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The Human Edge in Offline Electronics Retail: Interpersonal Communication and Customer Loyalty in an E-Commerce Context

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Abstract

The growing integration of e-commerce into consumer purchasing journeys has increased the need for offline electronics retailers to understand the relational value of face-to-face customer–employee interaction. This study examines the associations of three interpersonal communication constructs—empathy, responsiveness, and closeness—with customer loyalty in an offline electronics-retail setting. The term *human edge* is used as an interpretive framing for interpersonal interaction rather than as a separately measured construct, while e-commerce competition serves as the contextual background rather than a variable in the tested model. A quantitative cross-sectional explanatory survey was conducted among 123 customers of MMS Computer in Tangerang, Indonesia, selected through purposive sampling. The data were analyzed using partial least squares structural equation modeling (PLS-SEM). Empathy was positively associated with customer loyalty ($\beta = 0.306$, $t = 3.793$, $p < 0.001$), as was responsiveness ($\beta = 0.542$, $t = 7.362$, $p < 0.001$). Closeness showed a positive but statistically non-significant association ($\beta = 0.153$, $t = 1.694$, $p = 0.090$). The three predictors jointly explained 42.0% of the variance in customer loyalty. The findings indicate differentiated associations among interpersonal communication constructs: empathy and responsiveness were independently associated with customer loyalty, whereas closeness did not demonstrate an independent statistically significant association. The study contributes context-specific evidence on how distinct interpersonal communication functions relate to customer loyalty within offline electronics retail operating alongside e-commerce.

KEYWORDS
customer loyalty; empathy; interpersonal communication; offline electronics retail; responsiveness.

Introduction

Digital transformation has reconfigured contemporary retail by expanding digital touchpoints, reducing information-search barriers, and enabling consumers to move more fluidly between online and offline channels. Retailing has consequently shifted from predominantly store-centered exchange toward interconnected customer journeys in which physical and digital touchpoints coexist (Cui et al., 2022). Within this environment, physical stores face increasing pressure to provide forms of value that extend beyond product availability alone. Recent empirical retail research indicates that personalization and relationship-oriented customer-journey design can support the continuing role of physical stores within omnichannel environments (Scholdra et al., 2023; Zheng & Li, 2024). This challenge is particularly relevant to electronics retail. Product evaluation may involve technical specifications, device compatibility, intended use, warranty conditions, price–performance considerations, and after-sales assistance. The role of physical retail can therefore remain important when consumers require clarification or consultation that complements information available through digital channels. Research on multichannel retailing indicates that the relevance of offline stores varies according to product functionality and information-search requirements (Kim et al., 2024), while research on omnichannel shopping shows that interactions with in-store employees can provide product knowledge, clarification, expertise, and problem-solving assistance during purchase decisions (Sharma et al., 2024). Physical presence alone, however, does not establish customer value; the quality of the face-to-face interaction remains important.

This study uses the term human edge as an analytical framing for the potential value generated through face-to-face customer–employee communication. It is not specified or tested as a separate latent construct. More specifically, the term refers in this article to the differentiated relevance of interpersonal communication qualities that can occur during direct employee–customer interaction. It does not encompass other possible advantages of physical retail, such as price, product assortment, store atmosphere, location, or technology-enabled service, because these factors were not included in the empirical model. The purpose of the framing is therefore not to establish that human interaction is inherently superior to digital interaction, but to examine whether particular interpersonal qualities are differently associated with customer loyalty within an offline retail setting where digital alternatives are readily accessible(Hamdan, 2022; Wufron et al., 2026).

Relationship-marketing theory provides a broader theoretical basis for this inquiry because it emphasizes the development and maintenance of enduring relational exchanges. Commitment-Trust Theory identifies trust and commitment as central mechanisms supporting successful relational exchange (Morgan & Hunt, 1994). In the present study, however, trust and commitment were not measured and are therefore used only as interpretive theoretical mechanisms rather than as components of the tested structural model. Accordingly, positive interpersonal contact alone should not be assumed to produce customer loyalty.

The present study focuses on three conceptually distinct qualities of customer–employee interaction: empathy, responsiveness, and closeness (Hidayat, 2024; Putrawansyah, 2024). Empathy concerns employees' ability to recognize and understand customers' needs, circumstances, concerns, and intended product use. Evidence from physical retail settings indicates that employee attention can enhance customers' perceptions of being recognized and valued during service encounters (Söderlund & Julander, 2025). Responsiveness concerns the provision of timely, relevant, and helpful assistance. Frontline-employee research indicates that task and interaction competence contribute to customers' evaluations of store encounters (Lucia-Palacios et al., 2020), while omnichannel research highlights the value of employee expertise and problem-solving assistance during customer journeys (Sharma et al., 2024). Closeness concerns interpersonal familiarity, comfort, and personal connection between customers and store personnel. Customer–employee rapport research has associated relational connection with favorable service and loyalty-related outcomes (Gremler & Gwinner, 2000), while more recent service research has continued to identify rapport and authenticity as relevant aspects of customer–employee interaction (Lindsey-Hall et al., 2020).

What is already known, however, does not resolve how these interpersonal qualities operate when considered simultaneously**.** Omnichannel studies have primarily examined broader phenomena such as customer journeys, channel interactivity, personalization, physical-store relevance, and customer experience (Cui et al., 2022; Scholdra et al., 2023; Zheng & Li, 2024). Studies focusing more directly on frontline employees have demonstrated the relevance of employee competence, expertise, interaction, attention, and rapport, but commonly examine these qualities within different conceptual models and frequently use outcomes such as customer evaluations, engagement, satisfaction, or relational responses rather than comparing empathy, responsiveness, and closeness simultaneously as predictors of loyalty (Lindsey-Hall et al., 2020; Lucia-Palacios et al., 2020; Sharma et al., 2024; Söderlund & Julander, 2025). Cross-channel research, meanwhile, demonstrates that customers may combine digital and physical channels through behaviors such as webrooming and showrooming, further complicating assumptions that loyalty develops within a single channel (Flavián et al., 2020).

As shown in Table 1, the closest empirical studies have examined related interpersonal qualities such as frontline competence, rapport, employee expertise, and customer recognition, but they have generally done so within different conceptual models and against different outcomes. The present study differs by estimating empathy, responsiveness, and closeness simultaneously as conceptually distinct predictors of customer loyalty. This comparison further clarifies that the contribution of the study lies in the model-level differentiation of interpersonal functions rather than merely in the Indonesian retail context.

The remaining uncertainty therefore concerns the differentiated loyalty relevance of specific interpersonal communication functions**.** Empathy represents individualized understanding, responsiveness represents timely and useful assistance, and closeness represents relational familiarity and interpersonal comfort. The studies synthesized above establish that each broader form of interaction can matter in service or retail encounters, but they do not resolve whether these three qualities exhibit similar or differentiated associations with customer loyalty when estimated simultaneously within the same structural model. This distinction is theoretically relevant because customers may value a familiar relationship without necessarily regarding familiarity as sufficient for continued patronage, while timely assistance may provide immediate value even in the absence of strong personal familiarity. Conversely, responsiveness without adequate understanding of the customer's circumstances may provide incomplete interpersonal value.

Accordingly, the three variables are treated in this study as separate first-order constructs rather than dimensions of a higher-order functional-relational construct.

Table 1. Comparison of Closely Related Empirical Studies and the Present Study

Prior study	Interpersonal focus	Main outcome	Difference from present study
Lucia-Palacios et al. (2020)	Frontline task and interaction competence	Store-encounter evaluations	Does not jointly estimate empathy, responsiveness, and closeness as loyalty predictors
Lindsey-Hall et al. (2020)	Rapport and authenticity	Service-relationship evaluations	Focuses primarily on relational qualities rather than their independent contribution alongside functional interpersonal qualities
Sharma et al. (2024)	Employee expertise and problem-solving	Customer engagement / omnichannel journey	Does not isolate responsiveness together with empathy and closeness as predictors of loyalty
Söderlund & Julander (2025)	Employee attention and recognition	Customer recognition/value perceptions	Does not estimate empathy simultaneously with responsiveness and closeness against loyalty
Present study	Empathy, responsiveness, and closeness	Customer loyalty	Simultaneously estimates three distinct interpersonal functions to examine their independent associations with loyalty

Source: Synthesized by the authors from the studies reviewed in the literature (2026).

Any broader functional-versus-relational pattern is interpreted only from the empirical configuration of the three estimated relationships and is not itself modeled as a latent construct. This specification avoids assuming in advance that empathy and responsiveness are inherently more important than closeness and allows their relationships with customer loyalty to be evaluated separately. Customer loyalty is an appropriate outcome for examining these distinctions because loyalty extends beyond repeated purchasing to include an enduring preference for a provider despite competing alternatives (Oliver, 1999). In this study, loyalty is represented through repurchase intention, willingness to recommend the retailer, and resistance to competing alternatives. These aspects are particularly relevant in contemporary retail environments in which customers can obtain information and alternative purchase opportunities across multiple channels. E-commerce competition therefore defines the context in which the interpersonal relationships are examined; it is not included as an independent, mediating, or moderating variable, and the study does not test whether the intensity of e-commerce competition changes the relationships among the focal constructs.

On this basis, empathy is expected to be positively associated with customer loyalty. Empathic communication indicates that employees recognize customers' individual circumstances rather than responding in a purely standardized manner. Such individualized understanding may be relevant in electronics retail because customers vary in intended use, budget, prior knowledge, and technical requirements. Evidence that employee attention can strengthen customers' positive evaluations of physical service encounters provides support for expecting an association between individualized understanding and loyalty-related responses (Söderlund & Julander, 2025). Accordingly,

H1: Empathy is positively associated with customer loyalty.

Responsiveness is also expected to be positively associated with customer loyalty because it reflects employees' ability to address customer questions and service needs in a timely and useful manner. In retail encounters requiring consultation, customers may evaluate not only whether employees communicate with them but also whether the interaction helps resolve concrete informational or service-related problems. Evidence concerning frontline competence and employee problem-solving in store and omnichannel settings supports the relevance of timely and useful assistance to customer evaluations and engagement (Lucia-Palacios et al., 2020; Sharma et al., 2024). Accordingly:

H2: Responsiveness is positively associated with customer loyalty.

Closeness is expected to be positively associated with customer loyalty because interpersonal familiarity can contribute to comfort, continuity, and personal connection between customers and store personnel. Customer–employee rapport research indicates that enjoyable interaction and personal connection can contribute to favorable relational outcomes (Gremler & Gwinner, 2000), while subsequent frontline-service research has continued to identify rapport and employee authenticity as relevant to customers' evaluations of service relationships (Lindsey-Hall et al., 2020). Nevertheless, whether closeness remains independently associated with loyalty when empathy and responsiveness are estimated simultaneously remains an empirical question. Accordingly:

H3: Closeness is positively associated with customer loyalty.

Novelty Statement**.** The contribution of this study is positioned as a theoretical and model-level refinement rather than primarily as a new contextual application. Previous empirical studies have established the relevance of individualized employee attention, frontline competence and problem-solving, employee expertise, and customer–employee rapport in shaping favorable service and relational outcomes. However, these interpersonal qualities have generally been examined within different conceptual models and against different outcomes, including customer evaluations, engagement, satisfaction, and broader relational responses. Consequently, the existing literature does not establish whether individualized understanding, timely and useful assistance, and relational familiarity retain independent associations with customer loyalty when considered simultaneously. As summarized in Table 1, the closest empirical studies have examined related interpersonal qualities, but they have generally done so within different conceptual models and against different outcomes.

The present study addresses this unresolved issue by distinguishing three interpersonal functions: empathy as individualized understanding, responsiveness as timely and useful assistance, and closeness as relational familiarity and interpersonal comfort. The specific theoretical refinement tested is that customer–employee interpersonal communication should not automatically be treated as a homogeneous relational resource(Rani et al., 2025). Instead, conceptually distinct interpersonal functions may exhibit differentiated independent associations with customer loyalty when estimated within the same structural model.

This proposition is empirically examined through H1–H3 by estimating the three interpersonal functions simultaneously. Such specification makes it possible to determine whether each interpersonal quality retains an independent association with customer loyalty after the other two qualities are statistically taken into account. A differentiated pattern of statistical support would therefore indicate that the loyalty relevance of face-to-face interaction depends on the specific interpersonal function represented rather than on interpersonal contact or relational familiarity in general. The Indonesian offline electronics-retail setting provides the empirical context for testing this theoretical refinement rather than constituting the primary source of novelty.

Method

Research Design

This study employed a quantitative cross-sectional explanatory survey design to examine theoretically specified associations between three interpersonal communication constructs—empathy, responsiveness, and closeness—and customer loyalty within a single period of observation. Because the data were collected at one point in time, the estimated structural paths are interpreted as associations consistent with the proposed theoretical model rather than as evidence of temporal or causal effects.

The study was primarily explanatory, focusing on estimating the direct associations among the latent constructs and assessing the proportion of variance in customer loyalty explained by the proposed model. Partial least squares structural equation modeling (PLS-SEM) was employed to evaluate the reflective measurement models and structural relationships simultaneously, following contemporary recommendations for PLS-SEM assessment (Hair et al., 2026). In addition to explanatory assessment through standardized path estimates, statistical significance, effect sizes, and explained variance, supplementary predictive assessment was conducted using Q^2predict and out-of-sample prediction-error criteria. The predictive assessment was used to evaluate the model's predictive performance rather than to redefine the study as primarily prediction-oriented.

E-commerce competition was treated as the contextual condition motivating the study rather than as an independent, mediating, or moderating construct. Accordingly, the structural model comprised three exogenous constructs—empathy, responsiveness, and closeness—and one endogenous construct, customer loyalty. Comparisons among the three standardized path coefficients were interpreted descriptively unless supported by a formal statistical comparison; therefore, coefficient magnitude alone was not treated as evidence of a statistically established hierarchy among the predictors.

Population and Sample

The target population consisted of individuals with direct experience interacting with MMS Computer's sellers or staff through store visits, product consultations, or purchases. Because a complete sampling frame of eligible customers was not available, purposive sampling was employed to recruit respondents with relevant first-hand experience of the retailer's interpersonal communication and service. Eligible participants were required to have visited or purchased from MMS Computer, interacted directly with store personnel, been at least 17 years old, voluntarily agreed to participate, and possessed sufficient experience to evaluate the store's interpersonal communication and service.

A total of 123 usable responses were retained for analysis. Sample adequacy was evaluated using an explicit statistical-power criterion rather than relying solely on the traditional ten-times rule, which may provide imprecise estimates of minimum sample requirements in PLS-SEM (Kock & Hadaya, 2018). Because the original study did not document an a priori power analysis, a sample-adequacy calculation was conducted for the revised manuscript using a fixed-model multiple-regression test of R^2 deviation from zero, corresponding to the customer-loyalty equation with three predictors. With a significance level of $\alpha = .05$, a target statistical power of .80, three predictors, and a medium effect size of $f^2 = .15$ as the minimum effect of substantive interest, the calculation indicated a minimum required sample of 77 respondents. The achieved sample of 123 therefore exceeded this requirement.

This assessment indicates that the available sample was adequate for detecting effects of approximately medium magnitude under the specified assumptions. It should not, however, be interpreted as evidence that the study had sufficient statistical power to detect substantially smaller effects. Furthermore, because purposive sampling is a non-probability procedure, adequacy in terms of statistical power does not imply statistical representativeness of the broader population of electronics consumers.

Research Setting

The study was conducted at MMS Computer in Tangerang, Banten, Indonesia, an offline electronics retailer operating in a market environment in which consumers can readily access online information about products, specifications, prices, promotions, and alternative sellers. Electronics retail provides a relevant setting for examining interpersonal communication because purchase decisions may involve clarification of technical specifications, device compatibility, product suitability, stock availability, warranty conditions, and after-sales support.

In this setting, physical-store interactions enable customers to obtain immediate clarification, personalized recommendations, technical consultation, and problem-solving assistance directly from store personnel. E-commerce competition was therefore used to characterize the broader retail environment in which these interpersonal encounters occurred. However, neither respondents' individual exposure to e-commerce nor the intensity of competitive pressure faced by the retailer was directly measured. Consequently, the study does not treat e-commerce competition as an empirically verified characteristic or causal factor in the structural model.

Instrumentation and Measurement

Primary data were collected using a structured, closed-ended questionnaire developed specifically for this study. The instrument was not adopted verbatim from a single existing scale. Instead, the items were generated through construct-based operationalization of empathy, responsiveness, closeness, and customer loyalty using established conceptual foundations. The questionnaire was developed and administered in Indonesian and employed a five-point Likert scale ranging from 1 (strongly disagree) to 5 (strongly agree). Respondents were instructed to evaluate each statement according to their personal experience interacting with sellers or staff at MMS Computer.

The measurement model included three conceptually distinct interpersonal-communication constructs: empathy, responsiveness, and closeness. Empathy was measured using eight items (X1.1–X1.8) covering attention to customer needs, understanding of customer circumstances, listening behavior, and the provision of recommendations appropriate to individual needs. These items were conceptually informed by DeVito, (2016) interpersonal-communication framework. Responsiveness was measured using eight items (X2.1–X2.8) covering response speed, clarity of information, assistance during customer difficulties, and appropriate responses to customer questions or complaints. Its operationalization was informed by the responsiveness dimension of service quality proposed by Parasuraman et al., (1988) . Closeness was measured using eight items (X3.1–X3.8) representing communication comfort, interpersonal familiarity, ease of requesting further information, and perceived personal connection with store personnel, drawing conceptually on customer–employee rapport research, particularly Gremler and Gwinner (2000).

Customer loyalty was initially operationalized using 18 indicators representing three substantive content domains: repurchase intention (Y1–Y6), recommendation (Y7–Y12), and resistance to competing alternatives (Y13–Y18). This operationalization was conceptually informed by Dick & Basu, (1994) and Oliver (1999). The three domains were intended to provide complementary behavioral and attitudinal coverage of an overall customer-loyalty orientation rather than to represent independently theorized lower-order latent constructs with distinct structural roles. Accordingly, a multidimensional or higher-order specification was not imposed a priori because such a specification would require treating the three content domains as empirically distinguishable latent dimensions. Customer loyalty was therefore specified as a single first-order reflective construct in the primary PLS-SEM model, subject to a supplementary dimensionality assessment to evaluate whether the observed data supported this parsimonious specification.

Prior to the main data collection, the questionnaire was reviewed by the undergraduate thesis supervisor. This supervisory review provided a pre-administration assessment of the questionnaire and its Indonesian wording. The supervisory review was not treated as a formal multi-expert content-validity procedure, and no content-validity index was calculated. Because the questionnaire was developed directly in Indonesian rather than translated from an English-language instrument, no translation or back-translation procedure was undertaken. However, a separate pilot study or respondent pretest was not conducted before the main survey administration. This absence of a formal respondent pretest is acknowledged as a methodological limitation of the study. (See Table 2).

Data Collection Procedures

Data were collected from MMS Computer customers using a mixed-mode questionnaire administration procedure comprising direct and online distribution. The questionnaire was administered directly to customers visiting MMS Computer and was also distributed online through Google Forms to individuals who met the study eligibility criteria. The same substantive questionnaire, screening questions, eligibility requirements, and response scale were applied across both modes of administration to maintain consistency in the information collected.

The final analytical dataset consisted of 123 usable responses. However, the original study records did not retain a sufficiently reliable mode-specific identifier to reconstruct with confidence the exact number of usable responses obtained through direct administration and Google Forms. Likewise, the available documentation does not record a formal duplicate-prevention or duplicate-detection procedure

based on unique identifiers across the two modes. Accordingly, the study does not claim that duplicate participation across modes was empirically ruled out.

No formal statistical comparison of response patterns between direct and online administration was conducted in the original analysis. Consequently, potential mode-related differences in respondent characteristics or response behavior could not be evaluated directly. This limitation is acknowledged when interpreting the findings and should be addressed in future mixed-mode studies by retaining administration mode as a dataset variable, implementing duplicate-screening procedures, and conducting mode-comparison analyses where sample sizes permit.

Data Analysis

Data analysis was conducted using SmartPLS 4 following a sequential partial least squares structural equation modeling (PLS-SEM) procedure. The analysis began with data screening to verify respondent eligibility and response completeness, followed by descriptive statistics to summarize respondent characteristics and the central tendencies of the study constructs. The PLS-SEM analysis then proceeded in two stages: evaluation of the reflective measurement model and evaluation of the structural model. Supplementary predictive assessment was subsequently performed to examine the model's out-of-sample predictive performance (Hair et al., 2026).

The reflective measurement model was evaluated using indicator loadings, average variance extracted (AVE), Cronbach's alpha, rho_A, and composite reliability (rho_C). Indicator loadings of approximately 0.70 or higher were preferred. Indicators with loadings between approximately 0.40 and 0.70 were not automatically removed; their retention was considered jointly with construct reliability, AVE, and the need to preserve the substantive content of the construct. Indicators were considered for removal when weak indicator performance adversely affected construct-level measurement quality. AVE values of at least 0.50 were used to establish convergent validity, whereas Cronbach's alpha, rho_A, and rho_C values of approximately 0.70 or higher were used as evidence of satisfactory internal-consistency reliability (Hair et al., 2026).

Discriminant validity was assessed primarily using the heterotrait–monotrait ratio (HTMT), supplemented by the Fornell–Larcker criterion. Because empathy, responsiveness, and closeness represent conceptually related but theoretically distinguishable interpersonal constructs, an HTMT value below 0.90 was used as the primary criterion for empirical distinctiveness (Henseler et al., 2015). The Fornell–Larcker criterion was examined as a complementary diagnostic by comparing the square root of each construct's AVE with its correlations with the other constructs (Fornell & Larcker, 1981).

Because customer loyalty was represented by three substantive content domains within a single first-order reflective construct, a supplementary dimensionality assessment was also conducted for the 17 loyalty indicators retained in the final model. An unrotated principal component analysis of the inter-item correlation matrix was used to examine whether a dominant common component was present. The three substantive item groupings—repurchase intention, recommendation, and resistance to competing alternatives—were additionally evaluated using standardized Cronbach's alpha, inter-facet correlations, and HTMT values to assess whether they demonstrated sufficient empirical distinctiveness to justify treatment as separate latent constructs.

To evaluate whether the substantive conclusions were sensitive to the retention of the weakest indicators, a supplementary sensitivity analysis was conducted. The measurement and structural models were re-estimated after removing X1.6 from the empathy construct and X3.7 from the closeness construct, which had the lowest outer loadings in the primary model. The sensitivity model retained the same structural specification and the same 123 observations. Measurement quality was reassessed using Cronbach's alpha, rho_A, rho_C, and AVE. Structural robustness was evaluated by comparing standardized path coefficients and R^2 with those obtained from the primary model. Statistical inference for the sensitivity model was additionally examined using 5,000 nonparametric bootstrap resamples and 95% percentile-bootstrap confidence intervals. The sensitivity analysis was treated as a robustness check and did not replace the theoretically specified primary measurement model. The sensitivity bootstrap was independently reproduced from the raw dataset using the same PLS path-weighting specification rather than being treated as a separate primary SmartPLS model.

Following evaluation and retention of the final measurement model, the structural model was assessed for collinearity, explanatory power, path estimates, and effect sizes.

Table 2. Item–Source Mapping and Conceptual Domains

Construct	Item codes	Operational domain	Conceptual source
Empathy	X1.1–X1.2	Attention to customer needs	DeVito (2016)
Empathy	X1.3–X1.4	Understanding customer circumstances	DeVito (2016)
Empathy	X1.5–X1.6	Listening behavior	DeVito (2016)
Empathy	X1.7–X1.8	Need-appropriate recommendations	DeVito (2016)
Responsiveness	X2.1–X2.2	Timeliness of responses	Parasuraman et al. (1988)
Responsiveness	X2.3–X2.4	Clarity of information	Parasuraman et al. (1988)
Responsiveness	X2.5–X2.6	Assistance during product selection	Parasuraman et al. (1988)
Responsiveness	X2.7–X2.8	Response to questions/problems	Parasuraman et al. (1988)
Closeness	X3.1–X3.2	Communication comfort and acceptance	Gremler & Gwinner (2000)
Closeness	X3.3–X3.4	Familiar and pleasant interaction	Gremler & Gwinner (2000)
Closeness	X3.5–X3.6	Ease of requesting additional explanation	Gremler & Gwinner (2000)
Closeness	X3.7–X3.8	Personal relationship and individualized treatment	Gremler & Gwinner (2000)
Customer loyalty	Y1–Y6	Repurchase intention	Dick & Basu (1994); Oliver (1999)
Customer loyalty	Y7–Y12	Recommendation	Dick & Basu (1994); Oliver (1999)
Customer loyalty	Y13–Y18	Resistance to competing alternatives	Dick & Basu (1994); Oliver (1999)

Note. The original questionnaire grouped the loyalty items by substantive domain. For statistical analysis, the 18 loyalty items were sequentially coded Y1–Y18. Indicator Y7 was subsequently removed during measurement-model assessment.

Inner-model variance inflation factor (VIF) values were examined to assess collinearity among empathy, responsiveness, and closeness as predictors of customer loyalty, with values below 5.00 treated as acceptable. The coefficient of determination (R^2) and adjusted R^2 were used to report the proportion of variance in customer loyalty accounted for by the three predictors. Standardized path coefficients (β) were used to estimate the direction and magnitude of the theoretically specified associations, while f^2 effect sizes were calculated to assess the contribution of each exogenous construct to the explained variance in customer loyalty (Hair et al., 2026). Because the near-unity inner-model VIF values and the relatively weak correlations among the three interpersonal constructs were unusual, a targeted data-quality verification was conducted before interpreting the structural results. Item coding was checked against the original questionnaire and raw dataset, including the direction of all response scales and the potential need for reverse scoring. The final SmartPLS indicator dataset was also compared with the original response data after the removal of Y7. In addition, the latent-variable scores were independently reconstructed from the standardized retained indicators using the final outer weights, and inner- and outer-model VIF statistics were examined separately. As a supplementary check, unit-weighted mean scores were calculated directly from the raw indicators to determine whether the low interconstruct correlations were also present independently of the PLS weighting procedure.

Statistical inference for the three hypothesized direct paths was conducted using nonparametric bootstrapping in SmartPLS 4 with 5,000 bootstrap samples. The bootstrapping procedure used a percentile-bootstrap confidence-interval method, a fixed seed, and two-tailed testing at a significance level of 5%. Accordingly, 95% percentile-bootstrap confidence intervals were examined together with standardized path coefficients, t statistics, and p values. A structural relationship was interpreted as statistically supported when $p < 0.05$ and the corresponding 95% confidence interval did not include zero. The archived SmartPLS output did not display a separate sign-change setting; therefore, no sign-change option was retrospectively inferred or reported. The magnitudes of the standardized coefficients were compared descriptively; a larger coefficient was not interpreted as statistically larger than another coefficient because no formal pairwise coefficient-difference test was conducted.

Because the study was primarily explanatory but included a supplementary assessment of predictive performance, PLSpredict was conducted in SmartPLS 4 using 10-fold predictive cross-validation repeated 10 times. The prediction type was set to Early antecedents and a fixed seed was used. Predictive performance was assessed at the customer-loyalty indicator level using Q^2predict together with root mean squared error (RMSE) and mean absolute error (MAE). Prediction errors from the PLS-SEM model were compared with both the linear-model (LM) benchmark and the indicator-average (IA) benchmark. Positive Q^2predict values were interpreted as evidence that the model generated predictive information relative to the naïve benchmark, while RMSE and MAE comparisons were used to evaluate whether the PLS-SEM predictions produced lower out-of-sample prediction errors than the benchmark models. The predictive assessment was used as supplementary evidence of model performance and was not treated as a substitute for the explanatory structural-model results.

Finally, because the predictor and outcome constructs were obtained from the same respondents through the same questionnaire, common-method variance was recognized as a potential source of bias. The documented survey procedures included experience-based eligibility screening, voluntary participation, confidentiality of responses, and standardized questionnaire administration. However, the original study did not document a dedicated statistical common-method-bias diagnostic. Accordingly, the analysis does not claim that common-method bias was empirically ruled out, and this issue is retained as a methodological limitation when interpreting the observed associations.

Ethical Considerations and Informed Consent

Participation in the study was voluntary. Before completing the questionnaire, prospective respondents were informed that their responses would be used for academic research purposes, reported in aggregate form, and treated confidentially. Respondents were required to indicate their willingness to participate before proceeding to the substantive questionnaire. Permission to conduct the study at MMS Computer was obtained from the retailer, as documented by a research confirmation letter dated May 4, 2026. This organizational permission authorized questionnaire administration at the research setting but did not constitute institutional ethics approval.

Results and Discussion

Respondent Characteristics

A total of 123 respondents met the eligibility criteria and were included in the analysis. Male respondents accounted for 67.48% of the sample, whereas 32.52% were female. The largest age group was 21–30 years (41.46%), followed by respondents older than 40 years (22.76%), those aged 31–40 years (20.33%), and those aged 17–20 years (15.45%). Employees constituted the largest occupational group (45.53%),

Table 3. Respondent Characteristics

Characteristic	Category	n	%
Gender	Male	83	67.48
	Female	40	32.52
Age	17–20 years	19	15.45
	21–30 years	51	41.46
	31–40 years	25	20.33
	>40 years	28	22.76
Occupation	Employee	56	45.53
	Student	32	26.02
	Entrepreneur	23	18.70
	Homemaker	10	8.13
	Police officer	2	1.62
Visit frequency	1 time	24	19.51
	2–3 times	50	40.65
	4–5 times	24	19.51
	>5 times	25	20.33

Source: Primary data processed by the authors (2026).

Table 4. Descriptive Statistics of the Study Constructs

Construct	Mean	Median	Minimum	Maximum	SD
Empathy	3.771	4.000	2.875	4.250	0.347
Responsiveness	3.797	4.000	3.000	4.250	0.340
Closeness	3.771	4.000	2.875	4.250	0.368
Customer loyalty	3.804	3.941	2.941	4.235	0.330

Source: Primary data processed by the authors (2026).

Table 5. Indicator Loadings of the Final Measurement Model

Empathy	Loading	Responsiveness	Loading	Closeness	Loading	Customer Loyalty	Loading
X1.1	0.836	X2.1	0.749	X3.1	0.857	Y1	0.658
X1.2	0.770	X2.2	0.715	X3.2	0.818	Y2	0.740
X1.3	0.748	X2.3	0.665	X3.3	0.723	Y3	0.749
X1.4	0.698	X2.4	0.810	X3.4	0.683	Y4	0.623
X1.5	0.719	X2.5	0.792	X3.5	0.764	Y5	0.767
X1.6	0.486	X2.6	0.629	X3.6	0.811	Y6	0.631
X1.7	0.705	X2.7	0.644	X3.7	0.545	Y8	0.787
X1.8	0.727	X2.8	0.756	X3.8	0.682	Y9	0.770
—	—	—	—	—	—	Y10	0.776
—	—	—	—	—	—	Y11	0.608
—	—	—	—	—	—	Y12	0.718
—	—	—	—	—	—	Y13	0.632
—	—	—	—	—	—	Y14	0.745
—	—	—	—	—	—	Y15	0.694
—	—	—	—	—	—	Y16	0.602
—	—	—	—	—	—	Y17	0.821
—	—	—	—	—	—	Y18	0.668

Source: SmartPLS output from the research dataset (2026).

followed by students (26.02%), entrepreneurs (18.70%), homemakers (8.13%), and police officers (1.62%).

Most respondents had previous experience with the store beyond a single visit. Specifically, 40.65% reported visiting MMS Computer two to three times, 19.51% reported four to five visits, and 20.33% had visited more than five times. Thus, 80.49% of the sample had visited the store more than once, indicating that most respondents had repeated exposure to MMS Computer and its service interactions before evaluating the study constructs. (See Table 3).

Descriptive Statistics

Descriptive statistics indicated generally favorable evaluations across all four constructs. Customer loyalty recorded the highest mean score (M = 3.804, SD = 0.330), followed by responsiveness (M = 3.797, SD = 0.340). Empathy and closeness had identical mean scores of 3.771, with standard deviations of 0.347 and 0.368, respectively.

The median values were approximately 4 across the constructs, indicating that respondents generally tended toward agreement with the questionnaire statements. Standard deviations ranged from 0.330 to 0.368, suggesting relatively limited dispersion in respondent evaluations. These descriptive results provide an overview of customer perceptions but were not used to determine hypothesis support, which was assessed through the PLS-SEM structural model. (See Table 4).

Measurement Model Assessment

The reflective measurement model was assessed before interpreting the structural relationships. Indicator reliability, internal-consistency reliability, convergent validity, and discriminant validity were evaluated using outer loadings, Cronbach's alpha, rho_A, composite reliability (rho_C), average variance extracted (AVE), the heterotrait–monotrait ratio (HTMT), and the Fornell–Larcker criterion.

During the initial measurement-model evaluation, indicator Y7 of the customer-loyalty construct was removed because of its weak contribution to the construct and because its retention resulted in an AVE below the minimum acceptable criterion. The model was subsequently re-estimated after Y7 was removed. The final measurement model therefore retained all eight empathy indicators, all eight responsiveness indicators, all eight closeness indicators, and 17 of the original 18 customer-loyalty indicators. The retained customer-loyalty indicators continued to represent the three substantive content domains of repurchase intention, recommendation, and resistance to competing alternatives.

As a supplementary assessment of the customer-loyalty measurement structure, the 17 retained indicators were examined to determine whether they were more consistent with a dominant common dimension or with empirically distinguishable facet-based groupings. The first component accounted for 50.29% of the total variance, with a first eigenvalue of 8.549 compared with 1.017 for the second component, yielding a first-to-second eigenvalue ratio of 8.40. In addition, all retained customer-loyalty indicators loaded positively on the first component, with loadings ranging from 0.611 to 0.817. These results indicated the presence of a substantial common dimension underlying the retained loyalty indicators.

The three substantive domains—repurchase intention, recommendation, and resistance to competing alternatives—were also examined separately to assess whether they demonstrated sufficient empirical distinctiveness to justify treatment as separate latent constructs. Their standardized Cronbach's alpha coefficients were 0.828, 0.840, and 0.838, respectively, indicating satisfactory internal consistency within each grouping. However, the three facet scores were strongly intercorrelated, with correlations ranging from 0.809 to 0.854. More importantly, HTMT values among the three facet-based groupings ranged from 0.969 to 1.029, exceeding the conventional threshold of 0.90. These findings indicated insufficient discriminant validity for treating the three substantive domains as empirically distinct first-order latent constructs.

Taken together, the dominant first component, the positive loadings of all retained indicators on that component, the strong correlations among the three substantive domains, and the lack of discriminant validity among the facet-based groupings were consistent with retaining customer loyalty as a parsimonious single first-order reflective construct in the primary PLS-SEM model.

As shown in Table 5, indicator loadings in the final measurement model ranged from 0.486 to 0.857. Several retained indicators had loadings below the preferred value of approximately 0.70. The two weakest indicators were X1.6 for empathy (loading = 0.486) and X3.7 for closeness (loading = 0.545). Their retention was not based solely on exceeding a minimum loading threshold. X1.6 represents attentive listening and interpersonal attention when customers explain their product-related needs, thereby preserving the listening component of empathy. X3.7 represents customers' perception of having a positive interpersonal relationship with store personnel, thereby preserving the personal-relationship component of closeness. Removing these items from the primary model solely on statistical grounds could therefore narrow the substantive content coverage of the two constructs. At the construct level, empathy and closeness continued to satisfy the specified reliability and convergent-validity criteria in the primary model.

A supplementary sensitivity analysis was conducted by removing X1.6 and X3.7 and re-estimating the measurement and structural models. Measurement quality improved modestly after removal of the two weakest indicators. For empathy, Cronbach's alpha remained stable at 0.868, rho_A was 0.876, composite reliability (rho_C) was 0.897, and AVE increased from 0.515 in the primary model to 0.555 in the sensitivity model. For closeness, Cronbach's alpha was 0.890, rho_A was 0.924, rho_C was 0.908, and AVE increased from 0.550 to 0.588. Thus, removal of the two weakest indicators improved convergent-validity estimates without materially altering internal-consistency reliability.

Discriminant validity was primarily assessed using HTMT because the three interpersonal communication constructs are theoretically related but were modeled as empirically distinct constructs. As shown in Table 7, all pairwise HTMT values were below the predefined threshold of 0.90. The values ranged from 0.112 to 0.594, with the highest HTMT observed between responsiveness and customer loyalty (0.594) (See Table 6). These results indicate that the four constructs demonstrated adequate empirical distinctiveness based on the HTMT criterion. The Fornell–Larcker criterion was examined as a complementary assessment of discriminant validity. The square root of the AVE for each construct, presented on the diagonal of Table 8, exceeded its correlations with the other constructs. Empathy, responsiveness, closeness, and customer loyalty therefore also satisfied the Fornell–Larcker criterion Taken together, the indicator-level and construct-level assessments support the adequacy of the final reflective measurement model. Following the removal of Y7 and subsequent model re-estimation, all four constructs met the specified criteria for convergent validity and internal-consistency reliability, while HTMT and Fornell–Larcker assessments supported discriminant validity. The analysis therefore proceeded to evaluation of the structural model.

Structural Model Assessment

Following establishment of satisfactory measurement quality, the structural model was assessed in terms of collinearity, explanatory power, effect sizes, and the statistical significance of the hypothesized structural paths. Because the very low correlations among the three interpersonal predictors and the corresponding near-unity inner-model VIF values represented an unusual empirical pattern, additional data-quality checks were performed before interpreting the structural results.

The verification did not identify a coding or scoring error that could account for this pattern. The final SmartPLS indicator matrix was consistent with the original response data for all 123 observations and all 41 indicators retained after the removal of Y7. Item direction was also checked against the original questionnaire. All indicators were coded so that higher scores represented higher levels of their respective constructs, and no reverse-score transformation was required. Items expressing resistance to competing alternatives were likewise positively keyed to customer loyalty, such that greater agreement represented greater resistance to switching. The construct-score calculation was additionally verified by independently reconstructing the latent-variable scores from the standardized indicator data and the final outer weights.

Table 6. Construct Reliability and Convergent Validity

Construct	*Cronbach's Alpha*	*rho_A*	*rho_C*	*AVE*
Empathy	*0.867*	*0.884*	*0.893*	*0.515*
Responsiveness	*0.868*	*0.873*	*0.897*	*0.522*
Closeness	*0.887*	*0.933*	*0.906*	*0.550*
Customer Loyalty	*0.937*	*0.944*	*0.944*	*0.502*

Source: SmartPLS output from the research dataset (2026).

Table 7. Heterotrait–Monotrait Ratio (HTMT)

Construct	Empathy	Responsiveness	Closeness	Customer Loyalty
Empathy	—			
Responsiveness	0.112	—		
Closeness	0.115	0.149	—	
Customer Loyalty	0.287	0.594	0.197	—

Source: SmartPLS output from the research dataset (2026).

Table 8. Fornell–Larcker Criterion

Construct	Empathy	Responsiveness	Closeness	Customer Loyalty
Empathy	**0.717**			
Responsiveness	-0.019	**0.723**		
Closeness	-0.019	0.108	**0.741**	
Customer Loyalty	0.293	0.552	0.206	**0.708**

Source: SmartPLS output from the research dataset (2026).

The reconstructed scores reproduced the SmartPLS latent-variable scores to numerical precision. The resulting SmartPLS construct-score correlations among the three predictors were -0.019 for empathy–responsiveness, -0.019 for empathy–closeness, and 0.108 for responsiveness–closeness. As an additional check independent of the PLS weighting procedure, correlations based on unit-weighted mean scores from the raw indicators were -0.028, -0.033, and 0.083, respectively. The similarly weak correlations obtained from the raw composite scores indicate that the pattern was present in the observed responses rather than being generated by the PLS weighting procedure.

Outer- and inner-model VIF statistics were also verified separately. Outer-model VIF values ranged from 1.387 to 3.057, whereas the final inner-model VIF values were 1.001 for empathy and 1.012 for both responsiveness and closeness. Independent recalculation of the inner VIF values from the final construct-score correlation matrix reproduced the SmartPLS results. Thus, although the near-unity inner VIF values are unusual for conceptually related predictors, the available checks indicate that they reflect the weak empirical associations among the three predictor scores in this sample rather than an identified coding, reverse-scoring, construct-score, or VIF-extraction error.

The coefficient of determination for customer loyalty was R^2 = 0.420, with an adjusted R^2 of 0.406. Thus, empathy, responsiveness, and closeness collectively accounted for 42.0% of the observed variance in customer loyalty. The R^2 value is reported descriptively rather than assigned a qualitative strength category because the interpretation of explained variance depends on the research context and model specification.

Empathy showed a positive and statistically significant association with customer loyalty (β = 0.306, t = 3.793, p < 0.001), with a 95% bootstrap confidence interval of [0.170, 0.454] and f^2 = 0.162. Therefore, H1 was supported. Responsiveness also showed a positive and statistically significant association with customer loyalty (β = 0.542, t = 7.362, p < 0.001), with a 95% bootstrap confidence interval of [0.393, 0.680] and f^2 = 0.500. Therefore, H2 was supported. Closeness showed a positive estimated association with customer loyalty (β = 0.153), but the relationship was not statistically significant (t = 1.694, p = 0.090), and its 95% bootstrap confidence interval included zero [-0.108, 0.307]. The corresponding f^2 value was 0.040. Therefore, H3 was not supported. (See Table 9).

To examine whether the structural conclusions were sensitive to the retention of the two weakest indicators, a supplementary sensitivity analysis was conducted by removing X1.6 from empathy and X3.7 from closeness and re-estimating the model using the same 123 observations and structural specification. Table 10 compares selected measurement-quality and structural-model results between the primary and sensitivity models.

More importantly, the structural results remained substantively stable. The empathy–customer loyalty association changed only slightly from β = 0.306 in the primary model to β = 0.309 in the sensitivity model and remained statistically significant (t = 4.109, p < 0.001, 95% percentile-bootstrap CI [0.177, 0.453]). The responsiveness–customer loyalty association remained virtually unchanged (β = 0.541, t = 7.441, p < 0.001, 95% CI [0.393, 0.678]). The closeness–customer loyalty association also remained essentially unchanged in magnitude (β = 0.153) and remained statistically non-significant (t = 1.769, p = 0.077, 95% CI [-0.075, 0.309]). The R^2 for customer loyalty changed only marginally from 0.420 in the primary model to 0.423 in the sensitivity model.

Taken together, the sensitivity analysis indicates that removal of X1.6 and X3.7 modestly improved AVE but did not materially change the magnitude, direction, or substantive interpretation of the structural relationships. Empathy and responsiveness remained positively and statistically associated with customer loyalty, whereas closeness remained statistically non-significant. The primary model therefore retained X1.6 and X3.7 to preserve the intended substantive coverage of empathy and closeness, while the sensitivity analysis demonstrates that the principal structural conclusions were not dependent on these two weak indicators.

Predictive Assessment

As a supplementary assessment of model performance, the out-of-sample predictive performance of the structural model was examined using PLSpredict in SmartPLS 4. The procedure employed 10-fold predictive cross-validation repeated 10 times and was conducted for the 17 customer-loyalty indicators retained in the final measurement model. Predictive performance was evaluated using Q^2predict together with root mean squared error (RMSE) and mean absolute error (MAE).

All Q^2predict values were positive, ranging from 0.049 to 0.327. This result indicates that, for each retained customer-loyalty indicator, the PLS-SEM model generated predictive information relative to the naïve prediction benchmark. The positive Q^2predict values therefore provide initial evidence that the model possessed out-of-sample predictive relevance for the loyalty indicators examined.

Prediction-error performance was further evaluated by comparing the PLS-SEM model with both the linear-model (LM) benchmark and the indicator-average (IA) benchmark. Across all 17 retained customer-loyalty indicators, the PLS-SEM model produced lower RMSE and MAE values than both benchmark approaches. The consistency of this pattern across the retained indicators indicates that the PLS-SEM model generated comparatively lower out-of-sample prediction errors than the LM and IA benchmarks.

Taken together, the positive Q^2predict values and the lower RMSE and MAE values relative to both benchmark approaches provide supplementary evidence of the model's predictive performance. These findings are interpreted as complementary to, rather than a substitute for, the explanatory structural-model results because the primary objective of the study remains the examination of theoretically specified associations between empathy, responsiveness, closeness, and customer loyalty. (See Table 11).

Interpretation of Key Findings

The findings indicate that interpersonal communication in customer–employee encounters should not be treated as a homogeneous relational resource. The three constructs examined in this study showed differentiated associations with customer loyalty: empathy and responsiveness were positively and statistically supported, whereas closeness did not

demonstrate an independent statistically significant association when all three constructs were estimated simultaneously. This pattern is more informative than simply establishing whether interpersonal communication matters because it suggests that different interpersonal qualities may relate to loyalty through different forms of customer value. Importantly, the observed ordering of the standardized coefficients is descriptive rather than evidence of a statistically established hierarchy among the three predictors.

The positive association between empathy and customer loyalty is consistent with the view that individualized understanding can create relational value during face-to-face service encounters. Empathy in this study reflects employees' ability to recognize customer needs, circumstances, and concerns rather than providing a purely standardized response. Previous research in physical retail settings indicates that employee attention and recognition can strengthen customers' sense of importance and satisfaction, supporting the broader relevance of individualized interpersonal treatment (Söderlund & Julander, 2025). Related frontline-service research also suggests that interpersonal behaviors can contribute to favorable relational evaluations, including trust-related responses (Park & Yi, 2023). In the present study, however, trust was not measured. It should therefore be regarded as a plausible mechanism for future testing rather than as an empirically established explanation of the observed empathy–loyalty association.

Responsiveness displayed the largest estimated standardized path coefficient and the largest effect-size estimate among the three predictors. This pattern suggests that customers' perceptions of timely, relevant, and helpful assistance may be particularly salient in the retail setting examined. Contemporary research on frontline employees shows that task and interaction competence contribute to customers' evaluations of store encounters, particularly where consultation and assistance are required (Lucia-Palacios et al., 2020). Evidence from omnichannel retail similarly indicates that interactions with in-store employees can contribute to customer engagement by providing product knowledge, clarification, expertise, and problem-solving assistance (Sharma et al., 2024). The present findings extend this literature by identifying responsiveness as one specific interpersonal quality associated with customer loyalty rather than treating employee interaction as an undifferentiated service resource.

One plausible contextual interpretation is that responsiveness becomes valuable when customers require immediate clarification concerning product specifications, compatibility, availability, warranty conditions, or other purchase-related questions. Electronics purchases can involve considerable information processing and product evaluation, making timely interpersonal assistance potentially useful. Nevertheless, these specific informational demands were not measured as mechanisms in the structural model. The findings therefore support an association between perceived responsiveness and loyalty, but they do not establish that technical complexity, information search, or problem solving caused that association.

The non-significant association between closeness and customer loyalty provides an important qualification to relationship-oriented interpretations of face-to-face retail. Previous customer–employee rapport research has linked interpersonal connection with favorable service evaluations, loyalty intentions, and related relational outcomes (Fatima et al., 2020; Gremler & Gwinner, 2000; Lindsey-Hall et al., 2020). The present finding does not contradict the broader proposition that relational familiarity can be valuable. Rather, it indicates that closeness did not explain a statistically significant independent portion of customer loyalty after empathy and responsiveness were considered simultaneously in this particular sample.

This result suggests that interpersonal familiarity and comfort may not be sufficient, by themselves, to account for continued retailer preference. Closeness may instead operate as a supportive relational resource whose relevance depends on other interpersonal, experiential, or transactional conditions. It is also possible that closeness influences outcomes through mechanisms such as trust, satisfaction, perceived value, or relationship quality rather than through a direct association with loyalty. These possibilities were not examined in the present model and should therefore be treated as directions for future research rather than explanations established by the current data.

Viewed collectively, the pattern both converges with and qualifies previous service and retail research. The positive findings for empathy and responsiveness are consistent with evidence that customers value recognition, employee competence, and useful interpersonal assistance during service encounters. At the same time, the relatively larger estimated coefficient for responsiveness differs from findings reported in some high-service contexts in which empathy has appeared comparatively prominent. Such differences should not be interpreted as evidence of a universal ordering of interpersonal constructs/qualities. Rather, they suggest that the relative relevance of empathy, responsiveness, and relational familiarity may vary according to the characteristics of the service setting, the type of purchase decision, and the form of assistance customers seek. These contextual possibilities require direct comparative testing across retail categories.

The observed pattern also helps refine the study's use of the human edge concept. The term should not be interpreted as a separately measured construct or as evidence that human interaction is inherently superior to digital interaction. Rather, it serves as an interpretive framing for the potential value generated through face-to-face communication. Within the specific setting examined, the findings suggest that this value may be associated more clearly with employees' capacity to understand customer needs and provide timely, relevant assistance than with interpersonal familiarity alone. This interpretation is consistent with contemporary retail research emphasizing that physical and digital capabilities can complement rather than simply replace one another (Scholdra et al., 2023; Sharma et al., 2024).

E-commerce competition should likewise remain a contextual feature of the study rather than an explanatory variable. Respondents' exposure to e-commerce, online price comparison, showrooming, webrooming, or perceived attractiveness of digital alternatives was not directly measured. Consequently, the results do not show that e-commerce competition strengthened, weakened, or caused the observed interpersonal communication–loyalty relationships. The empirical contribution is limited to the differentiated associations among empathy, responsiveness, closeness, and customer loyalty within an offline electronics-retail setting in which digital alternatives were readily available.

Theoretical Implications

The principal theoretical implication of this study is that interpersonal communication in face-to-face retail should be conceptualized as a differentiated set of customer–employee interaction qualities rather than as a single homogeneous relational resource. Empathy, responsiveness, and closeness represent distinct interpersonal functions—understanding customer needs, providing timely assistance, and creating relational familiarity—and the present findings show that these functions were not associated with customer loyalty in the same way. This differentiation extends relationship-oriented retail research by shifting attention from whether interpersonal interaction is valuable in general to how particular qualities of that interaction may be differently associated with loyalty.

The findings suggest an emergent functional-relational pattern, but they do not establish a universal hierarchy among empathy, responsiveness, and closeness. Responsiveness produced the largest estimated standardized association with

customer loyalty, empathy also showed a statistically supported positive association, whereas closeness did not demonstrate an independent statistically significant association. Because no formal pairwise coefficient-difference test was conducted, this pattern should be interpreted as evidence of differentiated associations rather than proof that responsiveness is statistically superior to the other interpersonal constructs. The theoretical contribution therefore lies in distinguishing interpersonal functions within the same structural model, not in establishing a fixed ranking among them.

This pattern also refines the application of relationship-marketing theory in the present context. Relationship-marketing perspectives emphasize the development and maintenance of enduring customer relationships, while Commitment-Trust Theory identifies trust and commitment as central mechanisms supporting relational exchange (Morgan & Hunt, 1994). The present study did not measure trust or commitment, however. Consequently, these concepts should be treated as interpretive mechanisms that may help explain why reliable, individualized, and useful interpersonal exchanges could support enduring customer relationships, rather than as mechanisms empirically demonstrated by the current model. Future research can extend the present findings by explicitly testing whether trust, commitment, perceived value, or relationship quality mediate the associations between interpersonal communication constructs and customer loyalty.

The non-significant closeness relationship provides an additional theoretical qualification. Existing customer–employee rapport and relational-benefit research indicates that interpersonal connection can contribute to positive service and loyalty-related outcomes (Gremler & Gwinner, 2000). The present evidence suggests that relational familiarity may nevertheless have limited independent explanatory value when other interpersonal qualities are considered simultaneously. This does not imply that closeness lacks relational value; instead, it raises the possibility that familiarity may function as a complementary resource whose relationship with loyalty depends on other mechanisms or conditions. This proposition requires direct empirical testing and should not be treated as established by the current cross-sectional model.

Finally, the findings clarify the theoretical status of the human edge framing used in this study. The human edge is not proposed as a new latent construct and was not directly measured. Rather, it provides an interpretive framework for considering the forms of customer value that face-to-face interaction may provide within increasingly digital retail environments. The present pattern suggests that such value may arise not merely from interpersonal contact or familiarity, but from the combination of individualized understanding and timely, contextually relevant assistance. This interpretation complements contemporary retail perspectives that view human-enabled and technology-enabled customer experiences as potentially complementary rather than inherently competing resources (Scholdra et al., 2023; Sharma et al., 2024).

Practical Implications

The findings provide several evidence-informed priorities for MMS Computer rather than prescriptions that can be assumed to increase customer loyalty. Because responsiveness showed a statistically supported positive association with customer loyalty and produced the largest estimated standardized path coefficient in the model, the retailer may consider strengthening responsiveness as a customer-communication capability. In practical terms, this could involve helping frontline employees provide timely and relevant responses to customer questions and ensuring ready access to information concerning product specifications, compatibility, stock availability, warranty conditions, and after-sales support. These initiatives should be treated as service-development priorities to be evaluated in practice rather than as interventions whose causal effects on loyalty have been established by the present study.

Empathy represents a complementary priority. Its positive association with customer loyalty suggests that responsive service may be more useful when it is also sensitive to the customer's individual circumstances. MMS Computer may therefore encourage employees to identify customers' intended product use, budget, prior technical knowledge, preferences, and specific concerns before recommending products or solutions. Such an approach would combine timely assistance with individualized understanding rather than reducing responsiveness to speed alone. This recommendation is consistent with prior evidence emphasizing the value of employee expertise, problem solving, and customer-sensitive interaction in contemporary retail encounters (Sharma et al., 2024).

The findings provide a different managerial interpretation for closeness. Although interpersonal familiarity may remain useful for creating comfort, continuity,

Table 9. Structural Model Assessment and Hypothesis Testing

Hypothesis	Structural path	VIF	β	95% Bootstrap CI	t	p	f^2	Decision
H1	Empathy → Customer Loyalty	1.001	0.306	[0.170, 0.454]	3.793	<0.001	0.162	Supported
H2	Responsiveness → Customer Loyalty	1.012	0.542	[0.393, 0.680]	7.362	<0.001	0.500	Supported
H3	Closeness → Customer Loyalty	1.012	0.153	[-0.108, 0.307]	1.694	0.090	0.040	Not supported

Source: Authors' analysis of SmartPLS 4 output from the research dataset (2026).

Table 10. Sensitivity Analysis Following Removal of X1.6 and X3.7

Assessment	Primary model	Sensitivity model
Empathy AVE	0.515	0.555
Empathy rho_C	0.893	0.897
Closeness AVE	0.550	0.588
Closeness rho_C	0.906	0.908
Empathy → Loyalty β	0.306	0.309
Responsiveness → Loyalty β	0.542	0.541
Closeness → Loyalty β	0.153	0.153
R^2 Customer Loyalty	0.420	0.423

Note. The sensitivity model excluded X1.6 and X3.7 and used the same 123 observations and structural specification as the primary model.

Table 11. PLSpredict Assessment for Customer Loyalty Indicators

Indicator	Q²predict	PLS RMSE	LM RMSE	IA RMSE	PLS MAE	LM MAE	IA MAE
Y1	0.103	0.488	0.560	0.515	0.323	0.396	0.370
Y2	0.056	0.420	0.460	0.433	0.296	0.343	0.333
Y3	0.292	0.375	0.437	0.446	0.264	0.320	0.336
Y4	0.099	0.441	0.508	0.465	0.295	0.362	0.340
Y5	0.327	0.380	0.430	0.464	0.262	0.319	0.349
Y6	0.207	0.398	0.472	0.446	0.266	0.340	0.319
Y8	0.182	0.369	0.407	0.408	0.256	0.293	0.310
Y9	0.189	0.453	0.504	0.503	0.317	0.359	0.412
Y10	0.168	0.366	0.428	0.401	0.251	0.300	0.300
Y11	0.105	0.495	0.515	0.524	0.338	0.362	0.404
Y12	0.147	0.445	0.517	0.482	0.291	0.352	0.353
Y13	0.183	0.454	0.501	0.502	0.300	0.354	0.382
Y14	0.151	0.412	0.451	0.447	0.270	0.316	0.316
Y15	0.155	0.440	0.508	0.479	0.298	0.356	0.375
Y16	0.049	0.529	0.610	0.542	0.372	0.442	0.425
Y17	0.265	0.425	0.454	0.495	0.304	0.349	0.396
Y18	0.089	0.430	0.493	0.451	0.304	0.357	0.353

Source: Authors' analysis of SmartPLS 4 PLSpredict output from the research dataset (2026).

and a more personal service encounter, closeness did not show an independent statistically significant association with customer loyalty after empathy and responsiveness were considered simultaneously. MMS Computer should therefore avoid treating familiarity with customers as a stand-alone loyalty strategy. Instead, relational familiarity may be used as a complementary resource that supports, rather than substitutes for, accurate understanding of customer needs and useful service responses. More broadly, the results suggest that the practical value of face-to-face retail interaction may depend less on interpersonal contact alone and more on the quality and usefulness of that interaction. For MMS Computer, an appropriate service priority would therefore be to combine responsive assistance with individualized understanding while maintaining interpersonal familiarity as a supporting relational element. Similar electronics retailers may use this pattern as a basis for developing and testing their own customer-communication practices, but the present findings should not be generalized as a universal prescription because the evidence was obtained from a single retailer using purposive sampling and a cross-sectional design.

Limitations and Future Research

Several limitations define the boundaries within which the findings should be interpreted. First, the study employed a cross-sectional design. The structural paths therefore represent statistical associations observed at a single period of measurement and do not establish temporal ordering or causality.

Second, although the questionnaire was developed from established conceptual foundations and reviewed by the undergraduate thesis supervisor prior to data collection, the study did not include a separate pilot or respondent pretest. Consequently, the study lacks independent pre-administration evidence regarding respondent comprehension, item ambiguity, and completion feasibility. The subsequent PLS-SEM measurement assessment provides empirical evidence regarding reliability and validity but cannot substitute for a dedicated pretest. Future studies should incorporate cognitive pretesting or pilot testing with respondents before full-scale data collection.

Third, the study relied on purposive sampling and was conducted within a single electronics retailer in Tangerang, Indonesia. The sample therefore should not be interpreted as statistically representative of electronics consumers or offline retailers more broadly. Although the achieved sample exceeded the minimum requirement for detecting an effect of approximately medium magnitude under the specified power-analysis assumptions, the study may have had limited statistical power to detect substantially smaller effects. Accordingly, the non-significant association observed for closeness should not be interpreted as evidence that the underlying population relationship is necessarily zero. Retailer characteristics, customer profiles, product categories, employee capabilities, and local market conditions may also differ across settings. Replication across multiple retailers and geographic locations, using probability-oriented sampling procedures where feasible, would provide stronger evidence regarding the extent to which the observed pattern is reproducible across retail contexts.

Fourth, empathy, responsiveness, closeness, and customer loyalty were measured through self-reported responses obtained from the same respondents within the same questionnaire. This design creates potential exposure to common-method variance, social-desirability bias, and discrepancies between stated loyalty and subsequent customer behavior. The documented survey procedures included experience-based eligibility screening, voluntary participation, confidentiality of responses, and standardized questionnaire administration; however, the original study records do not document a dedicated statistical diagnostic specifically designed to assess common-method bias. The present study therefore does not claim that common-method bias was empirically ruled out. Future research could reduce this concern by combining customer-perception measures with temporally separated measurements, multiple data sources, or behavioral outcomes such as transaction records, repeat purchases, recommendation behavior, and customer-retention data.

Fifth, the questionnaire was administered through both direct and online modes. Although the same substantive questionnaire, screening criteria, eligibility requirements, and response scale were applied across the two modes, the original study records did not retain a reliable mode-specific identifier for reconstructing the exact number of usable responses contributed by each mode. The available documentation also did not record a formal cross-mode duplicate-prevention or duplicate-detection procedure, and no statistical analysis of mode-related response differences was conducted. Potential selection effects, duplicate-participation risk, and mode effects therefore cannot be fully excluded.

Future mixed-mode studies should retain administration mode as an explicit dataset variable, apply privacy-preserving duplicate-screening procedures, and test whether respondent characteristics or response patterns differ systematically across administration modes.

Sixth, an additional limitation concerns the ethical documentation available for the original study. The research did not undergo formal institutional ethics review, and no institutional approval or exemption number was issued. Although participation was voluntary and respondents indicated their willingness to participate before completing the questionnaire, the study used a minimum eligibility age of 17 years. Because age was recorded in grouped categories, the available records do not allow respondents aged exactly 17 years to be distinguished retrospectively from those aged 18–20 years. Moreover, the original documentation does not establish whether parental or guardian consent was obtained for any potentially under-18 participant. This limitation cannot be resolved retrospectively from the available dataset and should be considered when evaluating the study's ethical documentation. Future research should obtain prospective institutional ethics review where applicable, use clearly documented age-appropriate consent procedures, and retain sufficiently granular age information to verify participant eligibility.

Seventh, the model accounted for 42.0% of the variance in customer loyalty. The remaining variance should not be interpreted as evidence that the model is inadequate, nor should it be attributed retrospectively to specific factors that were not measured. Rather, it defines the theoretical scope of the present model, which was intentionally limited to empathy, responsiveness, and closeness. Customer loyalty may also involve mechanisms beyond these interpersonal communication constructs. Future studies could extend the model by testing theoretically specified mechanisms such as trust, satisfaction, perceived value, customer engagement, or relationship quality, particularly as mediators between interpersonal communication and loyalty.

Eighth, e-commerce competition was used as the contextual motivation for the study rather than as a measured construct. The analysis therefore does not establish whether exposure to online alternatives strengthens, weakens, or otherwise modifies the relationships between interpersonal communication and customer loyalty. Future studies could directly measure online price-comparison intensity, showrooming, webrooming, digital-channel preference, online consumer informedness, or the perceived attractiveness of e-commerce alternatives. These variables could then be examined as predictors or moderators to determine whether digital-market conditions alter the associations between face-to-face communication and loyalty.

Finally, the human edge examined in this article remains an interpretive framing rather than a directly measured latent construct. The current findings therefore provide evidence concerning the differentiated associations of empathy, responsiveness, and closeness with loyalty, not a direct empirical test of the human edge itself. Future research could operationalize this broader concept explicitly by specifying its dimensions and testing its relationship with human-enabled and technology-enabled customer experiences. Theory-driven mediation and moderation models could also examine whether mechanisms such as trust, perceived value, or customer engagement explain when and how particular interpersonal qualities become associated with loyalty.

Conclusion

This study examined the associations of empathy, responsiveness, and closeness with customer loyalty in an offline electronics-retail setting in Tangerang, Indonesia. The findings showed differentiated relationships across the three interpersonal communication constructs. Empathy was positively and statistically associated with customer loyalty, and responsiveness also showed a positive and statistically significant association while producing the largest estimated standardized path coefficient. In contrast, closeness showed a positive but statistically non-significant association when the three predictors were considered simultaneously. Together, the three constructs accounted for 42.0% of the variance in customer loyalty.

The study contributes to interpersonal communication and relationship-marketing research by showing that face-to-face customer–employee interaction may be more informative when understood as a set of distinct interpersonal functions rather than as a single homogeneous relational resource. The observed pattern suggests that individualized understanding and timely, useful assistance may be particularly relevant within the retail context examined, whereas relational familiarity alone did not demonstrate an independent statistically significant association with loyalty. The human edge should therefore be understood as an interpretive framing of this pattern rather than as a separately measured or empirically validated construct.

For MMS Computer, the findings provide an evidence-informed basis for giving greater attention to responsive and customer-sensitive communication while treating interpersonal familiarity as a complementary relational resource. These implications should nevertheless be interpreted within the study's boundaries: the research used a cross-sectional design, purposive sampling, self-reported data, and a single-retailer setting. Moreover, e-commerce competition was not measured as an independent, mediating, or moderating variable. The findings therefore establish context-specific associations rather than causal effects or universally generalizable relationships.

Author Contributions

Sandhika Jun Wiyogo contributed to the conceptualization, investigation, data curation, formal analysis, and preparation of the original draft. Suryadi Wardiana contributed to supervision, methodology, validation, and review and editing of the manuscript. Both authors reviewed and approved the final version of the manuscript and agreed to be accountable for the accuracy and integrity of the work.

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