

Integrating Technology-Based and Human-Based CRM in Islamic Higher Education: Student Willingness to Churn

***Ana Rimbahari¹, Amalina Nur Arifah², Agniya Thahira³**

^{1,2,3}Universitas Siber Muhammadiyah, Jl. HOS Cokroaminoto No. 17, Wirobrajan, Daerah Istimewa Yogyakarta, Indonesia

*anarimbahari@sibermu.ac.id

ABSTRACT: *Student retention is a challenge in managing higher education, including Muhammadiyah and Aisyiyah Higher Education (PTMA) which is based on Islamic values. From an Islamic education management perspective, the sustainability of the relationship between institutions and students not only depends on the effectiveness of services, but also the quality of human relations and the use of technology. This research aims to analyze the influence of Technology-Based Customer Relationship Management (T-CRM) and Human-Based Customer Relationship Management (H-CRM) on student willingness to churn in PTMA students in Indonesia partially and simultaneously. The research uses a cross-sectional quantitative approach. Primary data was obtained from 120 active PTMA students through a 28-item questionnaire with a Likert scale of five answer choices. Secondary data comes from literature and previous research. The sample was selected using systematic random sampling. Data were analyzed through descriptive statistics, Pearson correlation, classical assumption tests and multiple linear regression using IBM SPSS 26. The validity of the instrument was tested through expert review, Confirmatory Factor Analysis (CFA), and Cronbach's alpha reliability. The Cronbach's alpha values (T-CRM: $\alpha = 0.87$; H-CRM: $\alpha = 0.84$; Churn: $\alpha = 0.82$). The results show that T-CRM has a negative and significant effect on student willingness to churn ($\beta = -0.24$; $p < 0.001$), while H-CRM has a negative and significant effect with a stronger effect ($\beta = -0.32$; $p < 0.001$). Simultaneously, both explained 52.4% of the variation in students' propensity to leave the institution ($R^2 = 0.524$; $p < 0.001$). These findings indicate that the management of Islamic education at PTMA needs to combine the use of technology with interpersonal relationships that are service-oriented and caring for students. Thus, CRM in the context of Islamic education not only functions as a student retention strategy, but can also be part of educational management practices that integrate technological efficiency with the relational dimensions and values of Islamic education. The study's limitations lie in its cross-sectional design which limits causal inference. The originality of the research lies in the integration of T-CRM and H-CRM in the context of PTMA Islamic higher education in Indonesia.*

Retensi mahasiswa merupakan tantangan dalam pengelolaan pendidikan tinggi, termasuk Perguruan Tinggi Muhammadiyah dan Aisyiyah (PTMA)

¹ orcid id: <https://orcid.org/0009-0009-6361-0870>

² orcid id: <https://orcid.org/0009-0000-3658-9732>

³ orcid id: <https://orcid.org/0009-0000-6637-7212>

yang berbasis nilai-nilai Islam. Dalam perspektif manajemen pendidikan Islam, keberlanjutan hubungan institusi dan mahasiswa tidak hanya bergantung pada efektivitas layanan, tetapi juga kualitas relasi kemanusiaan dan pemanfaatan teknologi. Penelitian ini bertujuan menganalisis pengaruh *Technology-Based Customer Relationship Management* (T-CRM) dan *Human-Based Customer Relationship Management* (H-CRM) terhadap *student willingness to churn* pada mahasiswa PTMA di Indonesia secara parsial dan simultan. Penelitian menggunakan pendekatan kuantitatif *cross-sectional*. Data primer diperoleh dari 120 mahasiswa aktif PTMA melalui kuesioner 28 item dengan skala *likert* lima pilihan jawaban. Data sekunder berasal dari literatur dan penelitian terdahulu. Sampel dipilih menggunakan *systematic random sampling*. Data dianalisis melalui statistik deskriptif, *korelasi Pearson*, uji asumsi klasik dan regresi linear berganda menggunakan IBM SPSS 26. Keabsahan instrumen diuji melalui *expert review*, *Confirmatory Factor Analysis* (CFA), dan reliabilitas *Cronbach's alpha*. Adapun nilai *Cronbach's alpha* (T-CRM: $\alpha = 0,87$; H-CRM: $\alpha = 0,84$; Churn: $\alpha = 0,82$). Hasil menunjukkan T-CRM berpengaruh negatif dan signifikan terhadap *student willingness to churn* ($\beta = -0,24$; $p < 0,001$), sedangkan H-CRM berpengaruh negatif dan signifikan dengan pengaruh lebih kuat ($\beta = -0,32$; $p < 0,001$). Secara simultan, keduanya menjelaskan 52,4% variasi kecenderungan mahasiswa meninggalkan institusi ($R^2 = 0,524$; $p < 0,001$). Temuan tersebut menunjukkan bahwa pengelolaan pendidikan Islam di PTMA perlu memadukan pemanfaatan teknologi dengan hubungan interpersonal yang berorientasi pada pelayanan dan kepedulian terhadap mahasiswa. Dengan demikian, CRM dalam konteks pendidikan Islam tidak hanya berfungsi sebagai strategi retensi mahasiswa, tetapi juga dapat menjadi bagian dari praktik manajemen pendidikan yang mengintegrasikan efisiensi teknologi dengan dimensi relasional dan nilai-nilai pendidikan Islam. Keterbatasan penelitian terletak pada desain *cross-sectional* yang membatasi inferensi kausal. Originalitas penelitian terletak pada integrasi T-CRM dan H-CRM dalam konteks pendidikan tinggi Islam PTMA di Indonesia.

Keywords: CRM, *Technology-Based CRM*, *Human-Based CRM*, *Student Churn*, *Islamic Higher Education*, *Islamic Education*.

Received: April 9, 2026; *Revised:* August 7, 2026; *Accepted:* September 18, 2026

I. INTRODUCTION

Indonesia's Islamic higher education sector is confronted with a critical and growing student retention challenge. Recent national statistics indicate that approximately 30% of students enrolled at Muhammadiyah and Aisyiyah Higher Education institutions (PTMA) withdrew from their studies during the 2022–2023 academic cycle (Kemendikbud, 2023). These figures are particularly alarming given that PTMA institutions collectively constitute one of the largest private higher education networks in Southeast Asia, with a distinctive sociocultural and educational mission grounded in Islamic values. Student attrition at this scale not only undermines institutional financial sustainability but also diminishes the broader social impact of these institutions (Hemsley-Brown & Oplatka, 2006). Moreover, research confirms that the costs of student dropout extend beyond institutional revenues to encompass negative

consequences for students themselves, including diminished career prospects and reduced socioeconomic mobility (Gonçalves et al., 2024). Student willingness to churn—defined as a student's cognitive predisposition to discontinue enrollment or transfer to a competing institution—has increasingly been studied through the frameworks of consumer behavior and behavioral intention theory (Ajzen, 2020; Zeithaml et al., 2018). Empirical evidence consistently links churn intention to perceived service quality, relational dissatisfaction, and inadequate institutional support (Borishade et al., 2021; Del Río-Rama et al., 2021; Hrnjic, 2016). Palomino & Ortega (2023), in a systematic review of dropout intention research, service quality and institutional support were identified as among the most robust predictors of retention, reinforcing the need for institutions to adopt proactive, relationship-oriented strategies.

Customer Relationship Management (CRM) has emerged as a strategic institutional response to student attrition (Khashab, Ayoubi, et al., 2022; Octavia et al., 2023). In the higher education context, students are increasingly conceptualised as customers whose satisfaction, loyalty, and retention are central to institutional health (Hemsley-Brown & Oplatka, 2006; Soliman, 2011). CRM is broadly defined as a business strategy that integrates internal processes and functions, and external networks, to create and deliver value to targeted customers at a profit (Payne & Frow, 2013). In higher education, CRM is adapted to encompass all institutional efforts to build and sustain meaningful, long-term relationships with students (Hemsley-Brown & Oplatka, 2006; Soliman, 2011). The application of CRM in education is grounded in relationship marketing theory (Zeithaml et al., 2018), which posits that retaining existing customers (students) is more cost-effective than acquiring new ones (Zeithaml et al., 2018).

The integration of ICT within CRM frameworks significantly enhances customer lock-in—the degree to which customers are committed to a service provider. In the educational context, this translates to increased student loyalty and reduced attrition (Badwan et al., 2017; Hrnjic, 2016). Relationship quality—comprising trust, commitment, and satisfaction—is recognised as the central mediating mechanism through which CRM practices reduce churn. CRM can be classified into two complementary dimensions: technology-based CRM (T-CRM), which encompasses digital tools, automated communication systems, and data analytics platforms for scalable student engagement (Garrido-Moreno et al., 2020; Rajput et al., 2018), and human-based CRM (H-CRM), which centers on empathetic interpersonal interactions between staff and students (Rimbahari & Wijaya, 2020; Shrestha, 2020). The strategic integration of both dimensions has gained significant traction in higher education management literature (Khashab, Gulliver, et al., 2022; Shalihati et al., 2025).

T-CRM refers to the use of digital technologies—including enterprise resource planning (ERP) systems, learning management systems (LMS), chatbots, automated email campaigns, and student information systems—to manage student interactions at scale (Rajput et al., 2018) found that high reliance on self-service technology in CRM generated cost savings and improved service scalability. However, they also noted that over-reliance on technology without human supplementation may reduce customer satisfaction due to the impersonal nature of automated interactions.

In the higher education context, T-CRM enables institutions to proactively identify at-risk students through predictive analytics, communicate through personalised digital channels, and streamline administrative processes. These capabilities are associated

with improved student engagement and reduced dropout intent (Badwan et al., 2017; Hrnjic, 2016).

Furthermore, H-CRM encompasses interpersonal, empathy-driven interactions between institutional staff and students. These include academic advising, mentoring, counseling, peer support programs, and face-to-face communication with administrative staff (Rimbahari & Wijaya, 2020; Shrestha, 2020). The theoretical basis for H-CRM draws from emotional intelligence theory and social support theory, which emphasise that individuals' sense of belonging and wellbeing is shaped significantly by perceived interpersonal care and responsiveness. Shrestha (2020) found that universities with structured empathy training programs for academic staff demonstrated significantly lower student dropout rates. Similarly, Manogharan (2016) documented that personalised human interaction was the strongest predictor of student loyalty in Malaysian private universities. These findings converge on the conclusion that H-CRM is indispensable in educational environments, particularly for students navigating the complex social and academic challenges of university life.

Several prior studies have examined CRM in educational settings, yet notable gaps persist. Badwan et al. (2017) investigated CRM technology adoption in Palestinian universities, but did not account for the human dimension. Hrnjic (2016) explored CRM's impact on student satisfaction in Bosnian universities but focused predominantly on technology without quantifying the combined effect. Manogharan (2016) examined CRM and student retention in Malaysian private universities without differentiating T-CRM and H-CRM as distinct constructs. Rimbahari & Wijaya (2020) and Shrestha (2020) analysed T-CRM and H-CRM in the banking sector, leaving a gap in its application to higher education. Furthermore, none of these studies were conducted in the context of Indonesian Islamic higher education, where distinctive institutional values and socio-religious dynamics may moderate CRM effectiveness. The present study's novelty is threefold: *first*, it simultaneously examines T-CRM and H-CRM as dual predictors of student churn intention within a single quantitative model. *Second*, it is set in the unique institutional context of PTMA. *Third*, it contributes empirical evidence from Indonesian Islamic higher education, an underrepresented context in the global CRM-in-education literature (Shalihati et al., 2025). Based on this rationale, this study tests the following hypotheses: H1 — T-CRM has a significant negative effect on student willingness to churn; H2 — H-CRM has a significant negative effect on student willingness to churn; H3 — the simultaneous integration of T-CRM and H-CRM exerts a greater negative effect on student willingness to churn than either dimension alone.

II. METHOD

This study employed a quantitative cross-sectional survey design, selected to enable hypothesis testing and inferential statistical analysis of directional relationships between CRM dimensions and student churn intention (Creswell & Creswell, 2018). The study population comprised all active students enrolled in PTMA institutions across Indonesia. A sample of 120 students was drawn using systematic random sampling, whereby a sampling interval (k) was computed by dividing the total population size by the target sample size, with every k-th individual on the sampling frame selected (Sugiyono, 2019). This sample size satisfies the minimum requirement for multiple regression analysis, which prescribes at least 10–20 participants per predictor variable (Field, 2018).

Data were collected via a structured online questionnaire delivered through Google Forms, comprising 28 items measured on a 5-point Likert scale (1 = strongly disagree; 5 = strongly agree). Items were distributed across three constructs: T-CRM (10 items, adapted from (Rimbahari & Wijaya, 2020), H-CRM (10 items, adapted from (Rimbahari & Wijaya, 2020; Shrestha, 2020) and Student Willingness to Churn (8 items, adapted from (Hrnjic, 2016; Zeithaml et al., 2018). Content validity was established through expert review by two specialists in marketing management and higher education administration. Construct validity was confirmed via Confirmatory Factor Analysis (CFA), with all factor loadings exceeding 0.60 (Hair et al., 2019). Reliability was assessed using Cronbach's alpha: $\alpha = 0.87$ (T-CRM), $\alpha = 0.84$ (H-CRM), and $\alpha = 0.82$ (Willingness to Churn), all exceeding the 0.70 threshold. Data were analysed using IBM SPSS v.26, with prior assumption checks for normality (Kolmogorov–Smirnov), Multicollinearity (VIF), and homoscedasticity (Breusch–Pagan).

Table 1. Instrument Reliability Results

Construct	Items (n)	Cronbach's α
Technology-Based CRM (T-CRM)	10	0.87
Human-Based CRM (H-CRM)	10	0.84
Student Willingness to Churn	8	0.82

III. RESULT AND DISCUSSION

The Effect of Technology-Based CRM (T-CRM) on Student Willingness to Churn

Prior to regression analysis, all statistical assumptions were rigorously verified. Normality of residuals was confirmed using the Kolmogorov–Smirnov test ($D = 0.071$, $p = 0.200$). Multicollinearity was assessed via Variance Inflation Factors: T-CRM ($VIF = 1.30$) and H-CRM ($VIF = 1.30$), both substantially below the conservative threshold of 5.0 (Hair et al., 2019). Homoscedasticity was verified using the Breusch–Pagan test ($\chi^2 = 3.42$, $p = 0.181$). All regression assumptions were therefore satisfied, establishing the validity of the inferential analysis.

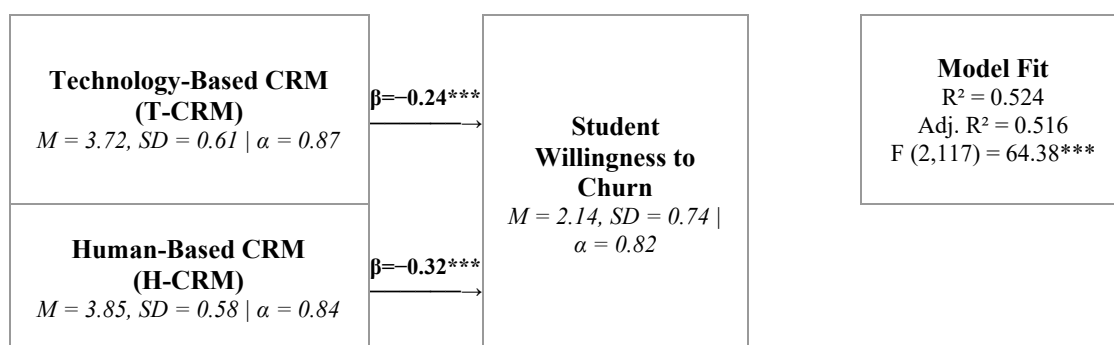
The overall regression model was statistically significant, $F(2, 117) = 64.38$, $p < 0.001$, with $R^2 = 0.524$ and adjusted $R^2 = 0.516$, indicating the model explained 52.4% of variance in student willingness to churn. This is a substantial level of explanatory power for a behavioral intention outcome in educational research. Complete regression results are presented in Table 2.

Table 2. Multiple Regression Results: Predictors of Student Willingness to Churn

Predictor	B	SE B	β	t	p	95% CI
Constant	5.61	0.38	—	14.76	< 0.001	[4.86, 6.36]
T-CRM (H1)	−0.29	0.08	−0.24	−3.63	< 0.001	[−0.45, −0.13]
H-CRM (H2)	−0.41	0.09	−0.32	−4.56	< 0.001	[−0.59, −0.23]

Note. $R^2 = 0.524$, Adjusted $R^2 = 0.516$, $F(2, 117) = 64.38$, $p < 0.001$. CI = Confidence Interval.

As shown in Table 2, T-CRM was a significant negative predictor of student willingness to churn ($B = -0.29$, $\beta = -0.24$, $t = -3.63$, $p < 0.001$, 95% CI $[-0.45, -0.13]$), supporting H1. This coefficient indicates that for every one-unit increase in perceived T-CRM quality, student willingness to churn decreases by 0.29 units while holding H-CRM constant. H-CRM was also a significant negative predictor ($B = -0.41$, $\beta = -0.32$, $t = -4.56$, $p < 0.001$, 95% CI $[-0.59, -0.23]$), supporting H2. The larger standardised coefficient for H-CRM ($\beta = -0.32$) compared to T-CRM ($\beta = -0.24$) indicates that human-centered CRM practices exert a comparatively stronger suppressive effect on churn intention. The combined R^2 of 0.524 provides robust support for H3, substantially exceeding what either predictor achieves in isolation.



Note. Arrows represent negative directional effects ($\beta < 0$). Both predictors were significant at $p < 0.001$.

Figure 1. Research Model with Standardised Regression Coefficients

The finding that T-CRM significantly and negatively predicts student willingness to churn ($\beta = -0.24$, $p < 0.001$) confirms H1 and contributes meaningfully to the growing literature on digital CRM in higher education. In the PTMA context, T-CRM encompasses all institutionally deployed digital systems designed to manage, facilitate, and personalise student interactions at scale—including student information portals, learning management systems (LMS), automated academic notification systems, digital advising tools, online grievance resolution systems, and data-driven early warning platforms that flag at-risk students based on engagement and performance indicators (Garrido-Moreno et al., 2020; Rajput et al., 2018). When students perceive these systems as responsive, accessible, and reliable, they experience reduced administrative and informational friction in their academic lives, which directly lowers their motivation to seek institutional alternatives.

This finding is theoretically grounded in the concept of customer lock-in through switching cost elevation (Payne & Frow, 2017). When an institution's digital ecosystem is well-integrated—where a student's academic records, course enrollments, financial aid status, and communication history are seamlessly accessible through a unified portal—the perceived cost of transferring to another institution increases substantially. This mechanism is consistent with Khashab, Ayoubi, et al. (2022), who demonstrated that digital enterprise resource integration in higher education CRM frameworks significantly enhanced student inertia—the tendency to remain with the current institution in the absence of compelling reasons to leave. Further emphasised that CRM systems must be designed with student experience at their center, ensuring that technological touchpoints feel intuitive and supportive rather than bureaucratic and impersonal.

From an empirical standpoint, the present finding converges with several prior studies across diverse institutional contexts. Badwan et al. (2017) found that CRM technology adoption significantly reduced student dissatisfaction in Palestinian universities, with the effect mediated by perceived institutional responsiveness. Octavia et al. (2023) in a structural equation modeling study of educational CRM in Indonesian universities, digital technology use and facilitating conditions were identified as among the strongest direct predictors of CRM success, which in turn negatively predicted student discontinuation intent. Shalihati et al. (2025) in a bibliometric analysis of CRM research in higher education across 2014–2024, digital communication management and predictive analytics were identified as the two fastest-growing research themes, reflecting the field's recognition that T-CRM is an increasingly central mechanism of student retention strategy.

The regression coefficient ($B = -0.29$) implies that a one-unit improvement in perceived T-CRM quality produces a 0.29-unit reduction in churn intention. Across a student body of several thousand, this translates into a potentially meaningful reduction in actual dropout rates. PTMA leadership should therefore treat T-CRM investment not as administrative overhead but as a strategic retention intervention with quantifiable return on investment (Garrido-Moreno et al., 2020). That institutions with higher social media CRM capability—a component of T-CRM—generated significantly stronger dynamic capabilities for student engagement, reinforcing the strategic value of digital investment as a capacity-building rather than merely operational expenditure.

At the same time, the boundaries of T-CRM's effectiveness must be acknowledged. Gazi et al. (2024) found that technology-based CRM achieved maximal retention outcomes only when paired with strong organisational commitment and knowledge-sharing practices—fundamentally human elements of institutional culture that cannot be automated. This boundary condition is addressed directly by the H-CRM findings discussed below and underscores why the integrated model (H3) outperforms either predictor in isolation. Reinartz et al. (2021) similarly confirmed that CRM process integration—combining technological infrastructure with relational practices—is the most robust predictor of customer retention. This conclusion directly supports the integrated CRM framework advocated by the present study.

The Effect of Human-Based CRM (H-CRM) on Student Willingness to Churn

H-CRM emerged as the stronger predictor of student willingness to churn ($\beta = -0.32$, $p < 0.001$), supporting H2. The larger standardised coefficient for H-CRM relative to T-CRM signals that when students evaluate their disposition to remain at or leave their PTMA institution, their perceptions of human-mediated relational quality—empathetic advising, responsive staff engagement, personalised mentoring, and face-to-face interpersonal care—carry greater weight than their assessments of digital service quality. This finding is counterintuitive in an era of rapid digital transformation, where technological CRM tools are frequently positioned as the primary driver of student experience improvement, and therefore requires careful theoretical interpretation.

The theoretical explanation for H-CRM's primacy lies in the relationship between belonging and retention. Pedler et al. (2022) in a quantitative study of 578 university students, it was demonstrated that a sense of belonging—shaped primarily through relational interactions with staff and peers—was the strongest predictor of students' retention intentions. Students with lower belonging were significantly more likely to consider leaving their institution, while those with higher belonging reported greater

motivation, enjoyment, and commitment to their studies. H-CRM practices—empathetic academic advising, proactive staff outreach, peer mentoring programs, and face-to-face counseling—directly cultivate this sense of belonging by communicating institutional care and recognition of each student as an individual. In this sense, H-CRM is not merely a service delivery mechanism but an institutional belonging intervention at scale.

This interpretation is further supported by Manogharan (2016), who found that personalised human interaction was the single strongest predictor of student retention in Malaysian private universities, outperforming all technology-mediated service quality dimensions. Del Río-Rama et al. (2021) validated a structural model in which empathy and responsiveness—the two most human-centric servqual dimensions—were the most influential antecedents of student loyalty in Spanish higher education. Borishade et al. (2021) replicated this pattern in Nigerian universities, finding that interpersonal service quality exerted the strongest effect on student satisfaction and loyalty. Shrestha (2020) provided causal evidence through a quasi-experimental design, demonstrating that structured staff empathy training programs significantly reduced student dropout rates. The present study adds PTMA Islamic higher education to this cross-cultural pattern, suggesting the primacy of human relational quality in retention is near-universal in higher education.

The PTMA institutional context provides additional insight into why H-CRM may be especially powerful in this setting. PTMA institutions are embedded in an Islamic educational philosophy that emphasises the relational and moral dimensions of the student-teacher relationship. The Islamic pedagogical tradition places considerable weight on the educator's responsibility to nurture students holistically—attending to their spiritual, emotional, and intellectual development—and on the concept of *uswatun hasanah*, modeling exemplary character through personal interaction. Within this framework, H-CRM practices are not merely operational strategies but authentic expressions of institutional Islamic values. When students perceive their PTMA institution as living up to these relational and moral commitments through genuinely caring staff interactions, the result is a deeply internalised institutional loyalty that is difficult for any competing institution to replicate. Malki et al. (2024) found that when CRM practices are perceived as authentic expressions of institutional values—rather than performative gestures—their effect on loyalty is substantially amplified, a dynamic particularly salient in value-laden educational contexts such as PTMA.

Practically, the H-CRM coefficient ($B = -0.41$) implies each one-unit improvement in perceived H-CRM quality produces a 0.41-unit reduction in churn intention—a larger marginal effect than T-CRM ($B = -0.29$). PTMA institutions facing constrained budgets should prioritise human capital development—staff recruitment, empathy training, supervision, and retention—as the highest-return CRM investment. Ong et al. (2023) demonstrated that structured peer support and faculty mentoring were among the strongest predictors of student loyalty in Asian higher education contexts. These findings collectively warrant investment in structured academic advising programs with defined student-advisor ratios, communication and empathy training for all student-facing staff, proactive outreach protocols for at-risk students, and peer mentoring programs extending relational support beyond the faculty-student dyad.

Synergistic Integration of T-CRM and H-CRM on Student Willingness to Churn

The integrated regression model explained 52.4% of the variance in student willingness to churn ($R^2 = 0.524$, adjusted $R^2 = 0.516$), providing robust support for H3. This explanatory power is notably high for a behavioral intention outcome in educational research, where R^2 values of 20–35% are commonly reported for single-predictor models (Field, 2018; Gonçalves et al., 2024). The substantial increase in explained variance achieved by the integrated model signals a synergistic dynamic: T-CRM and H-CRM are not merely additive contributors to retention but mutually reinforcing dimensions of a coherent relational ecosystem. When a student experiences both high-quality digital services and empathetic human engagement from the same institution, the combined effect on psychological commitment is greater than either experience in isolation would produce.

This synergistic dynamic can be understood through the lens of relationship quality theory (Payne & Frow, 2017; Reinartz et al., 2021). Relationship quality is constituted by three interacting components: trust, commitment, and satisfaction. T-CRM primarily operates on satisfaction—by reducing service failures, improving information access, and streamlining administrative processes, it addresses functional performance expectations. H-CRM, by contrast, operates predominantly on trust and commitment—by demonstrating genuine institutional care for each student as an individual, it builds the emotional and psychological bonds that are the deepest foundation of loyalty. When both dimensions are present and perceived as high quality, all three components of relationship quality are simultaneously activated, producing a holistic relational experience substantially more powerful in reducing churn intention than any single-dimension approach.

Direct empirical support for this integrated logic is found in Rimbasari & Wijaya (2020), whose study of T-CRM and H-CRM in the banking sector demonstrated that combining both dimensions predicted partnership quality more accurately than either dimension in isolation, explaining a substantially larger proportion of outcome variance. In a higher education context, Khashab, Ayoubi, et al. (2022) argued that CRM framework development in universities must explicitly address both the technological infrastructure layer and the human engagement layer, warning that institutions investing disproportionately in one dimension at the expense of the other will fail to realise the full retention benefits of CRM. Shalihati et al. (2025) corroborated this in their bibliometric analysis, finding that the most impactful recent CRM-in-education studies were those integrating both technological and relational dimensions within a unified conceptual framework.

The institutional implications of this synergistic finding are substantial. PTMA administrators should not conceptualise CRM investment decisions as binary choices between technology and people. Rather, the evidence strongly supports a portfolio approach in which digital infrastructure upgrades are planned and implemented in explicit coordination with human capacity investments. Fitriyani & Hendriyani (2021) documented this dynamic precisely, showing that technology-based customer data management achieved its maximum retention effect when combined with responsive human follow-up protocols. Gazi et al. (2024) further demonstrated that CRM effectiveness in service organisations is amplified when knowledge management and organisational commitment—both fundamentally human processes—are aligned with technological CRM implementation. Raja et al. (2023) added that institutional

reputation—built through both reliable digital services and authentic human engagement—was a significant predictor of student loyalty, reinforcing the value of the integrated approach.

Finally, the 52.4% explained variance, while substantial, indicates that approximately 47.6% of variance remains unaccounted for by T-CRM and H-CRM alone. This residual variance reflects the influence of factors outside the scope of the present model—including financial hardship, family circumstances, program dissatisfaction, peer relationships, academic performance difficulties, and health-related issues—that are well-documented predictors of student attrition (Nurmalitasari et al., 2023; Palomino & Ortega, 2023). This observation does not diminish the practical significance of CRM as a retention lever but underscores that CRM-based strategies are most effective when embedded within a broader, multi-dimensional student success framework. PTMA institutions should therefore treat CRM optimisation as one component of a comprehensive institutional retention strategy rather than a standalone solution.

Implications of T-CRM and H-CRM in Islamic Educational Management

The empirical findings of this study—that both T-CRM ($\beta = -0.24$) and H-CRM ($\beta = -0.32$) significantly reduce student willingness to churn, with their integration explaining 52.4% of outcome variance—carry important implications when interpreted through the lens of Islamic educational management. In the Islamic higher education context, institutional management is not a value-neutral administrative function but an expression of the institution's moral and relational commitments to its students. (Haddade et al., 2024), In a study of madrasah management strategies in Indonesia, it was demonstrated that effective institutional governance in Islamic educational contexts requires the deliberate integration of technology and Islamic educational values as complementary—not competing—dimensions of quality management. This finding directly mirrors the present study's H3 result: T-CRM and H-CRM are most powerful when integrated within a unified institutional framework, rather than pursued in isolation. The primacy of H-CRM ($\beta = -0.32$) in this integrated model is consistent with Rahtikawatie et al. (2021) finding that religious leadership and interpersonal relational quality—not administrative efficiency alone—are the strongest institutional predictors of student outcomes in Indonesian Islamic educational institutions, explaining 76% of variance in student achievement in their structural model.

The integration of technology-based management practices into Islamic higher education is a recognised strategic imperative, but one that requires careful grounding in institutional values. Atabik et al. (2024), studying digitalisation-based educational quality management at Indonesian Islamic universities, found that institutions which embedded digital management systems within an explicit Islamic educational quality framework achieved stronger outcomes than those adopting technology as a standalone administrative tool. This finding resonates directly with the present study's T-CRM result ($\beta = -0.24$): technology-based student relationship management contributes significantly to retention not through its technical capabilities alone, but through the institutional trustworthiness and responsiveness it communicates to students, in PTMA institutions, where the organisational mission is grounded in Muhammadiyah's philosophy of *tajdid* (renewal) and Islamic educational excellence, T-CRM systems—including digital student portals, early-warning platforms, and automated academic communication—function as contemporary expressions of the institution's commitment

to serving students with efficiency, transparency, and reliability (Haddade et al., 2024; Octavia et al., 2023).

The stronger effect of H-CRM relative to T-CRM in this study is particularly meaningful within the Islamic educational management framework. Rahtikawatie et al. (2021) demonstrated that leadership practices characterised by personal guidance, moral accompaniment, and relational responsiveness were the most powerful antecedents of institutional sustainability in Indonesian Islamic schools—effects operating through teacher commitment and student engagement. This mechanism is directly analogous to H-CRM in the PTMA university context: when academic advisors, lecturers, and administrative staff engage students with empathy, personalised attention, and genuine interpersonal care, they enact the Islamic educational ideal of the educator as *murabbi*—one who nurtures the whole person, not merely the academic dimension. Shalihati et al. (2025) in their bibliometric analysis of CRM in higher education from 2014 to 2024, they identified "Islamic higher education" as an emerging research theme and noted that institutions with stronger value-based organisational cultures demonstrated higher CRM effectiveness, precisely because relational practices in such contexts carry additional moral legitimacy and student resonance beyond their functional service quality dimensions.

The practical implications for PTMA institutional management are threefold. First, the integrated CRM model ($R^2 = 0.524$) provides empirical justification for PTMA administrators to invest simultaneously and proportionately in both digital infrastructure and human relational capacity—treating them as interdependent components of a unified student development system rather than competing budget priorities. Haddade et al. (2024) specifically recommended that Islamic educational institutions pursuing the Madrasah Reform agenda develop management strategies that explicitly bridge digital technology adoption and Islamic pedagogical values, warning that technology investment disconnected from institutional values fails to produce sustainable quality improvements—a caution equally applicable to PTMA's CRM strategy. Second, staff development programs at PTMA should be designed to cultivate empathetic, student-centered relational competencies alongside technical proficiency, recognising that H-CRM's stronger retention effect ($B = -0.41$ vs. $B = -0.29$ for T-CRM) reflects the irreplaceable human dimension of Islamic educational management. Third, T-CRM systems should be evaluated not only by technical performance metrics but by the degree to which they enhance student perceptions of institutional trustworthiness and transparency—qualities that align with Islamic organisational values and, as demonstrated by Atabik et al. (2024), are the primary mechanisms through which digitalisation improves educational quality outcomes in Indonesian Islamic universities.

Synthesising these findings, the present study contributes empirical evidence that CRM—when implemented within the distinctive institutional and value context of PTMA Islamic higher education—functions simultaneously as a retention management tool and as an expression of Islamic educational management principles. The regression results ($R^2 = 0.524$) demonstrate that CRM practices that combine technological reliability with human relational excellence can account for more than half the variation in student retention intent. This finding positions PTMA institutions not merely as adopters of management tools developed in secular business or university contexts, but as potential innovators in Islamic educational management—capable of developing CRM frameworks that are simultaneously evidence-based, operationally effective, and

authentically grounded in the moral and relational imperatives that define the Islamic higher education mission.

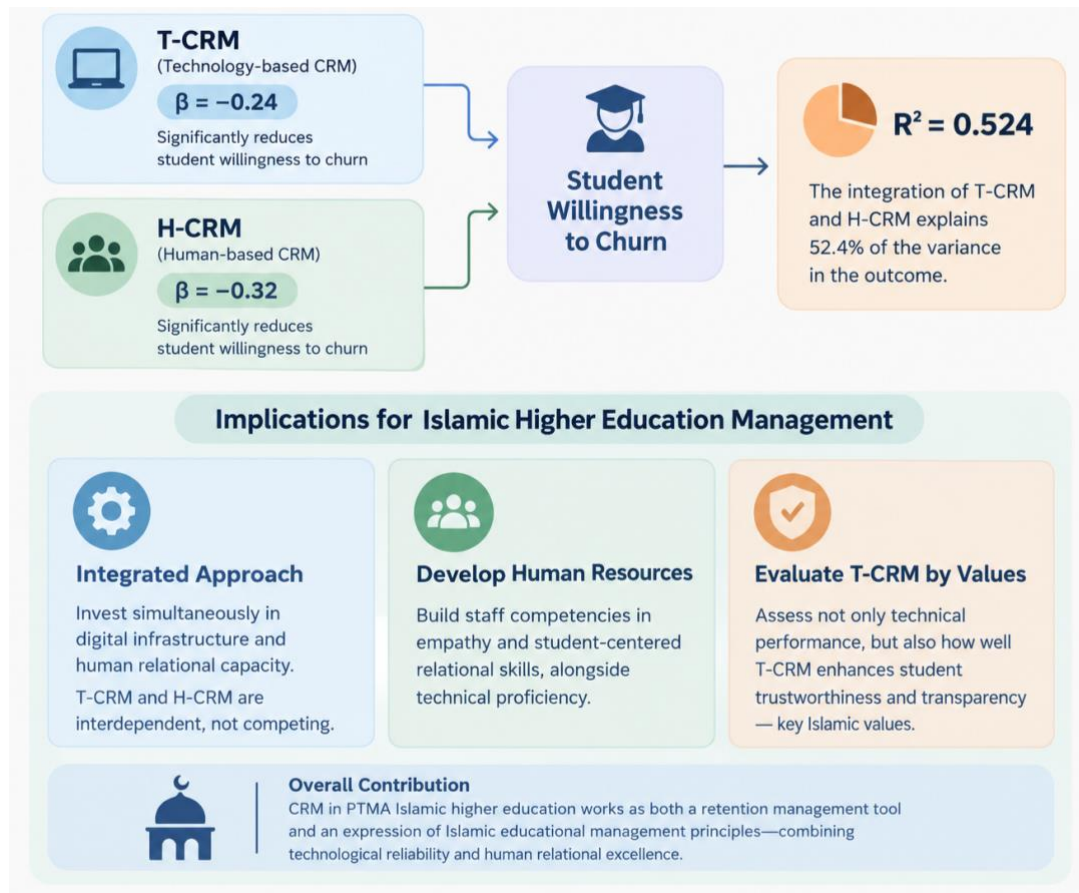


Figure 2. Integrated CRM and Student Retention in Islamic Higher Education

IV. CONCLUSION

This study provides strong empirical evidence that T-CRM ($\beta = -0.24$) and H-CRM ($\beta = -0.32$) significantly and negatively predict students' willingness to leave PTMA Islamic colleges, with H-CRM providing a stronger effect. The integrated model explained 52.4% of the variance in churn intent, emphasizing the synergistic value of combining both CRM dimensions in an integrated retention strategy. These findings urge PTMA administrators to simultaneously invest in digital infrastructure and empathy-driven staff development, and treat student retention as a holistic relationship management challenge. From an Islamic education perspective, these findings emphasize that management relationships with students do not only focus on service efficiency, but also need to reflect the values of trust, care and benefit-oriented service. The integration of T-CRM and H-CRM can be an Islamic education management approach that combines the use of modern technology with humanistic interpersonal relationships in supporting the sustainability of student education. Thus, retention strategies at PTMA can be developed as part of the implementation of Islamic education management that is adaptive, student-oriented, and remains based on Islamic values. Limitations include a cross-sectional design that limits causal inference, broad sampling without regional stratification, and measurement of dropout intentions rather than actual dropout behavior. Future research should employ longitudinal designs, test institutional-

level moderators such as institutional size and Islamic organizational culture, and link CRM perceptions to actual retention outcomes in various Islamic higher education contexts.

V. REFERENCES

- [1] Ajzen, I. (2020). The theory of planned behavior: Frequently asked questions. *Human Behavior and Emerging Technologies*, 2(4), 314–324. <https://doi.org/10.1002/hbe2.195>
- [2] Atabik, Nurfuadi, Hidayat, I., Masruri, & Nur, S. (2024). Digitalization of Educational Quality Management in Higher Education. *Revista de Gestão Social e Ambiental*, 18(7). <https://doi.org/10.24857/rgsa.v18n7-133>
- [3] Badwan, J. J., Al Shobaki, M. J., Abu Naser, S. S., & Abu Amuna, Y. M. (2017). Adopting technology for customer relationship management in higher educational institutions. *International Journal of Engineering and Information Systems*, 1(1), 20–28. <https://doi.org/10.5281/zenodo.573685>
- [4] Borishade, T. T., Ogunnaike, O. O., Salau, O., Motilewa, B. D., & Dirisu, J. I. (2021). Assessing the relationship among service quality, student satisfaction and loyalty: The Nigerian higher education experience. *Heliyon*, 7(7). <https://doi.org/10.1016/j.heliyon.2021.e07590>
- [5] Creswell, J. W., & Creswell, J. D. (2018). *Research design: Qualitative, quantitative, and mixed methods approaches* (5th ed.). SAGE Publications.
- [6] Del Río-Rama, M. de la C., Álvarez-García, J., Mun, N. K., & Durán-Sánchez, A. (2021). Influence of the quality perceived of service of a higher education center on the loyalty of students. *Frontiers in Psychology*, 12. <https://doi.org/10.3389/fpsyg.2021.671407>
- [7] Field, A. (2018). *Discovering statistics using IBM SPSS statistics* (5th ed.). SAGE Publications.
- [8] Fitriyani, I. P., & Hendriyani, C. (2021). Implementasi customer data management dalam meningkatkan retensi pelanggan IndiHome di PT Telkom. *ICIT Journal*, 7(2), 168–176. <https://doi.org/10.33050/icit.v7i2.1645>
- [9] Garrido-Moreno, A., García-Morales, V., King, S., & Lockett, N. (2020). Social media use and CRM capability: The generation of IT-enabled dynamic capabilities. *Information & Management*, 57(5). <https://doi.org/10.1016/j.im.2019.103206>
- [10] Gazi, Md. A. I., Mamun, A. Al, Masud, A. Al, Senathirajah, A. R. B. S., & Rahman, T. (2024). The relationship between CRM, knowledge management, organization commitment, customer profitability and customer loyalty in telecommunication industry. *Journal of Open Innovation: Technology, Market, and Complexity*, 10(1). <https://doi.org/10.1016/j.joitmc.2024.100227>

- [11] Gonçalves, G. S., Serra, F. A. R., Storopoli, J. E., Scafuto, I. C., Rafael, D. N., & Moretti, S. L. A. (2024). Undergraduate student retention activities: Challenges and research agenda. *SAGE Open*, 14(3). <https://doi.org/10.1177/21582440241249334>
- [12] Haddade, H., Nur, A., Achruah, A., Rasyid, M. N. A., & Ibrahim, A. (2024). Madrasah management strategies through Madrasah Reform program: an evidence from Indonesia. *International Journal of Educational Management*, 38(5), 1289–1304. <https://doi.org/10.1108/IJEM-05-2023-0236>
- [13] Hair, J. F., Risher, J. J., Sarstedt, M., & Ringle, C. M. (2019). When to use and how to report the results of PLS-SEM. *European Business Review*, 31(1), 2–24. <https://doi.org/10.1108/EBR-11-2018-0203>
- [14] Hemsley-Brown, J., & Oplatka, I. (2006). Universities in a competitive global marketplace: A systematic review of the literature on higher education marketing. *International Journal of Public Sector Management*, 19(4), 316–338. <https://doi.org/10.1108/09513550610669176>
- [15] Hemsley-Brown, J., & Oplatka, I. (2022). *Higher education consumer choice* (2nd ed.). Palgrave Macmillan. <https://doi.org/10.1007/978-3-030-88046-4>
- [16] Hrnjic, A. (2016). The transformation of higher education: Evaluation of CRM concept application and its impact on student satisfaction. *Eurasian Business Review*, 6(1), 53–77. <https://doi.org/10.1007/s40821-015-0037-x>
- [17] Kemendikbud. (2023). *Statistik pendidikan tinggi Indonesia 2022/2023*. Pusat Data dan Teknologi Informasi, Kemendikbudristek.
- [18] Khashab, B., Ayoubi, R., & Gulliver, S. (2022). Scoping and aligning CRM strategy in higher education institutions: Practical steps. *Journal of Strategic Marketing*, 30(7), 627–651. <https://doi.org/10.1080/0965254X.2020.1823458>
- [19] Khashab, B., Gulliver, S., Ayoubi, R., & Strong, C. (2022). Analysing enterprise resources for developing CRM framework in higher education institutions. *Journal of Enterprise Information Management*, 35(6), 1639–1657. <https://doi.org/10.1108/JEIM-09-2021-0421>
- [20] Malki, D., Bellahcene, M., Latreche, H., Terbeche, M., & Chroqui, R. (2024). How social CRM and customer satisfaction affect customer loyalty. *Spanish Journal of Marketing – ESIC*, 28(4), 465–480. <https://doi.org/10.1108/SJME-09-2022-0202>
- [21] Manogharan, M. W. (2016). The effect of customer relationship management on customer retention in private higher education institute in Malaysia. *International Journal Research in Education Methodology*, 9(1), 1441–1453. <https://doi.org/10.24297/ijrem.v9i1.5834>
- [22] Nurmalitasari, N., Abra, L. B., & Mohammad, M. F. (2023). Factors influencing dropout students in higher education. *Education Research International*. 2023(1). <https://doi.org/10.1155/2023/7704142>

- [23] Octavia, A., Jovanka, D. R., Alqahtani, T. M., Wijaya, T. T., & Habibi, A. (2023). Key factors of educational CRM success and institution performance: A SEM analysis. *Cogent Business & Management*, 10(1), 2196786. <https://doi.org/10.1080/23311975.2023.2196786>
- [24] Ong, A. K. S., Prasetyo, Y. T., Dangaran, V. C. C., Gudez, M. A. D., Juanier, J. I. M., Paulite, G. A. D., Yambot, R. X. R., Persada, S. F., Nadlifatin, R., & Ayuwati, I. D. (2023). Determination of loyalty among high school students to retain in the same university for higher education. *PLOS ONE*, 18(11). <https://doi.org/10.1371/journal.pone.0286185>
- [25] Palomino, J. C. V., & Ortega, A. M. (2023). Dropout intentions in higher education: systematic literature review: systematic literature review. *Journal on Efficiency and Responsibility in Education and Science*, 16(2), 149-158. <https://doi.org/10.7160/eriesj.2023.160206>
- [26] Payne, A., & Frow, P. (2013). *Strategic customer management: integrating relationship marketing and CRM*. Cambridge University Press.
- [27] Payne, A., & Frow, P. (2017). Relationship marketing: Looking backwards towards the future. *Journal of Services Marketing*, 31(1). <https://doi.org/10.1108/JSM-11-2016-0380>
- [28] Pedler, M. L., Willis, R., & Nieuwoudt, J. E. (2022). A sense of belonging at university: student retention, motivation and enjoyment. *Journal of Further and Higher Education*, 46(3), 397-408. <https://doi.org/10.1080/0309877X.2021.1955844>
- [29] Rahtikawatie, Y., Chalim, S., & Ratnasih, T. (2021). Investigating the Role of Religious Leadership at Indonesia's Islamic Boarding Schools in the Sustainability of School Management. *Eurasian Journal of Educational Research*, 96, 51-65. <https://doi.org/10.14689/ejer.2021.96.4>
- [30] Raja, E. D. O., Tan, P. L., Zorrilla, P., & Hassan, S. (2023). Building student loyalty in higher education: The role of corporate reputation. *F1000Research*, 12. <https://doi.org/10.12688/f1000research.129077.3>
- [31] Rajput, A., Zahid, M. M., & Najaf, R. (2018). Using CRM to Model Firm Performance in a Business-to-Business Market. *Journal of Relationship Marketing*, 17(2), 118-151. <https://doi.org/10.1080/15332667.2018.1440142>
- [32] Reinartz, W., Krafft, M., & Hoyer, W. D. (2004). The customer relationship management process: Its measurement and impact on performance. *Journal of Marketing Research*, 41(3), 293-305. <https://doi.org/10.1509/jmkr.41.3.293.35991>
- [33] Rimbasari, A., & Wijaya, N. H. S. (2020). Examining the relevance of T-CRM and H-CRM for the bank-customer partnership quality and willingness to invest more. *Jurnal Manajemen Bisnis*, 11(2), 215-223. <https://doi.org/10.18196/mb.11299>

- [34] Soliman, H. S. (2011). Customer relationship management and its relationship to the marketing performance. *International Journal of Business and Social Science*, 2(10), 166–182. <https://science.donntu.edu.ua/ius/duzik/library/1.pdf>
- [35] Shalihati, F., Sumarwan, U., Hartoyo, H., & Yuliati, L. N. (2025). Mapping customer relationship management research in higher education: Trends and future directions. *Administrative Sciences*, 15(2), 68. <https://doi.org/10.3390/admsci15020068>
- [36] Shrestha, S. K. (2020). Impact of relationship marketing on customer retention in higher education. *Management Dynamics*, 23(2), 33–44. <https://doi.org/10.3126/md.v23i2.35804>
- [37] Sugiyono. (2019). *Metode penelitian kualitatif*. Alfabeta.
- [38] Zeithaml, V. A., Parasuraman, A., & Berry, L. L. (1985). Problems and strategies in services marketing. *Journal of marketing*, 49(2), 33-46. <https://doi.org/10.1177/002224298504900203>