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Customer Conversion in Digital Broadband Services: The Roles of Personalization, Perceived Data Transparency, Customer Trust, Customer Engagement and Digital Literacy

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ABSTRACT

The rapid growth of digital marketing in Indonesia's telecommunications industry has created both opportunities and challenges for fixed broadband service providers. This study examines how personalization and perceived data transparency influence customer conversion through the mediating roles of customer trust and customer engagement, while also investigating the moderating effect of digital literacy. A quantitative survey approach was employed involving 400 active Indi Home Telkomsel customers distributed proportionally across five major regions in Indonesia. Data were analyzed using Structural Equation Modeling–Partial Least Squares (SEM-PLS). The results show that personalization positively and significantly influences customer trust ($\beta = 0.389$), customer engagement ($\beta = 0.356$), and customer conversion ($\beta = 0.214$). Perceived data transparency significantly affects customer trust ($\beta = 0.419$) and customer engagement ($\beta = 0.505$) but does not directly predict customer conversion. Both customer trust and customer engagement act as significant mediators, with customer engagement being the stronger predictor of conversion ($\beta = 0.408$). Digital literacy strengthens the relationship between personalization and customer conversion but does not moderate the effect of perceived data transparency on conversion. Fourteen hypotheses were tested, of which twelve were supported. These findings demonstrate that customer conversion in fixed broadband services is shaped not solely by data transparency but primarily by the quality of personalization, trust, engagement, and customers' capacity to interpret digital communications.

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Introduction

Indonesia's national internet penetration reached 78% in 2024, sustaining strong demand for residential broadband services [1]. IndiHome, operating under Telkomsel, serves approximately 9.6 million B2C subscribers and holds the largest fixed broadband market share in the country [2]. Despite this scale, the company faces persistent conversion challenges: average revenue per user declined from IDR 253,000 to IDR 238,000 between 2023 and 2024, the digital acquisition conversion rate sits at roughly 0.01%, and the churn rate of 5% is twice the internal target. Research on Indonesian high-speed internet (HSI) customers has established that trust and service quality are central to retention, and that behavioral data can be used effectively to address churn [3]. These structural pressures make the conversion problem both economically significant and analytically tractable.

In response, Telkomsel has invested in personalization, adapting messages and offers to individual customers based on usage history and behavioral patterns [1]. Research on Indonesian digital consumers confirms that communications aligned with individual motivational profiles produce stronger engagement and behavioral outcomes [4]. At the same time, data-driven marketing raises a legitimate concern about privacy. Perceived data transparency,

which refers to how openly a company communicates its data collection and usage practices, has been shown to be a key antecedent of consumer trust [5]. Studies involving Indonesian digital platforms demonstrate that perceived information quality and transparency are prerequisite conditions for trust formation, without which loyalty behavior is unlikely to develop [6].

This study integrates Conversion Funnel Theory, Personalization Marketing Theory, Customer Engagement Theory, and Relevance Theory to explain how personalization and perceived data transparency influence customer conversion through trust and engagement. Previous studies consistently show that personalization enhances trust, engagement, and purchase-related behavior, whereas perceived data transparency primarily strengthens trust and engagement rather than directly driving conversion [7,8]. Customer trust reduces perceived risk, while customer engagement reflects sustained cognitive, emotional, and behavioral involvement that encourages conversion decisions [9,10]. Digital literacy influences how customers interpret personalized messages and transparency information. Prior studies suggest that digitally literate consumers respond more effectively to online marketing activities, although empirical evidence regarding its moderating role remains mixed [11,12]. This study examines the direct, mediating, and moderating relationships among personalization, perceived data transparency, customer trust, customer engagement, digital literacy, and customer conversion in Indonesia's fixed broadband industry.

Methods

Research Design and Sample

A quantitative explanatory design was employed, consistent with digital marketing research practice in the Indonesian context [4-13]. The population comprised all active IndiHome Telkomsel B2C subscribers, estimated at 9.6 million. Using the Slovin formula at a 5% margin of error, a minimum sample of 400 respondents was required, comparable to prior trust and loyalty studies on Indonesian digital platforms [6]. Stratified random sampling was applied by region: Java (n = 224), Sumatra (n = 64), Kalimantan (n = 44), Sulawesi (n = 32), and Bali and Nusa Tenggara (n = 28). Respondents had to be active subscribers who had received digital marketing communications from IndiHome.

Measures

All constructs were measured using five-point Likert scales. Table 1 summarizes each variable's measurement role, number of items, and source instrument [15-20].

Table 1: Research Variables and Measurement Sources			
Variable	Role	Items	Source
Personalization	Independent (X1)	5	Wang et al.
Perceived Data Transparency	Independent (X2)	4	Lee et al.
Customer Trust	Mediator (Z1)	4	Shao et al. , Miao et al.
Customer Engagement	Mediator (Z2)	7	Parihar et al.
Customer Conversion	Dependent (Y)	4	Bag et al.
Digital Literacy	Moderator (M)	3	Yuan & Li

Conceptual Framework

Figure 1 presents the research conceptual framework. Personalization (X1) and perceived data transparency (X2) are positioned as independent variables. Customer trust (Z1) and customer engagement (Z2) serve as mediators. Digital literacy (M) moderates the paths from both independent variables to customer conversion (Y). This structure draws on the logic established in social media marketing research, where relational intermediaries are necessary for translating marketing activities into purchase behavior [13].

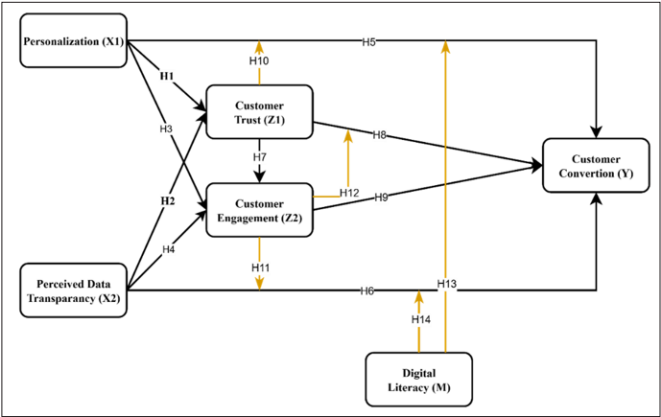


Figure 1: Research Conceptual Framework

Data Analysis

Data analysis was conducted using SEM-PLS via SmartPLS software. This method is well suited to models with multiple

mediating and moderating variables, and it has been widely used in Indonesian digital marketing and service research [3-6]. The analysis followed a standard two-stage procedure. The first stage assessed the outer model, evaluating convergent validity through outer loadings (threshold: 0.70) and Average Variance Extracted (threshold: 0.50), discriminant validity through the Heterotrait-Monotrait Ratio (threshold below 0.90), and construct reliability through Cronbach's Alpha and Composite Reliability (both requiring at least 0.70). The second stage assessed the structural model using path coefficients, R-squared values, effect sizes (f-squared), model fit via SRMR (threshold below 0.08), and hypothesis testing through bootstrapping with 5,000 resamples at a 5% significance level [14].

Result and Discussion

Respondent Profile

All 400 respondents were confirmed active IndiHome Telkomsel subscribers. In terms of geographic distribution, the majority came from Java (56.0%), followed by Sumatra (16.0%), Kalimantan (11.0%), Sulawesi (8.0%), Bali and Nusa Tenggara (7.0%), and other regions (2.0%). Male respondents made up 55.75% of the sample. The largest age groups were 21 to 29 years (40.0%) and 30 to 39 years (32.25%), reflecting a productive-age sample that is actively engaged with digital services in their daily lives. Most respondents held a bachelor's degree (54.0%) and worked in the private sector (48.0%). Regarding subscription duration, 32.5% had been IndiHome subscribers for 3 to 4 years, and 39.75% used the service for more than 5 to 8 hours each day. This profile suggests that the sample has sufficient experience with IndiHome's services and digital communications to meaningfully evaluate all the constructs in this study.

Measurement Model Assessment

Convergent validity was examined using outer loadings and Average Variance Extracted (AVE). As shown in Table 2, all indicator loadings exceeded the 0.70 threshold, with values ranging from 0.851 to 0.929. Every construct also achieved an AVE above 0.50, indicating that each latent variable explains more than half of the variance in its indicators.

These results are consistent with the validity standards applied in comparable SEM-PLS studies on Indonesian digital marketing and service quality [4-13].

Table 2: Outer Loadings and Average Variance Extracted (AVE)

Construct	Outer Loading	AVE	Criteria	Result
Personalization	0,897	0.749	> 0.50	Valid
Perceived Data Transparency	0,901	0.814	> 0.50	Valid
Customer Trust	0,924	0.811	> 0.50	Valid
Customer Engagement	0,908	0.805	> 0.50	Valid
Customer Conversion	0,902	0.854	> 0.50	Valid
Digital Literacy	0,866	0.825	> 0.50	Valid

Construct reliability is reported in Table 3. Cronbach's Alpha values ranged from 0.895 to 0.960, and Composite Reliability values ranged from 0.934 to 0.967. Both indicators comfortably exceeded the minimum threshold of 0.70 for all six constructs, confirming the internal consistency of the measurement model [14].

Table 3: Construct Reliability

Construct	Cronbach's Alpha	Composite Reliability	Criteria	Result
Personalization	0.916	0.937	> 0.70	Reliable
Perceived Data Transparency	0.924	0.946	> 0.70	Reliable
Customer Trust	0.922	0.945	> 0.70	Reliable
Customer Engagement	0.960	0.967	> 0.70	Reliable
Customer Conversion	0.943	0.959	> 0.70	Reliable
Digital Literacy	0.895	0.934	> 0.70	Reliable

Discriminant validity was evaluated using the Heterotrait-Monotrait Ratio (HTMT), as recommended by [14]. Table 4 shows that all inter-construct HTMT values were below the 0.90 threshold. The highest value observed was 0.745, between Customer Engagement and Customer Trust, which is well within the acceptable range and confirms that each construct measures a conceptually distinct domain.

Table 4: Discriminant Validity (HTMT Ratio)

Variable	CV	CT	CE	DL	PDT	PER
Customer Conversion (CV)	-					
Customer Trust (CT)	0.644	-				
Customer Engagement (CE)	0.700	0.745	-			
Digital Literacy (DL)	0.272	0.116	0.134	-		
Perceived Data Transparency (PDT)	0.458	0.552	0.625	0.107	-	
Personalization (PER)	0.557	0.530	0.506	0.148	0.258	-

Structural Model Assessment

The R-squared values for the three endogenous constructs are presented in Table 5, alongside the model fit indicator. Customer Conversion achieved an R-squared of 0.553, meaning that approximately 55.3% of the variation in conversion behavior is explained by the variables in the model. This is a moderate level of explanatory power, and it sits within the range found in comparable Indonesian studies on digital trust and customer loyalty [3-6]. Customer Trust showed an R-squared of 0.404 and Customer Engagement showed 0.467, both reflecting moderate models fit. The SRMR for the estimated model was 0.071, which is below the accepted threshold of 0.08, confirming that the overall model fit is satisfactory.

Table 5: R-Squared Values and Model Fit

Construct	R-Square	R-Square Adjusted	Interpretation
Customer Conversion	0.553	0.545	Moderate
Customer Trust	0.404	0.401	Moderate
Customer Engagement	0.467	0.464	Moderate
SRMR (Model Fit)	0.071	< 0.08	Acceptable

Table 6 reports the effect sizes (f-squared) for each path in the structural model. The largest effect was observed for Perceived

Data Transparency on Customer Engagement (f-squared = 0.451, classified as large), followed by Perceived Data Transparency on Customer Trust (f-squared = 0.278, medium) and Personalization on Customer Trust (f-squared = 0.240, medium). The direct path from Perceived Data Transparency to Customer Conversion showed a negligible effect (f-squared = 0.002), as did the moderation interaction between Digital Literacy and Perceived Data Transparency (f-squared = 0.006). These results provide preliminary evidence that transparency exerts its influence primarily through trust and engagement rather than through a direct path to conversion.

Table 6: R-Squared Values and Model Fit

Path	f-squared	Interpretation
PDT -> Customer Engagement	0.451	Large
PDT -> Customer Trust	0.278	Medium
Personalization -> Customer Trust	0.240	Medium
Personalization -> Customer Engagement	0.224	Medium
Customer Engagement -> Customer Conversion	0.152	Medium
Personalization -> Customer Conversion	0.073	Small
Digital Literacy -> Customer Conversion	0.053	Small
Customer Trust -> Customer Conversion	0.032	Small
DL x Personalization -> Customer Conversion	0.023	Small
PDT -> Customer Conversion	0.002	Negligible
DL x PDT -> Customer Conversion	0.006	Negligible

Direct Effects and Moderation Effects (H1-H10)

Table 7 presents the results for all direct and moderation hypotheses. Figure 2 shows the full structural model with path coefficients and significance indicators. A hypothesis was considered supported when the p-value fell below 0.05 and the t-statistic exceeded 1.96.

Table 7: Hypothesis Testing: Direct Effects

Hyp.	Path	Beta	T-stat.	P-value	Decision
H1	Personalization -> Customer Trust	0.389	9.909	<0.001	Supported
H2	PDT -> Customer Trust	0.419	10.715	<0.001	Supported
H3	Personalization -> Customer Engagement	0.356	9.775	<0.001	Supported
H4	PDT -> Customer Engagement	0.505	14.657	<0.001	Supported
H5	Personalization -> Customer Conversion	0.214	5.224	<0.001	Supported
H6	PDT -> Customer Conversion	0.034	0.792	0.428	Not Supported
H7	Customer Trust -> Customer Conversion				
Conversion	0.178	3.497	<0.001	Supported	
H8	Customer Engagement -> Customer Conversion	0.408	7.981	<0.001	Supported
H9	DL x Personalization -> Customer Conversion	0.104	3.236	0.001	Supported
H10	DL x PDT -> Customer Conversion				
Conversion	0.054	1.513	0.130	Not Supported	

The results in Table 7 show that personalization has a positive and significant effect on all three of its proposed targets: customer trust (H1), customer engagement (H3), and customer conversion

(H5). Perceived data transparency significantly predicts customer trust (H2) and customer engagement (H4), but its direct effect on customer conversion (H6) did not reach statistical significance, with a path coefficient of 0.034 and a p-value of 0.428. Both customer trust (H7) and customer engagement (H8) positively and significantly predict customer conversion, with engagement producing a notably stronger effect ($\beta = 0.408$) compared to trust ($\beta = 0.178$). Regarding moderation, digital literacy amplifies the personalization-to-conversion path (H9, $\beta = 0.104$, $p = 0.001$), but does not moderate the transparency-to-conversion path (H10, $p = 0.130$). These patterns are broadly consistent with social media marketing research showing that relational constructs mediate between marketing inputs and behavioral outcomes more effectively than direct paths alone [13].

Mediation Effects (H11-H14)

The four mediation hypotheses were tested through bootstrapping of indirect effects. The results are presented in Table 8.

Table 8: Hypothesis Testing: Indirect Effects

Hyp.	Path	Beta	T-stat.	P-value	Decision
H11	Personalization -> Customer Trust -> Customer Conversion	0.069	3.264	0.001	Supported
H12	PDT -> Customer Trust -> Customer Conversion	0.075	3.217	0.001	Supported
H13	Personalization -> Customer Engagement -> Customer	0.356	9.775	<0.001	Supported
Conversion	0.145	6.279	<0.001	Supported	Supported
H14	PDT -> Customer Engagement	0.214	5.224	<0.001	Supported

All four indirect effects hypotheses were supported. Customer trust significantly mediates the effect of personalization on customer conversion (H11, $\beta = 0.069$, $p = 0.001$) and the effect of perceived data transparency on customer conversion (H12, $\beta = 0.075$, $p = 0.001$). Customer engagement likewise mediates the effect of personalization (H13, $\beta = 0.145$, $p < 0.001$) and perceived data transparency (H14, $\beta = 0.206$, $p < 0.001$) on customer conversion. The indirect effects running through customer engagement were consistently stronger than those running through customer trust, particularly for the transparency-to-conversion path (H14, $\beta = 0.206$). This finding points to engagement as the more powerful relational channel and is consistent with research showing that sustained customer involvement mediates between trust and behavioral outcomes in Indonesian service contexts [3]. Across all 14 hypotheses, 12 were supported and 2 were rejected, specifically H6 and H10.

Discussion

The results support H1, H3, and H5, indicating that personalization positively influences customer trust, customer engagement, and customer conversion. These findings support Personalization Marketing Theory, which suggests that tailored communications increase relevance and reduce cognitive friction, thereby strengthening customer responses [1]. The findings are also consistent with prior research showing that personalized marketing enhances customer behavioral outcomes in digital environments [4].

The finding that perceived data transparency is the strongest predictor of customer engagement (H4, $\beta = 0.505$) deserves particular attention. When customers feel that a company is clear and honest about how their data is collected and used, they ap-

pear to relax their psychological guard and engage more openly with the brand's communications and offers. This interpretation is supported by Indonesian platform research showing that information quality and perceived trustworthiness of the service provider are prerequisites for meaningful customer involvement [6]. The rejection of H6, the direct path from transparency to conversion, is not surprising in this light. Transparency does not appear to translate immediately into a purchase decision; it instead cultivates the relational soil from which trust and engagement eventually grow. The mediation results for H12 and H14 confirm exactly this sequence.

Customer engagement's dominance as a conversion predictor (H8, $\beta = 0.408$) reflects a fundamental truth about subscription-based services: customers do not convert because they received a message, they convert because they have been genuinely involved with the brand over time. This finding mirrors the pattern observed in the Indonesian HSI loyalty literature, where sustained interaction and psychological commitment, rather than transactional incentives alone, are the real drivers of retention [3]. The mediation results for H13 and H14 further reinforce this by showing that engagement is a necessary pathway through which both personalization and transparency eventually produce conversion [21-28].

Digital literacy's moderating role on the personalization-to-conversion path (H9, $\beta = 0.104$) suggests that customers who are more comfortable navigating digital environments are better equipped to recognize the value of personalized offers and act on them. This is intuitive: a customer who understands how recommendation systems work, or who can quickly evaluate the relevance of a tailored package offer, faces fewer cognitive barriers to conversion. The failure of H10, where digital literacy was expected to moderate the transparency-to-conversion path, is more nuanced. It is possible that highly literate customers are simultaneously more appreciative of transparency and more critical of it, creating a tension that cancels out any amplifying effect. This interpretation is consistent with the personalization-privacy paradox observed in prior literature [11,12].

Conclusion

This study tested 14 hypotheses examining how personalization and perceived data transparency contribute to customer conversion in the Indonesian fixed broadband market. Twelve hypotheses were supported and two were rejected (H6 and H10). The findings establish that personalization works on multiple fronts: it builds trust, raises engagement, and can directly stimulate conversion. Perceived data transparency operates relationally, cultivating trust and engagement that eventually produce conversion outcomes through H12 and H14, rather than generating direct purchase responses.

Customer engagement consistently emerged as the strongest predictor of conversion, reinforcing the view that in subscription services, behavioral outcomes are products of sustained relational investment.

For practitioners, the evidence suggests that personalization should be treated as a long-term relational strategy rather than a short-term sales mechanism, and that data transparency should be communicated proactively through the same digital channels used for promotions. Investments in digital literacy among customer segments with lower digital capability can also expand the effective reach of personalization campaigns, given the confirmed moderating effect in H9. For researchers, the rejection of H6 and H10 points to boundary conditions that warrant further investigation, includ-

ing privacy concern, perceived intrusiveness, and service quality. Longitudinal designs and multi-operator comparisons would also strengthen the generalizability of these findings beyond the single-company context of the present study.

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