sobel test assumes that the sampling distribution of the indirect effect ($a \times b$) is normal, but the product of two coefficients is typically skewed, which makes the test conservative and low in power (Hayes & Scharkow, 2013; MacKinnon et al., 2004). Methodologists therefore recommend bootstrap confidence intervals (Preacher & Hayes, 2008; Zhao et al., 2010), and reviews of marketing journals show that deficient mediation practices remain common (Kim et al., 2018). Moreover, the Sobel test cannot assess moderated mediation at all; this requires a bootstrap-based index of moderated mediation (Hayes, 2015).

This study therefore makes two contributions. Substantively, it tests product involvement as a boundary condition of the SMM → brand trust → purchase intention chain within a single conditional process model. Methodologically, it compares the Sobel test and bootstrapping side by side on the same data, including a sensitivity analysis across sample sizes, to show when the two methods lead to different conclusions. The remainder of the article reviews the literature and develops the hypotheses, describes the method, presents and discusses the results, and concludes with implications and limitations.

1.1 Theoretical Background and Hypotheses

Social media marketing and brand trust. SMM refers to consumers' perceptions of a brand's marketing activities on social media (Kim & Ko, 2012). Brand trust is the consumer's confidence that the brand is reliable and acts in the consumer's interest (Chaudhuri & Holbrook, 2001; Delgado-Ballester et al., 2003). Two-way interaction, relevant information, and consistent content reduce uncertainty about the brand and thereby build trust, a relationship supported in prior research (Al-Faruq & Prasetio, 2026; Salhab et al., 2023).

H1: Social media marketing has a positive effect on brand trust.

Brand trust and purchase intention. Purchase intention is the consumer's inclination to buy a brand and, according to the Theory of Planned Behavior, the most proximal predictor of actual behavior (Ajzen, 1991). Trust lowers the perceived risk of a transaction, so consumers who trust a brand are more willing to buy it (Chaudhuri & Holbrook, 2001). Because recent Indonesian evidence did not support this link (Al-Faruq & Prasetio, 2026), it warrants re-examination.

H2: Brand trust has a positive effect on purchase intention.

Direct effect of social media marketing. Entertaining and interactive content can trigger interest in a product directly, independent of trust, and a direct effect of SMM on purchase intention has been reported across contexts (Salhab et al., 2023).

H3: Social media marketing has a positive direct effect on purchase intention.

Mediating role of brand trust. Following the S-O-R logic, SMM should raise purchase intention partly by building brand trust. Contemporary mediation analysis focuses on the significance of the indirect effect rather than on a sequence of causal steps (Zhao et al., 2010). Whereas the Sobel test relies on a normal approximation, bootstrapping builds a confidence interval from the empirical distribution of resampled estimates and has been shown to have higher power with better-controlled error rates (Hayes & Scharkow, 2013; Preacher & Hayes, 2008).

H4: Brand trust mediates the effect of social media marketing on purchase intention.

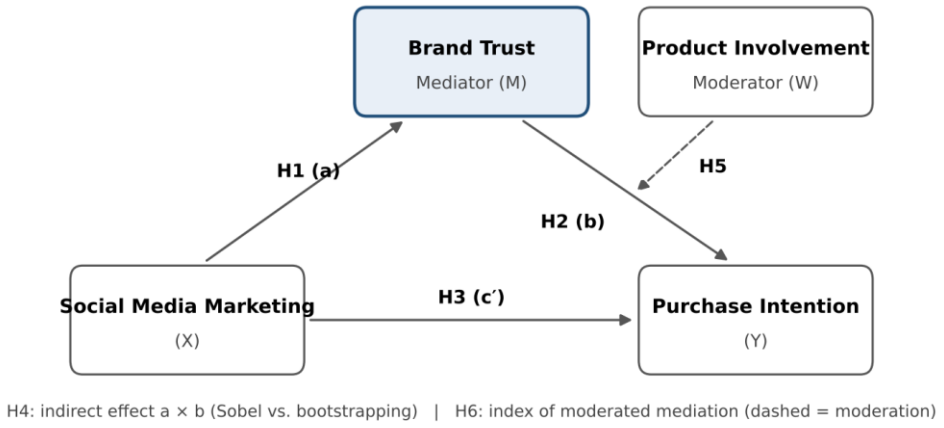
Moderating role of product involvement. Product involvement captures the importance and relevance of a product category to the consumer and comprises cognitive and affective components (Zaichkowsky, 1985, 1994). As discussed above, theory and evidence disagree on the direction of its moderating role (Geng & Chen, 2021; Petty & Cacioppo, 1986). The moderation hypotheses are therefore stated without a direction.

H5: Product involvement moderates the effect of brand trust on purchase intention.

H6: The indirect effect of social media marketing on purchase intention through brand trust differs across levels of product involvement (moderated mediation).

Figure 1

Research Model



Note. Solid arrows are hypothesized paths; the dashed arrow indicates moderation of path *b*. The model corresponds to PROCESS Model 14 (Hayes, 2022).

METHOD

This study used a quantitative, cross-sectional survey design with an explanatory purpose. The population comprised Indonesian consumers who follow or have viewed the social media accounts of [Brand X]. Because no sampling frame was available, purposive sampling was applied with two criteria: respondents were at least 17 years old and had followed or viewed the brand's social media accounts in the previous three months.

Sample size was determined using two criteria. The rule of five to ten respondents per item (Hair et al., 2019) implies 135–270 respondents for 27 items. An a priori power analysis for multiple regression with four predictors in the purchase intention equation

(f^2 = .15, α = .05, power = .95) yielded a minimum of 129 respondents. The final sample of 200 therefore provides power above .99 for a medium effect.

The questionnaire was administered through Google Forms. Respondents read an informed consent statement before participating, participation was voluntary, and no identifying information was collected. Of 230 submitted responses, 30 were excluded: 12 failed the screening questions, 10 failed an embedded attention check item, and 8 gave identical answers to all items (straight-lining). The remaining 200 responses were analysed.

Of the 200 respondents, 61.0% were female, the largest age group was 21–25 years (42.5%), and Instagram (43.5%) and TikTok (40.5%) were the main platforms used to view the brand's content. Table 1 summarizes the respondent profile.

Table 1

Respondent Profile (N = 200)

Characteristic	Category	*n*	%
Gender	Male	78	39.0
	Female	122	61.0
Age (years)	17-20	55	27.5
	21-25	85	42.5
	26-30	31	15.5
	31-35	16	8.0
	> 35	13	6.5
Education	High school	74	37.0
	Diploma	35	17.5
	Bachelor's	69	34.5
	Master's/Doctoral	22	11.0
Occupation	Student	89	44.5
	Private employee	50	25.0
	Civil servant/SOE	15	7.5
	Entrepreneur	34	17.0
	Other	12	6.0
Main platform	Instagram	87	43.5

Characteristic	Category	*n*	%
	TikTok	81	40.5
	Facebook	17	8.5
	YouTube	11	5.5
	Other	4	2.0
Purchased before	Yes	131	65.5
	No	69	34.5

All constructs were measured with items adapted from validated scales, translated into Indonesian, and rated on a five-point Likert scale (1 = *strongly disagree*, 5 = *strongly agree*). SMM was measured with 10 items covering entertainment, interaction, trendiness, customization, and word of mouth (Kim & Ko, 2012). Brand trust was measured with six items covering reliability and intentions (Chaudhuri & Holbrook, 2001; Delgado-Ballester et al., 2003). Purchase intention was measured with five items reflecting transactional, referential, preferential, and exploratory intention (Dodds et al., 1991; Ferdinand, 2006). Product involvement was measured with six items covering cognitive and affective involvement (Zaichkowsky, 1985, 1994). The instrument was reviewed by [two] experts and pilot-tested with 30 respondents outside the main sample.

The analysis proceeded in four stages. First, the measurement model was evaluated using item loadings (≥ .70), average variance extracted (AVE ≥ .50), Cronbach's alpha and composite reliability (CR ≥ .70; Fornell & Larcker, 1981; Hair et al., 2019), and the heterotrait–monotrait ratio (HTMT < .90; Henseler et al., 2015). Common method bias was assessed with Harman's single-factor test (Podsakoff et al., 2003). Construct scores were then computed as item means.

Second, the indirect effect was tested with the Sobel test, using the unstandardized coefficients a (SMM → brand trust) and b (brand trust → purchase intention, controlling for SMM) and their standard errors s_a and s_b:

$$z = ab \,/\, \sqrt{(b^2 s_a^2 + a^2 s_b^2)}$$

Third, the same model was estimated with PROCESS Model 4 (Hayes, 2022) using 5,000 bootstrap samples and 95% percentile confidence intervals; an indirect effect was considered significant when the interval excluded zero. Fourth, H5 and H6 were tested with PROCESS Model 14, with product involvement moderating path b and variables mean-centered before forming the interaction term. Conditional indirect effects were estimated at low (−1 *SD*), mean, and high (+1 *SD*) involvement, and H6 was supported if the bootstrap interval for the index of moderated mediation excluded zero (Hayes, 2015).

Finally, a sensitivity analysis examined how the two methods behave at smaller sample sizes. Random subsamples of 30, 50, 100, and 150 respondents were drawn 300 times each without replacement; for each subsample, the Sobel test and a 1,000-sample percentile bootstrap were computed, and the percentage of subsamples in which each method declared the indirect effect significant was recorded.

RESULTS

All constructs showed satisfactory reliability and convergent validity (Table 2). Cronbach's alpha ranged from .863 to .911, CR from .897 to .927, and AVE from .558 to .679. One SMM item, SMM6 (0.692), loaded slightly below .70; it was retained because the construct's AVE exceeded .50 and removing it would not improve reliability materially. All HTMT values were below .90 (maximum = .577), supporting discriminant validity. The first unrotated factor explained 34.5% of the variance, below the 50% threshold, so common method bias is unlikely to be a serious concern.

Table 2

Reliability and Convergent Validity

Construct	Items	Loading range	α	CR	AVE
Social media marketing	10	.692–.804	.911	.926	.558
Brand trust	6	.786–.876	.904	.927	.679
Purchase intention	5	.791–.865	.879	.912	.675
Product involvement	6	.726–.816	.863	.897	.594

Note. Loadings were estimated from a one-factor solution for each construct. CR = composite reliability; AVE = average variance extracted.

Table 3

Descriptive Statistics, Correlations, and HTMT Ratios

Construct	*M*	*SD*	1	2	3	4
1. Social media marketing	3.44	0.81	—	(.58)	(.52)	(.31)
2. Brand trust	3.39	0.92	.52	—	(.52)	(.22)
3. Purchase intention	3.48	0.90	.46	.47	—	(.37)
4. Product involvement	3.52	0.84	.28	.20	.32	—

Note. Values below the diagonal are Pearson correlations between construct scores; values above the diagonal (in parentheses) are HTMT ratios. All correlations are significant at $p < .01$; $N = 200$.

3.2 Direct Effects and Mediation (H1–H4)

As shown in Table 4, SMM had a positive effect on brand trust ($b = 0.593$, $SE = 0.069$, $p < .001$, $\beta = .52$), supporting H1. Brand trust had a positive effect on purchase intention while controlling for SMM ($b = 0.300$, $p < .001$, $\beta = .31$), supporting H2, and the direct effect of SMM on purchase intention remained significant ($b = 0.333$, $p < .001$), supporting H3. The model explained 27.5% of the variance in brand trust and 28.4% of the variance in purchase intention.

Table 4
Direct Effects (Unstandardized Coefficients)

Hypothesis and path	*b*	*SE*	*t*	*p*	Decision
H1: SMM → Brand trust (*a*)	0.593	0.069	8.66	< .001	Supported
H2: Brand trust → Purchase intention (*b*)	0.300	0.069	4.35	< .001	Supported
H3: SMM → Purchase intention (*c'*)	0.333	0.078	4.27	< .001	Supported
Total effect: SMM → Purchase intention (*c*)	0.510	0.069		< .001	

Note. R^2 (brand trust) = .275; R^2 (purchase intention) = .284.

Table 5 compares the two tests of the indirect effect. The point estimate was identical (*ab* = 0.178), accounting for 34.8% of the total effect. The Sobel test indicated a significant indirect effect (z = 3.89, p < .001), and the bootstrap interval excluded zero (95% CI [0.090, 0.281]). H4 was therefore supported, and because *c'* remained significant, brand trust partially mediated the effect of SMM. The bootstrap interval was asymmetric: it extended 0.088 below the point estimate and 0.103 above it, and the bootstrap distribution was positively skewed (skewness = 0.27). This asymmetry is exactly what the Sobel test ignores when it builds a symmetric interval around a normal approximation.

Table 5
Indirect Effect of SMM on Purchase Intention Through Brand Trust: Sobel Test Versus Bootstrapping

Method	*ab*	*SE*	Test statistic	Conclusion
Sobel test	0.178	0.046	z = 3.89, p < .001	Significant
Percentile bootstrap (5,000 samples)	0.178	0.048	95% CI [0.090, 0.281]	Significant

Note. The bootstrap standard error is the standard deviation of the 5,000 bootstrap estimates.

3.3 Moderated Mediation (H5–H6)

The interaction between brand trust and product involvement was positive and significant (*b* = 0.250, *SE* = 0.064, p < .001) and added 4.9% of explained variance, F(1, 195) = 15.02, p < .001 (Table 6). H5 was therefore supported. Simple slope analysis showed that brand trust did not affect purchase intention at low involvement (*b* = 0.099, p = .223) but had a strong effect at high involvement (*b* = 0.520, p < .001; Figure 2). The Johnson–Neyman technique indicated that the effect became significant when product involvement exceeded 2.87 on the five-point scale, a region that includes 74% of respondents.

Table 6

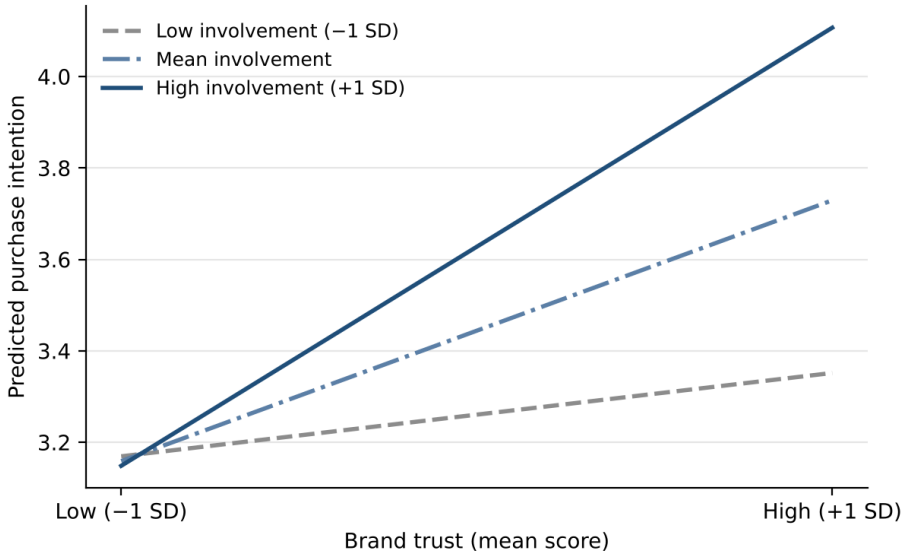
Conditional Process Model (PROCESS Model 14) Predicting Purchase Intention

Predictor	*b*	*SE*	*t*	*p*
Social media marketing	0.290	0.075	3.86	< .001
Brand trust	0.310	0.065	4.73	< .001
Product involvement	0.218	0.063	3.45	< .001
Brand trust × Product involvement	0.250	0.064	3.88	< .001

Note. Predictors were mean-centered. R^2 = .368; ΔR^2 due to the interaction = .049.

Figure 2

Effect of Brand Trust on Purchase Intention at Three Levels of Product Involvement



Note. Lines show predicted values from PROCESS Model 14 at −1 *SD*, the mean, and +1 *SD* of product involvement (*SD* = 0.84).

Table 7 shows that the indirect effect of SMM through brand trust was not significant for consumers with low involvement (0.059, 95% CI [-0.029, 0.159]), but was significant at mean (0.184, 95% CI [0.102, 0.278]) and high involvement (0.309, 95% CI [0.193, 0.441]). The index of moderated mediation was 0.148 (95% CI [0.065, 0.227]), supporting H6. This test has no Sobel-based counterpart.

Table 7

Conditional Indirect Effects of SMM on Purchase Intention Through Brand Trust

Product involvement	Effect	Boot *SE*	Boot LLCI	Boot ULCI
Low (−1 *SD*)	0.059	0.048	-0.029	0.159
Mean	0.184	0.045	0.102	0.278

Product involvement	Effect	Boot *SE*	Boot LLCI	Boot ULCI
High (+1 *SD*)	0.309	0.063	0.193	0.441
Index of moderated mediation	0.148	0.040	0.065	0.227

Note. Based on 5,000 percentile bootstrap samples. LLCI and ULCI = lower and upper limits of the 95% confidence interval.

3.4 Sensitivity to Sample Size

Table 8 shows how the two methods diverged as the sample became smaller. With 30 respondents, the Sobel test detected the indirect effect in 19.0% of subsamples, whereas bootstrapping detected it in 35.7%, and the two methods reached different conclusions in 17.3% of cases. The gap narrowed at 50 respondents (43.0% vs. 54.7%), was negligible at 100, and disappeared at 150.

Table 8

Percentage of Random Subsamples in Which the Indirect Effect Was Significant

Subsample size	Sobel test (%)	Bootstrap (%)	Different conclusion (%)
n = 30	19.0	35.7	17.3
n = 50	43.0	54.7	13.7
n = 100	89.7	90.0	2.3
n = 150	100.0	100.0	0.0

Note. 300 random subsamples per size, drawn without replacement from the full sample; 1,000 bootstrap samples per subsample.

3.5 Discussion

SMM, brand trust, and purchase intention. The present study found that SMM strengthens brand trust and also raises purchase intention directly. These results agree with Salhab et al. (2023) and with the positive SMM–trust link reported by Al-Faruq and Prasetio (2026). Consistent with the S-O-R framework (Mehrabian & Russell, 1974), interactive and relevant content appears to reduce uncertainty about the brand. For managers, this means social media should be treated as a trust-building channel and not only as a promotional one.

Why brand trust sometimes fails to matter. Unlike Al-Faruq and Prasetio (2026), this study found that brand trust predicted purchase intention on average. The moderation results offer an explanation for this discrepancy: trust mattered strongly for consumers who regarded the product category as important but not at all for those with low involvement. A sample dominated by low-involvement consumers, or a low-involvement category such as everyday coffee purchases, may therefore show no trust effect. This pattern supports the Elaboration Likelihood Model, which predicts that highly involved consumers rely more on substantive brand evaluations (Petty & Cacioppo, 1986), and it contrasts with Geng and Chen (2021), whose context of user-generated content may have provided low-involvement consumers with alternative cues.

Sobel test versus bootstrapping. With 200 respondents both methods supported mediation, which illustrates that the Sobel test is not wrong in large samples. Its weakness appears when samples are small: it missed a true indirect effect in most small subsamples where bootstrapping detected it. A null mediation result based on the Sobel test in a small sample is thus a likely Type II error, and reviewers are justified in asking for bootstrap intervals (Kim et al., 2018; Zhao et al., 2010). Furthermore, the central question of this study, whether mediation depends on involvement, could only be answered with a bootstrap-based index of moderated mediation.

DISCUSSION

This study shows that social media marketing raises purchase intention both directly and through brand trust, and that the trust pathway operates only when consumers are sufficiently involved with the product category. Theoretically, it extends the S-O-R framework by identifying product involvement as a boundary condition of the trust mechanism and offers evidence on the contested direction of involvement's moderating role. Methodologically, it demonstrates on a single dataset when the Sobel test and bootstrapping diverge, and why conditional process questions require bootstrapping.

Practically, marketers should tailor trust-building content to the involvement level of their audience: for highly involved segments, evidence of reliability such as reviews, certifications, and responsive complaint handling should be emphasized, whereas for low-involvement segments entertaining and trend-based content may be more effective. For researchers and journal editors, bootstrap confidence intervals should be the default for reporting indirect effects.

This study has several limitations. The cross-sectional design limits causal inference, so longitudinal or experimental designs are recommended. Purposive sampling and a single brand limit generalizability; future studies could compare product categories that differ in involvement. Finally, all constructs were self-reported by the same respondents, so common method variance cannot be ruled out entirely despite the diagnostic tests.

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