

5. Artificial Intelligence in Insurance: Managing Emerging Risks and Transforming the Future of Risk Protection, A Study with Reference to Insurance Policyholders in Tamil Nadu, India

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Abstract

The insurance sector is being reshaped by Artificial Intelligence (AI) across underwriting, claims, and customer service, generating efficiency gains alongside emerging risks around data privacy, cybersecurity, and algorithmic transparency. This study examines customer awareness, perceived risks, trust, and adoption intention toward AI-enabled insurance services using primary data from 300 policyholders in Tamil Nadu, India, collected through a structured five-point Likert questionnaire administered via convenience sampling. Reliability was confirmed (Cronbach's $\alpha = 0.891$). Percentage analysis, Chi-square tests, one-way ANOVA, and multiple regression were applied. Findings show moderate AI awareness alongside high privacy and cybersecurity concern. Age and education are significantly associated with adoption level, and adoption and trust differ significantly across age and income groups respectively. Regression results indicate that Trust, Awareness, Ease of Use, and Personalisation positively predict adoption, while Privacy Concerns and Cybersecurity Risk negatively predict it, jointly explaining 59.9% of variance ($R^2 = 0.599$). Recommendations for transparent, secure, trust-based AI strategies are offered for insurers and regulators.

Keywords: Artificial Intelligence, Insurance, Emerging Risks, Customer Trust, Technology Adoption, Risk Protection

1. Introduction

AI is transforming insurance through automated underwriting, claims processing, fraud detection, and personalised pricing, improving efficiency while introducing risks in data privacy, cybersecurity, and algorithmic opacity. Because insurance depends on customer trust, perceptions of these emerging risks materially affect willingness to adopt AI-enabled services. India's insurance sector has accelerated AI-based digital initiatives, and Tamil Nadu, with a diverse policyholder base across life, health, and motor insurance, offers a relevant context to study awareness, risk perception, trust, and adoption. This paper investigates these dimensions using primary survey data from 300 respondents.

2. Review of Literature (2020–2026)

Studies report moderate customer awareness of AI applications in Indian insurance markets, associated with education and occupation (Anbarasan & Vijayakumar, 2021; Chandrasekaran, 2020; Rajendran & Bhavani, 2022). Data privacy and cybersecurity concerns are consistently significant negative predictors of trust and adoption of digital insurance platforms (Devi & Kumar,

2023; Ganesan & Priya, 2022; Sharma & Gupta, 2023; Nair & Pillai, 2020). Transparency and explainability of algorithmic decisions strongly influence trust, often more than technical accuracy (Ho & Tan, 2020; Iyer & Krishnan, 2023; Oliveira & Costa, 2021; Venkataraman & Anitha, 2025). Ease of use and perceived usefulness remain robust predictors of acceptance of AI-enabled tools, consistent with TAM/UTAUT-based research (Jayaraman, 2021; Wong & Lim, 2022; Fernandes & Rao, 2021). AI-enabled personalisation, fraud detection, and claims automation improve satisfaction and efficiency but can generate distrust when outcomes are contested (Manikandan & Suresh, 2023; Karthik & Meenakshi, 2024; Padmanabhan & Selvi, 2026; Bhattacharya & Sen, 2022; Thangavel & Ramesh, 2021). Digital literacy moderates fintech/InsurTech adoption, particularly among rural and older customers (Lakshmanan & Prabhu, 2022).

3. Research Gap and Problem Statement

Few studies integrate awareness, multiple emerging-risk dimensions, trust, and adoption within one empirical model, and Tamil Nadu-specific evidence remains limited. Insurers face pressure to accelerate AI adoption, yet rapid deployment without addressing customer-perceived risk may erode the trust central to the insurance relationship. This study addresses this gap by modelling the joint influence of awareness, perceived benefits, privacy concerns, cybersecurity risk, and transparency, ease of use, personalisation, trust, and digital literacy on future adoption intention among 300 Tamil Nadu policyholders.

4. Objectives

(i) Examine customer awareness of AI in insurance; (ii) identify perceived emerging risks; (iii) analyse AI's impact on trust and risk protection; (iv) evaluate willingness to adopt AI-enabled services and its determinants; (v) recommend future AI-driven insurance practices.

5. Hypotheses

- H01: No significant association between gender and AI adoption level.
- H02: No significant association between age group and AI adoption level.
- H03: No significant association between education and AI adoption level.
- H04: No significant difference in mean AI adoption across age groups.
- H05: No significant difference in mean trust across income groups.
- H06: Awareness, Trust, Ease of Use, Privacy Concerns, Cybersecurity Risk, and Personalisation do not significantly predict Future Adoption.
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6. Research Methodology

A descriptive-analytical design based on primary data was adopted. 300 policyholders across urban/semi-urban Tamil Nadu were selected via convenience sampling and responded to a structured questionnaire covering demographics and nine Likert-scaled constructs (AI Awareness, Perceived Benefits, Data Privacy Concerns, Cybersecurity Risk, Transparency, Ease of Use, Personalisation, Trust, Digital Literacy) plus Future Adoption (DV). Data were analysed using percentage analysis, mean/SD, Cronbach's alpha, Chi-square, one-way ANOVA, and multiple linear regression.

7. Data Analysis and Interpretation

7.1 Profile, Reliability and Descriptive Statistics

Table 1: Sample Profile (Dominant Category), N = 300

Variable	Dominant Category	% of Sample
Gender	Male	54.0
Age	25-35 yrs	32.0
Education	Undergraduate	42.0
Occupation	Private Employee	36.0
Annual Income	₹3-6 Lakh	32.0
Insurance Held	Life Insurance	44.0
Experience	2-5 years	36.0

Table 2: Construct-wise Mean, SD and Cronbach's Alpha (N = 300)

Construct	Mean	SD	Cronbach's α
AI Awareness	3.42	0.78	0.812
Perceived Benefits of AI	3.86	0.71	0.834
Data Privacy Concerns	3.95	0.69	0.798
Cybersecurity Risk	3.78	0.74	0.807
Transparency of AI Decisions	3.35	0.82	0.781
Ease of Use	3.91	0.68	0.822
Personalisation	3.73	0.70	0.789
Trust in AI	3.48	0.77	0.845
Digital Literacy	3.66	0.73	0.776
Future Adoption of AI Services	3.58	0.75	0.856
Overall Instrument (42 items)	-	-	0.891

Interpretation: All alpha values exceed 0.70 (overall = 0.891), confirming reliability. Data Privacy Concerns (M=3.95) and Ease of Use (M=3.91) scored highest; AI Awareness (M=3.42) and Transparency (M=3.35) were moderate.

7.2 Chi-Square and ANOVA Summary

Table 3: Chi-Square (Association) and ANOVA (Mean Difference) Results

Test	Variables Tested	Value	df	Sig.	Decision (H0)
Chi-Square	Gender × Adoption Level	0.472	2	0.790	Accepted (Not Sig.)
Chi-Square	Age Group × Adoption Level	21.634	8	0.006	Rejected (Sig.)
Chi-Square	Education × Adoption Level	15.873	6	0.014	Rejected (Sig.)
ANOVA (F)	Adoption across Age Groups	6.482	4,295	0.000	Rejected (Sig.)
ANOVA (F)	Trust across Income Groups	4.117	3,296	0.007	Rejected (Sig.)

Interpretation: Gender shows no significant link with adoption; age group and education are significantly associated with adoption level (H02, H03 rejected). AI adoption differs significantly across age groups and trust differs significantly across income groups (H04, H05 rejected).

7.3 Multiple Linear Regression

DV: Future Adoption of AI-based Insurance Services. $R = 0.774$, $R^2 = 0.599$, Adjusted $R^2 = 0.591$; Regression ANOVA: $F(6,293) = 72.998$, $p = 0.000$ — model is significant (H06 rejected).

Table 4: Regression Coefficients

Predictor	B	Beta	t	Sig.
(Constant)	0.421	-	2.251	0.025
AI Awareness	0.187	0.194	4.561	0.000
Trust in AI	0.246	0.253	5.467	0.000
Ease of Use	0.198	0.180	4.605	0.000
Data Privacy Concerns	-0.142	-0.147	-3.641	0.000
Cybersecurity Risk	-0.098	-0.101	-2.450	0.015
Personalisation	0.171	0.166	4.071	0.000

Interpretation: Trust ($\beta=0.253$), Awareness ($\beta=0.194$), Ease of Use ($\beta=0.180$) and Personalisation ($\beta=0.166$) positively predict adoption; Privacy Concerns ($\beta=-0.147$) and Cybersecurity Risk ($\beta=-0.101$) predict it negatively — all significant at $p<0.05$.

8. Discussion and Key Findings

1. Awareness of AI in insurance is moderate; transparency of algorithmic decisions is the weakest-perceived dimension, consistent with prior explainability concerns.
2. Data privacy and cybersecurity concerns are rated high and significantly suppress adoption intention, confirming emerging-risk salience.
3. Gender shows no significant association with adoption; age and education significantly shape adoption patterns, with younger, more educated respondents adopting more readily.
4. Trust in AI is the single strongest driver of future adoption, ahead of awareness, ease of use, and personalisation.

5. The regression model explains 59.9% of variance in adoption intention, indicating a robust and practically meaningful predictive framework.

9. Suggestions

Insurers should: (a) improve customer education on AI-based underwriting/claims; (b) adopt explainable-AI practices with plain-language disclosures; (c) strengthen visible data-privacy and cybersecurity assurances; (d) prioritise fair, human-supervised outcomes with escalation channels to build trust; (e) expand transparent personalisation (e.g., usage-based pricing); and (f) design simplified onboarding for older/less digitally literate customers. Regulators should advance principles-based supervision emphasising explainability and data governance.

10. Conclusion, Limitations and Future Scope

AI offers substantial efficiency and personalisation benefits to insurance but introduces emerging risks that significantly shape customer trust and adoption. Trust, awareness, ease of use, and personalisation drive adoption, while privacy and cybersecurity concerns deter it; sustainable AI-driven risk protection therefore depends on transparent, secure, trustworthy digital ecosystems rather than algorithmic sophistication alone. This study is limited by its convenience sample, single-state coverage, cross-sectional design, and reliance on self-reported Likert data; findings should not be generalised beyond Tamil Nadu. Future research could use probability sampling across states, longitudinal designs, and additional predictors such as regulatory trust and brand reputation.

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