

IMPACT OF TECHNOLOGY ADOPTION ON PRICING EFFICIENCY AND RISK MANAGEMENT IN THE NON-LIFE INSURANCE SECTOR

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Abstract

Despite the growing adoption of digital technologies, pricing inefficiency remains a persistent challenge in Nigeria's non-life insurance sector. This study examines the impact of technology adoption, measured through IT investment intensity, digital channel penetration, and InsurTech collaboration density, on pricing efficiency and risk management performance. Using an ex post facto research design, data were collected from 20 registered non-life insurance firms between 2015 and 2024 and analyzed through panel regression analysis. Descriptive statistics and diagnostic tests, including multicollinearity, heteroskedasticity, and the Hausman specification test, confirmed the suitability of the Fixed Effects Model. The empirical findings reveal that IT investment intensity, digital channel penetration, and InsurTech collaboration density each have a positive and significant effect on pricing efficiency, demonstrating that technology-driven practices enhance premium accuracy and underwriting effectiveness. The results align with the Resource-Based View (RBV) and Technology–Organization–Environment (TOE) frameworks, underscoring that technological resources are essential for improving competitive and operational performance. The study concludes that technological integration enhances pricing transparency, accuracy, and market competitiveness in the Nigerian non-life insurance industry. It recommends continuous IT infrastructure investment, broader digital platform utilization, and deeper collaboration with InsurTech firms to sustain pricing efficiency and strengthen sectoral resilience in an increasingly digital financial environment.

Keywords: Pricing Efficiency, IT Investment Intensity, Digital Channel Penetration, InsurTech Collaboration Density, Non-Life Insurance, Technology Adoption, Nigeria.

1.0 Introduction

Pricing efficiency has emerged as a critical indicator of competitive and sustainable performance in the global non-life insurance industry. As risk environments become more volatile, insurers increasingly rely on data-driven models to price premiums accurately and manage underwriting risks. The Pricing Efficiency Index (PEI) offers a practical way to evaluate how well premiums align with the actual risk profile of policyholders, reflecting both actuarial precision and operational adaptability. Studies suggest that technological innovation enhances insurers' ability to leverage large datasets, thereby improving pricing accuracy and predictive capacity (Moussa,



2022). However, disparities in the pace of technological adoption have created uneven levels of pricing efficiency across markets (Kshetri, 2021).

Globally, the integration of digital technologies such as artificial intelligence, machine learning, and big data analytics has transformed how insurers assess and manage risk. The property and casualty segment, in particular, has been at the forefront of adopting automated underwriting systems and dynamic pricing engines (Zhao, 2023). These technologies not only refine pricing models but also enable real-time risk monitoring and claims management. According to recent findings, insurers that invest more heavily in IT infrastructure demonstrate stronger pricing discipline and reduced adverse selection (Chen, 2021). Hence, technological adoption has become a strategic differentiator in ensuring pricing efficiency in the non-life insurance sector.

IT investment intensity serves as one of the most quantifiable indicators of technological adoption within the insurance domain. A higher proportion of IT expenditure relative to total operating costs often signifies a stronger commitment to digital transformation and process automation. Research shows that firms with higher IT intensity achieve improved underwriting accuracy and reduced operational inefficiencies (Liu, 2022). Moreover, such investments tend to enhance real-time data analytics capabilities, enabling insurers to tailor premiums to individual risk profiles more effectively (Bach, 2020). Consequently, IT investment intensity directly influences the overall pricing efficiency of insurers.

Alongside IT investments, digital channel penetration has become a vital component of modern insurance operations. The proliferation of online sales and digital policy management platforms allows insurers to gather rich behavioral data from customers, improving both customer segmentation and risk prediction accuracy. Insurers with higher digital channel penetration rates often experience lower distribution costs and better policyholder retention, leading to enhanced pricing performance (Asongu, 2023). Furthermore, digital platforms provide an avenue for personalized premium structures, aligning with the principles of precision underwriting and efficient risk allocation (Yin, 2021).

Another dimension of technological adoption is reflected in InsurTech collaboration density, which measures the extent of partnerships between traditional insurers and technology-driven startups. These collaborations foster innovation through data sharing, predictive modeling, and blockchain-based claims systems. According to a recent study, insurers engaged in more InsurTech partnerships achieve greater pricing agility and operational resilience (Gozman, 2022). Such collaborations expand access to new risk data sources, thereby enhancing the insurers' capacity to align premium rates with actual exposure levels (Ahmed, 2023). This synergy between technology and traditional underwriting is reshaping the contours of pricing efficiency in the non-life sector.

The convergence of IT investment, digital channel expansion, and InsurTech collaboration has thus redefined the parameters of risk management in the global non-life insurance industry. Yet, the extent of their impact varies significantly across markets depending on the maturity of digital



ecosystems and regulatory frameworks (Feyen, 2022). In emerging economies, where digital adoption is slower, insurers often face inefficiencies in pricing accuracy and claims handling. This uneven development underscores the need for empirical studies that quantify how different facets of technology adoption translate into measurable improvements in pricing and risk management performance.

In Nigeria, the non-life insurance sector continues to grapple with persistent inefficiencies in premium pricing and risk evaluation despite the ongoing wave of digital transformation. Insurers face difficulties in aligning actual premiums with predicted risk levels, reflecting low pricing efficiency and limited use of advanced data analytics. Although some firms have increased IT investments and introduced digital channels, the impact on pricing precision remains unclear (Eze, 2021). Furthermore, InsurTech collaborations remain underdeveloped, with few partnerships advancing beyond pilot stages. This raises fundamental questions about the effectiveness of technology adoption in improving pricing efficiency and risk management outcomes in the Nigerian context.

Therefore, this study investigates how technology adoption influences pricing efficiency and risk management performance in Nigeria's non-life insurance sector. Specifically, it examines the roles of IT investment intensity, digital channel penetration, and InsurTech collaboration density in shaping the Pricing Efficiency Index (PEI). By quantifying these relationships, the study seeks to establish empirical evidence on whether technology-driven transformation translates into tangible efficiency gains. The following null hypotheses are proposed to guide the analysis:

H_{01} : IT investment intensity has no significant effect on pricing efficiency in the Nigerian non-life insurance sector.

H_{02} : Digital channel penetration rate has no significant effect on pricing efficiency in the Nigerian non-life insurance sector.

H_{03} : InsurTech collaboration density has no significant effect on pricing efficiency in the Nigerian non-life insurance sector.

Testing these hypotheses provides information on how technological integration shapes the efficiency and sustainability of Nigeria's insurance industry.

2.0 Literature Review

Concept of Pricing Efficiency

Pricing efficiency in the insurance sector represents the alignment between actual premiums charged and the expected premiums derived from accurate risk estimation. Recent scholarship emphasizes that pricing efficiency reflects both actuarial precision and operational rationality in premium determination (Moussa, 2022; Zhao, 2023). Studies highlight that technological integration through predictive analytics, machine learning, and AI-driven models significantly enhances insurers' capacity to assess individual risk exposure (Chen, 2021; Liu, 2022). Efficient



pricing models reduce adverse selection and moral hazard by ensuring that policyholders pay commensurate with their true risk levels (Kshetri, 2021; Ahmed, 2023). Moreover, digital ecosystems enable real-time data utilization, enhancing responsiveness to market volatility (Yin, 2021; Feyen, 2022). Globally, pricing efficiency has evolved as a strategic indicator of financial soundness and competitive sustainability in insurance (Gozman, 2022; Bach, 2020; Asongu, 2023; Eze, 2021). For this study, pricing efficiency is conceptualized as the extent to which actual premiums align with predicted premiums based on risk factors, operationalized through the Pricing Efficiency Index (PEI): $PEI = (\text{Actual Premium} / \text{Expected Premium}) \times 100$.

Concept of IT Investment Intensity

IT investment intensity is commonly defined as the proportion of total operating expenditure allocated to digital infrastructure, analytics, and technological capabilities. Prior research has shown that IT investment intensity enhances firms' digital maturity, which translates into improved operational efficiency and data-driven pricing decisions (Liu, 2022; Bach, 2020). The relationship between IT investment and performance has been established in the financial services sector, where technology upgrades support innovation, underwriting precision, and risk forecasting (Chen, 2021; Zhao, 2023). Additionally, higher IT intensity enables better integration of predictive models into pricing systems, minimizing information asymmetry and transaction costs (Moussa, 2022; Gozman, 2022). In insurance markets, IT intensity correlates positively with profitability and adaptability to changing risk environments (Ahmed, 2023; Asongu, 2023). Thus, for this study, IT investment intensity is conceptualized as the ratio of total IT expenditure to total operating expense, serving as a quantitative proxy for technological commitment and digital transformation depth.

Concept of Digital Channel Penetration Rate

Digital channel penetration rate refers to the proportion of insurance policies distributed through digital or online platforms relative to total sales. With the rise of digital ecosystems, insurers increasingly rely on mobile applications, web portals, and AI chatbots to manage policy issuance and renewals (Yin, 2021; Asongu, 2023). Research has shown that higher digital channel adoption leads to improved customer experience, reduced operational costs, and enhanced data availability for underwriting and pricing (Feyen, 2022; Chen, 2021). Moreover, digital distribution channels strengthen data analytics and enable risk-based pricing, improving pricing efficiency (Moussa, 2022; Gozman, 2022). Studies also confirm that insurers with advanced digital penetration achieve superior retention and market competitiveness (Bach, 2020; Liu, 2022). In this study, digital channel penetration rate is conceptualized as the percentage of policies sold through digital platforms, representing the insurer's digital outreach and customer integration level.



Concept of InsurTech Collaboration Density

InsurTech collaboration density reflects the extent of strategic partnerships between traditional insurers and technology-based startups. Such collaborations enable access to novel data sources, AI-driven risk models, and blockchain-enabled claims systems (Gozman, 2022; Ahmed, 2023). Empirical studies reveal that insurers with greater collaboration density exhibit enhanced pricing agility, process automation, and predictive accuracy (Moussa, 2022; Zhao, 2023). Furthermore, partnerships with InsurTechs promote innovation ecosystems that reduce underwriting errors and operational inefficiencies (Kshetri, 2021; Liu, 2022). The synergy between established insurers and digital innovators has been found to amplify risk management efficiency and competitive advantage (Chen, 2021; Asongu, 2023). For this study, InsurTech collaboration density is defined as the ratio of active InsurTech partnerships to total strategic partnerships, conceptualized as a proxy for the insurer's technological openness and collaborative innovation capacity.

2.1 Review of Related Empirical Literature

IT Investment Intensity and Pricing Efficiency

Empirical studies affirm that IT investment intensity strongly influences pricing efficiency by enhancing data-driven underwriting and predictive modeling capacity. Park (2022) in *Technological Forecasting and Social Change* found that insurers with higher IT expenditure achieved more accurate premium pricing and risk differentiation. Similarly, Huang (2023) revealed that IT-enabled automation minimized pricing discrepancies in non-life insurance portfolios. In the financial sector, Duan (2021) demonstrated that digital infrastructure investments enhanced decision accuracy and reduced information asymmetry. Chen (2021) confirmed that IT intensity improved underwriting efficiency through advanced analytics, while Lee (2020) observed better premium risk alignment in IT-driven insurers. Research by Kim (2022) showed that IT modernization led to real-time claims and pricing recalibration. Fang (2023) and Choi (2022) both emphasized that strategic digital expenditure fosters pricing transparency. In Nigeria, Okoye (2022) and Abiola (2021) reported that insurers with sustained IT spending achieved better pricing performance. Recent global evidence from Ghosh (2024) and Wang (2023) reiterates that IT investment is a key enabler of predictive accuracy and pricing efficiency in dynamic risk environments.

Digital Channel Penetration and Pricing Efficiency

Studies have shown that digital channel penetration enhances pricing efficiency by expanding data access and enabling more granular risk segmentation. Zhang (2023) established that digital distribution improved premium accuracy through behavioral analytics. In *Sustainability*, Boateng (2022) found that insurers leveraging digital sales channels experienced reduced underwriting errors and improved pricing outcomes. Li (2020) demonstrated that online platforms provide



richer customer data that strengthens actuarial precision. A comparative analysis by Shukla (2023) confirmed that higher digital penetration correlates with optimized pricing structures in property and casualty insurance. Choudhury (2021) noted that digital interaction boosts real-time customer data collection for adaptive pricing. Similarly, Edeh (2022) revealed that digital platforms enhance pricing speed and responsiveness. Research by Mensah (2023) showed digital penetration reduced costs and improved price fairness. Kwok (2021) and Dos Santos (2023) also confirmed improved pricing elasticity with online channels. Moreover, Alhassan (2022) found that African insurers with digital ecosystems achieved superior pricing efficiency. Collectively, evidence from global and emerging markets suggests digital channel penetration is a vital determinant of pricing alignment and competitiveness.

InsurTech Collaboration Density and Pricing Efficiency

Empirical findings demonstrate that InsurTech collaboration density significantly affects pricing efficiency through innovation diffusion and predictive analytics. Wu (2023) found that insurers with higher InsurTech partnerships achieved superior risk pricing and dynamic policy adjustments. Similarly, Garcia (2022) observed that collaborative innovation improves data granularity and actuarial precision. Rahman (2021) established that partnership-driven analytics reduced underwriting volatility in non-life insurance. Chen (2022) reported that joint ventures with InsurTechs enhanced pricing automation and real-time model calibration. A study by Lopez (2023) highlighted how blockchain-based collaborations improved transparency in pricing algorithms. Martins (2021) found that insurers leveraging InsurTech partnerships gained cost efficiency and improved predictive accuracy. Additionally, Tan (2024) observed that collaboration density fosters adaptive risk pricing models. Evidence from Ahmed (2023) and Osei (2022) confirmed that InsurTech ecosystems improve premium rationality and reduce mispricing. In emerging markets, Bello (2023) and Ijeoma (2022) reported that low collaboration density contributes to persistent inefficiencies in pricing. Overall, the literature affirms that InsurTech collaboration density enhances pricing efficiency by integrating innovation, data analytics, and actuarial modernization.

2.2 Theoretical Framework

This study is anchored on the Resource-Based View (RBV) and Technology-Organization-Environment (TOE) frameworks, both of which provide strong theoretical underpinnings for understanding how technology adoption drives pricing efficiency and risk management in the non-life insurance sector. The Resource-Based View (RBV), propounded by Barney (1991), posits that firms gain competitive advantage when they possess valuable, rare, inimitable, and non-substitutable resources. Within the insurance context, technological assets such as IT infrastructure, digital platforms, and InsurTech partnerships are strategic resources that enhance data analytics capabilities and pricing precision (Liu, 2022; Park, 2022). The RBV assumes that technological resources can improve operational efficiency and enable firms to align premium prices more accurately with risk exposure (Zhao, 2023). Empirical studies by Huang (2023) and



Ghosh (2024) confirm that IT investment intensity and digital integration enhance insurers' pricing efficiency by improving predictive accuracy and information symmetry.

Complementarily, the Technology-Organization-Environment (TOE) framework by Tornatzky and Fleischer (1990) explains how external, technological, and organizational factors influence technology adoption. Studies by Chen (2021) and Ahmed (2023) applied the TOE framework to insurance firms, showing that supportive organizational structures and regulatory ecosystems foster InsurTech collaborations that improve risk-based pricing efficiency. Together, the RBV and TOE theories provide a comprehensive explanation of how technology-driven capabilities translate into measurable performance advantages in the insurance industry.

3.0 Methodology

This study adopts an ex post facto research design, which is appropriate for investigating the effect of technology adoption on pricing efficiency and risk management performance, as it relies on historical secondary data without manipulating variables (Kothari, 2020). The study focuses on all registered non-life (property and casualty) insurance firms in Nigeria, constituting an estimated population of 28 companies as listed by the National Insurance Commission (NAICOM, 2024). To ensure representativeness and data availability, a purposive sampling technique is employed, selecting 20 firms that consistently report IT expenditures, digital penetration metrics, and InsurTech collaborations during the study period. The study covers a ten-year period from 2015 to 2024, allowing sufficient time to observe the evolving impact of technology adoption on pricing performance in the Nigerian insurance industry, consistent with longitudinal studies such as Chen (2021) and Huang (2023). Data are sourced primarily from audited annual reports, NAICOM industry bulletins, and financial databases such as Eviews DataStream.

The study applies descriptive statistics to summarize variable characteristics and correlation matrix analysis to examine the strength and direction of relationships among variables. Prior to regression estimation, diagnostic tests—including multicollinearity (Variance Inflation Factor), heteroskedasticity (Breusch–Pagan test), and Hausman specification test, are performed to determine the most appropriate model between fixed and random effects (Gujarati & Porter, 2020). The main analytical technique is a panel regression model, consistent with similar insurance-sector studies (Park, 2022; Liu, 2022). This model quantifies the impact of IT investment intensity, digital channel penetration, and InsurTech collaboration density on the Pricing Efficiency Index (PEI), offering robust information on technology's role in enhancing pricing efficiency and risk management in Nigeria's non-life insurance industry.

3.1 Model Specification

The study adopts a panel regression model to evaluate the impact of technology adoption on pricing efficiency and risk management performance in Nigeria's non-life (property and casualty) insurance sector. The functional and econometric models are specified as follows:



Functional form:

$$PEI_{it} = f(ITINV_{it}, DIGPEN_{it}, INSCOL_{it}, \varepsilon_{it})$$

Econometric form:

$$PEI_{it} = \beta_0 + \beta_1 ITINV_{it} + \beta_2 DIGPEN_{it} + \beta_3 INSCOL_{it} + \mu_i + \varepsilon_{it}$$

Where:

PEI_{it} = Pricing Efficiency Index for firm i in year t

ITINV_{it} = IT Investment Intensity (Total IT Expenditure / Total Operating Expense)

DIGPEN_{it} = Digital Channel Penetration Rate (% of Policies Sold via Digital Platforms)

INSCOL_{it} = InsurTech Collaboration Density (Number of Active InsurTech Partnerships / Total Strategic Partnerships)

β₀ = Constant term

β₁ – β₃ = Coefficients of explanatory variables

μ_i = Unobserved firm-specific effect

ε_{it} = Error term

The model employs both Fixed Effects and Random Effects estimations, with the Hausman test determining the preferred specification.

Variable Measurements

Table 1 below presents the operational definitions, measurement proxies, and scholarly sources supporting the variables used in the study.

Table 1: Operational Measurements of the Study Variables

Variable	Measurement / Proxy	Scholarly Source
Pricing Efficiency Index (PEI)	(Actual Premium / Expected Premium) × 100	Moussa (2022); Zhao (2023); Chen (2021)
IT Investment Intensity (ITINV)	(Total IT Expenditure / Total Operating Expense)	Liu (2022); Bach (2020); Park (2022)
Digital Channel Penetration Rate (DIGPEN)	% of Policies Sold via Digital Platforms	Yin (2021); Boateng (2022); Zhang (2023)
InsurTech Collaboration Density (INSCOL)	(Number of Active InsurTech Partnerships / Total Strategic Partnerships)	Gozman (2022); Ahmed (2023); Rahman (2021)
Firm Size (FSIZE)	Natural Logarithm of Total Assets	Huang (2023); Eze (2021)
Leverage (LEV)	Total Liabilities / Total Assets	Chen (2021); Liu (2022)

Source: Author's Compilation, 2025.



4.0 Results and Discussion of Findings

This section presents the empirical results and findings of the study. It includes the descriptive statistics, correlation matrix, diagnostic tests, and regression results for the effect of technology adoption on pricing efficiency in Nigeria’s non-life insurance sector for the period 2015–2024.

Table 2: Descriptive Statistics

Variable	Mean	Std. Dev.	Min	Max
PEI	97.45	4.82	86.72	106.31
ITINV	0.126	0.058	0.05	0.25
DIGPEN	28.56	11.44	10.25	58.44
INSCOL	0.342	0.121	0.1	0.58
FSIZE	15.73	0.83	14.2	17.1
LEV	0.52	0.21	0.18	0.91

Source: STATA 26 Output, 2025.

The descriptive statistics indicate that the average Pricing Efficiency Index (PEI) across the sampled firms is 97.45%, suggesting a moderate alignment between actual and expected premiums. The mean IT Investment Intensity (0.126) shows that insurers dedicate roughly 12.6% of their operating expenses to IT-related activities, reflecting a growing digital focus. Digital Channel Penetration averages 28.56%, highlighting a moderate yet expanding digital adoption rate. The mean InsurTech Collaboration Density (0.342) indicates that approximately one-third of strategic partnerships involve InsurTech alliances. Firm Size (15.73) shows moderate heterogeneity, while Leverage (0.52) suggests balanced capital structures among firms.

Table 3: Correlation Matrix

Variables	PEI	ITINV	DIGPEN	INSCOL	FSIZE	LEV
PEI	1.0	0.64	0.59	0.53	0.27	-0.31
ITINV	0.64	1.0	0.48	0.55	0.32	-0.22
DIGPEN	0.59	0.48	1.0	0.6	0.24	-0.18
INSCOL	0.53	0.55	0.6	1.0	0.28	-0.14
FSIZE	0.27	0.32	0.24	0.28	1.0	-0.35
LEV	-0.31	-0.22	-0.18	-0.14	-0.35	1.0

Source: STATA 26 Output, 2025.



The correlation matrix reveals positive relationships between the dependent variable (PEI) and the independent variables. IT Investment Intensity ($r = 0.64$), Digital Channel Penetration ($r = 0.59$), and InsurTech Collaboration Density ($r = 0.53$) all exhibit strong positive correlations with Pricing Efficiency, implying that increased technological engagement improves pricing alignment. Leverage shows a weak negative correlation (-0.31), indicating that higher debt ratios may reduce pricing efficiency.

Table 4: Diagnostic Test Results

Test	Statistic	p-Value	Decision
VIF (Mean)	1.82	<0.05	No multicollinearity detected
Breusch–Pagan Test	12.44	<0.05	Heteroskedasticity absent at 5% significance level
Hausman Test	19.63	<0.05	Fixed Effects model preferred

Source: STATA 26 Output, 2025.

Table 5: Regression Results

Variable	Coefficient	Std. Error	t-Statistic	p-Value
ITINV	5.812	1.144	5.08	0.000
DIGPEN	0.432	0.128	3.37	0.001
INSCOL	2.675	0.984	2.72	0.007
FSIZE	0.415	0.221	1.88	0.062
LEV	-0.782	0.312	-2.51	0.013
Constant	82.491	5.613	14.69	0.000

$R^2 = 0.731$ | Adjusted $R^2 = 0.698$ | F-Statistic = 21.74 ($p < 0.01$)

Source: STATA 26 Output, 2025.

The regression results show that IT Investment Intensity ($\beta = 5.812$, $p < 0.01$), Digital Channel Penetration ($\beta = 0.432$, $p < 0.01$), and InsurTech Collaboration Density ($\beta = 2.675$, $p < 0.01$) significantly and positively affect Pricing Efficiency. Firm Size has a marginally significant positive effect ($p < 0.10$), while Leverage exerts a significant negative effect ($p < 0.05$). The R^2 value of 0.731 indicates that approximately 73.1% of variations in pricing efficiency are explained by the model, confirming a strong explanatory power. The Hausman test supports the Fixed Effects model as the most appropriate estimator.

Discussion of Findings

IT Investment Intensity and Pricing Efficiency

The regression coefficient for IT investment intensity ($\beta = 5.812$, $p < 0.01$) indicates a strong and statistically significant positive relationship with pricing efficiency in the Nigerian non-life insurance sector. This implies that a one-unit increase in IT investment intensity enhances the Pricing Efficiency Index by approximately 5.8%, reflecting the critical role of technological infrastructure in premium accuracy. The result aligns with the Resource-Based View (RBV),



which posits that firms leveraging unique technological assets gain operational efficiency and sustainable advantage (Barney, 1991). Similar findings by Liu (2022) and Park (2022) confirmed that IT-intensive insurers achieve superior pricing precision through data analytics and automation. This outcome also supports Moussa (2022), who emphasized that IT investments improve actuarial modeling in non-life insurance. Hence, IT investment intensity remains a strategic driver of pricing efficiency, enabling Nigerian insurers to align premiums with predicted risk levels and enhance competitive sustainability.

Digital Channel Penetration and Pricing Efficiency

The estimated coefficient for digital channel penetration ($\beta = 0.432$, $p < 0.01$) reveals a statistically significant positive relationship with pricing efficiency. This implies that for every percentage increase in digital policy sales, pricing efficiency improves by 0.43%. The finding validates the Technology–Organization–Environment (TOE) framework, which emphasizes that technological integration and environmental readiness enhance firm performance (Tornatzky & Fleischer, 1990). It also corroborates empirical results from Zhang (2023) and Boateng (2022), who found that digital distribution enhances pricing accuracy through customer data analytics. Similarly, Choudhury (2021) observed that digital channels promote real-time underwriting and adaptive premium structures. In Nigeria, this signifies that insurers utilizing online platforms for policy management gain improved pricing accuracy and customer retention. Therefore, the finding demonstrates that digital penetration not only expands access but also drives data-driven precision in risk-based pricing within the non-life insurance segment.

InsurTech Collaboration Density and Pricing Efficiency

The coefficient for InsurTech collaboration density ($\beta = 2.675$, $p < 0.01$) indicates a significant positive impact on pricing efficiency. This suggests that insurers with higher InsurTech partnership ratios achieve more efficient premium pricing by 2.67% per unit increase. The result aligns with the Resource-Based View (RBV) in which partnerships with technology startups serve as valuable, inimitable resources fostering innovation and market agility (Barney, 1991). It also supports findings by Gozman (2022) and Rahman (2021), who emphasized that InsurTech collaborations enhance risk prediction and dynamic pricing in property and casualty insurance. In Nigeria's context, the finding implies that collaborative ecosystems allow insurers to access advanced data analytics and AI-driven pricing models, improving alignment between actual and expected premiums. This outcome strengthens the argument that technological alliances promote innovation diffusion and foster pricing transparency, thereby improving overall pricing efficiency and sectoral competitiveness.

5.0 Conclusion and Recommendations

This section presents the overall conclusion drawn from the empirical findings of the study and offers practical, theory-driven recommendations aimed at enhancing pricing efficiency and technological integration within Nigeria's non-life insurance sector.



Conclusion

This study examined the impact of technology adoption, measured by IT investment intensity, digital channel penetration, and InsurTech collaboration density—on pricing efficiency in Nigeria’s non-life insurance sector from 2015 to 2024. Empirical evidence from panel regression analysis confirms that all three technological proxies significantly and positively affect the Pricing Efficiency Index (PEI). These findings underscore the relevance of technology as a performance-enhancing resource within the framework of the Resource-Based View (RBV) and TOE theories. The results suggest that Nigerian insurers embracing digital transformation not only improve pricing precision but also strengthen operational resilience and risk management effectiveness. Overall, technological adoption emerges as a vital strategic lever for achieving actuarial soundness, reducing pricing asymmetries, and promoting consumer trust in the dynamic non-life insurance market.

Recommendations

The following recommendations are proposed based on the empirical results of the study to guide policymakers, industry regulators, and insurance firms in leveraging technology adoption to improve pricing efficiency and risk management performance.

- i. Regulators and boards should encourage consistent IT infrastructure investments to enhance data-driven underwriting and improve pricing accuracy.
- ii. Insurance firms should expand online platforms and mobile applications to deepen digital policy distribution and real-time customer engagement.
- iii. The industry should institutionalize innovation partnerships with InsurTech startups to improve predictive modeling, pricing transparency, and operational agility.

Limitations and Frontiers for Further Studies

Although this study provides robust empirical information, it is limited by its reliance on secondary data, which may not capture qualitative factors such as organizational culture and regulatory readiness that influence technology adoption. The study also focuses solely on non-life insurers in Nigeria, thus its findings may not be directly generalizable to life insurance or other developing economies with different digital maturity levels. Additionally, the proxy measures for technology adoption, though quantitatively valid, may not fully capture technological integration depth or innovation quality. Future research should employ mixed-methods approaches, incorporating qualitative interviews and cross-country analyses to explore how contextual, behavioral, and institutional factors mediate the technology–efficiency nexus. Integrating machine learning-based panel models and global comparative datasets could further refine the predictive understanding of technology adoption’s impact on pricing efficiency in the broader insurance ecosystem.



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