



Application of Artificial Intelligence and Machine Learning in the Indian Insurance Industry

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Abstract

The integration of Artificial Intelligence (AI) and Machine Learning (ML) is transforming the Indian insurance industry by enhancing efficiency, customer experience, and decision-making processes. This paper explores the application of AI and ML technologies in the Indian insurance sector, focusing on their usage from 2018-19 to 2022-23, as reported in IRDAI annual reports. Key applications include claims automation, customer interaction through chatbots, underwriting, fraud detection, and personalized policy offerings. Notable initiatives such as IRDAI's regulatory sandbox and the BIMA Sugam platform have supported innovation and digital transformation. Insurers are leveraging AI-powered chatbots, predictive models, and IoT-based solutions to streamline operations and offer tailored services. Advanced technologies like robotic process automation (RPA), blockchain, telematics, and drone-based inspections are further improving risk assessment and operational accuracy. This study categorizes and analyses these technological applications, highlighting their impact on stakeholders, from policyholders to intermediaries. The findings emphasize a strong alignment with the "Insurance for All by 2047" vision, showcasing the industry's commitment to accessibility, fraud prevention, and cost-efficiency through technology-driven innovations.

Keywords: Artificial intelligence, machine learning, Indian insurance industry, claims automation, fraud detection, digital transformation

Introduction

The Indian insurance industry is witnessing a transformation with the integration of Artificial Intelligence (AI) and Machine Learning (ML). Insurtech companies are leveraging the technologies in traditional operations, driving efficiency, enhancing customer experience, and enabling data-driven decision-making. Insurers in India are now leveraging AI and ML to optimize underwriting, streamline claims processing, personalize policy offerings, and detect fraudulent activities (ASSOCHAM 2023) ^[15]. The introduction of the regulatory sandbox by IRDAI has facilitated the testing of innovative products, services, and business models under a controlled regulatory environment, encouraging innovation while ensuring consumer protection (IRDAI Report on *InsurTech: Working group findings & recommendations*). The BIMA Sugam initiative of IRDAI is a unified digital marketplace designed to seamlessly integrate all insurance stakeholders, providing policyholders with single-window access to manage policies, insurers with real-time validated data, and offering end-to-end solutions for purchasing, servicing, and claims, while empowering intermediaries to efficiently handle policy sales and services (IRDAI Annual Report 2022-23). IRDAI organized its first hackathon, themed 'Innovation in Insurance,' inviting participants to develop technology-driven solutions to enhance insurance accessibility and policyholder protection, focusing on areas such as automated death claim settlements, prevention of miss-selling, identification of uninsured motor vehicles, distribution of microinsurance in challenging terrains, and fraud mitigation in motor insurance (IRDAI Annual Report 2022-23)

AI-powered chatbots and virtual assistants are transforming customer engagement by providing 24/7 assistance and tailored recommendations. Additionally, ML algorithms analyse vast amounts of data to assess risk profiles, predict

customer behaviour, and improve actuarial models. This paper studies the usage of Artificial Intelligence and Machine Learning in the Indian Insurance Industry based on the disclosures in the IRDAI annual reports covering period from 2018-19 to 2022-23.

Literature Review

The rise of InsurTech companies is revolutionizing the insurance industry and ushering in a new era of innovative business models (Greineder, M. *et al.* 2020) ^[11]. The COVID-19 pandemic has catalysed a significant shift in consumer behaviour and expectations in the insurance sector like 24/7 access to information, seamless interactions, automated services, and personalized products (Desikan, J., & Jayanthila Devi, A. 2021) ^[7]. The emergence of FinTech and InsurTech in the insurance sector compels regulators to balance safeguarding financial stability and consumer protection with embracing innovation, responding to dynamic consumer needs, and supporting a competitive marketplace (Chatzara, V. 2020) ^[9]. AI-powered solutions revolutionize the insurance industry by enabling personalized product offerings, dynamic behavioural pricing, improved risk assessment, enhanced fraud detection, and automation of repetitive business processes (Śmietanka, M., *et al.* 2021) ^[6]. AI-driven predictive models have enhanced the accuracy of risk assessments and pricing strategies and the real-time data processing has transformed risk evaluation. Additionally, advanced financial forecasting techniques have delivered more robust and dynamic forecasting capabilities in the insurance industry (Kuna, S. S. 2022) ^[1]. By utilizing extensive datasets that include traditional demographics, medical records, wearable device data, and potentially social media insights, AI models enable life insurance companies to gain a comprehensive understanding of an applicant's health, leading to more

accurate risk assessments, fairer pricing, and enhanced risk management (Perumalsamy, J. *et al.* 2023)^[5]. AI techniques, including natural language processing (NLP), geospatial analytics, and hybrid models, can automate processes, improve customer targeting, and enhance fraud detection (Singh, S. K., & Chivukula, M. 2020)^[3]. Advanced algorithms streamline the routing of initial claims, enhancing efficiency and accuracy. IoT sensors and various data-capture technologies, including drones, have largely supplanted traditional manual methods for first notice of loss. (Balasubramanian, R *et al.* 2018)^[2]. AI/ML systems can adapt to emerging fraud patterns by continuously learning from new data, analysing large volumes of structured and unstructured information from various sources to detect anomalies and flag potential fraud cases in real time. (Mwangi, E. 2024)^[4]. Technology can be leverage to reduce operational costs by implementing risk-based pricing for fair premiums, and provide flexible payment options to cater to diverse financial needs (PWC India 2023)^[13]. Generative AI technology used in underwriting carries the risk of producing biased outcomes, influenced by factors such as age, gender, and ethnicity (Pankaj Zanke 2024)^[8]. The ability of insurtech devices to personalize pricing through the use of personal data for risk calculation has largely overlooked contemporary and historical practices of risk classification (McFall, L., & Moor, L. 2018)^[10]. In this era of AI-driven digital transformation, earning and maintaining consumer trust is essential for financial organizations and insurers (Zarifis, A., & Cheng, X. 2022)^[11].

Objectives and Methodology of the Study

The objective of the study is to list out the type of technologies that are adopted by Insurance companies in India for the different stakeholders from policy holders to intermediaries for different business functions such as underwriting, claims management, fraud detection, and customer interaction. The Methodology used for the study is analytical research based on the annual reports of IRDAI from 2018-19 to 2022-23. The different technologies adopted by the Insurance companies are categorized to bring clarity on the insurance activities for which they are used and the subsequent benefits thereof.

Analysis and Results

1. Artificial Intelligence (AI) and Machine Learning (ML)

Claims Automation

Acko General Insurance has automated claims estimation and payout using ML models for faster turnaround and hassle-free paperless processes (IRDAI Annual Report 2018-19). ICICI Lombard General Insurance Company has adopted AI based break-in inspection service where customers can take photos of their vehicle and the cloud-based AI algorithms can take decisions on whether to accept the policy proposal or to recommend it to for further verification and this has resulted in 24/7 and instantaneous service for renewal of break-in motor policies for the benefit of the Customers (IRDAI Annual Report 2018-19). Shriram General Insurance uses AI based technology for Health cashless claims approval process. This has resulted in faster cashless authorization for health customers who can now focus more on the hospital treatment (IRDAI Annual Report 2018-19). Niva Bupa Health Insurance uses AI for pre-

authorization approval and for adjudication process to learn from historical data set and build comprehensive deep neural linkages (IRDAI Annual Report 2020-21).

Customer Interaction

ICICI Prudential Life Insurance uses a conversational bot on the website "LiGo" (Life Insurance on the Go), which has resolved over 1 million customer queries with accuracy (IRDAI Annual Report 2018-19). PNB MetLife has a customer service application- 'khushi' which is powered with Artificial Intelligence (AI) and speech recognition capabilities and has ability to understand customer's intent to provide tailored responses. Since launch, around 1,00,000+ customers have interacted with khushi and around 1,50,000 servicing requests have been accepted till date (IRDAI Annual Report 2019-20). Niva Bupa's CIA-chat bot has catered 60 per cent of the addressable service request types being handled by customer care team. Chatbot CIA and the company health app are equipped to address basic servicing needs of customers regarding policy details, claims, renewal, purchase, premium payment, etc. Chatbot CIA is also equipped to address basic queries related to Covid-19 as well. (IRDA Annual Report 2020-21).

Underwriting and Risk Assessment

ICICI Prudential Life Insurance Company underwrites the medical cases assisted with an AI engine which analyzes the data provided by the customer and accordingly the issuance decision is made (IRDAI Annual Report 2018-19). It also developed TeleNideo MER to conduct tele or video based medical assessments (IRDAI Annual Report 2019-20). Tata AIA General Insurance uses AI for underwriting and claims fraud detection (IRDAI Annual Report 2019-20).

Personalized Services

ICICI Prudential Life Insurance uses Nudge engine for prompting customers for appropriate next action to achieve the next goal, digital life verification for annuity customers, moved to real-time payout for customers, post submission and verification of all relevant documents. Customers can get most of their queries and requests addressed instantly at their fingertips through Visual IVR. IVR and speech recognized IVR using Natural Language Processing to understand the context & intent of the query or request and process the same (IRDAI Annual Report 2019-20).

2. Mobile and Web Applications

Customer Apps, Agent Appa and Self-Service Portals

Star Health & Allied Insurance embarked into digitalization by introducing Star Atom Mobile App for Agents, Star Power Mobile App for Customers and STAR Health Sales Web Portal (IRDAI Annual Report 2019-20). Star Health started Talk to Star - from Illness to Wellness, (a teleconsultation facility) which provides Tele Consult-General as well as Specialist Consultations and E-Prescription (IRDAI Annual Report 2019-20). ICICI Lombard General Insurance has 'IL Take Care' App a one-stop shop for all motor and health insurance and wellness needs of their customers. It also introduced a tele-consult feature, which helped customers to obtain expert medical advice during lockdown from the safe environment of their homes (IRDAI Annual Report 2019-20). Aditya Birla health insurance company (ABHI) has a Health app to help the policyholders to know Healthy Heart Score TM (HHS),

which gives an indication of a healthy heart (IRDAI Annual Report 2018-19). In SBI Life Insurance through Digital Moral Hazard Report (MHR) application sales force can submit and evaluate MHR through Smart Advisor Application (IRDAI Annual Report 2019-20).

Self-Service Portals

ICICI Lombard General Insurance launched digital portal to help cater to the internet savvy SME/MSME customers which helps them understand commercial insurance products, buy policies as well as intimate claims (IRDAI Annual Report 2020-21). Tata AIA General Insurance has customer self-service through WhatsApp (IRDAI Annual Report 2019-20). Bajaj Allianz Life Insurance Co. Ltd. has launched eSampark which allows agents to personalize the communications with their name and contact details (IRDAI Annual Report 2019-20).

3. Robotics and Automation

Robotic Process Automation (RPA)

Aditya Birla Health Insurance has RPA for back-office functions like Cashless/ reimbursement intimation, policy cancellation & refund processing, policy servicing, receipt generation and for generation of certificate of insurance which enabled in achieving high accuracy in lesser time and making operational activities automated. (IRDAI Annual Report 2019-20). SBI General Insurance uses RPA to ensure business operations are more productive have fewer errors and increased data security (IRDAI Annual Report 2020-21). ICICI Prudential Life Insurance has Humanoid, an AI-based conversational tool deployed for renewal premium reminder calling. Humanoid can converse with customers in multiple languages and can reach out to over 50,000 customers in an hour. It has enabled the company to reach out to its customers and deliver a superior experience, along with achieving scalability (IRDAI Annual Report 2020-21).

Touchless Hiring: PNB MetLife uses AI and predictive modeling for recruiting sales candidates (IRDAI Annual Report 2019-20).

Cloud Computing and Integration

Canara HSBC OBC Life Insurance uses IPM+ technology (Intelligent Power Management) optimizes power by ensuring that power is automatically managed and saved without user intervention. It helps in conservations of energy even when workstations are in use (IRDAI Annual Report 2020-21).

Integration Platforms

Acko General Insurance has Integration with VAHAN for real-time vehicle data verification by doing this they have done away with requirement of physical documents from insured / customer. Acko's integration with OAG, where it retrieves flight data from OAG and approve/reject the claim based on the delay time of the flight (IRDAI Annual Report 2019-20).

4. Data Science and Analytics

Health and Wellness

Aditya Birla Health Insurance provides Well-Being Score (WBS) based on existing diseases, clinical health markers, lifestyle choices, activity levels, medical events/ claims, investment in one's health. Based on WBS, the company categorizes the customers into various risk levels starting from low to high. Targeted and personalized interventions

are done to ensure improvement in customer health (IRDAI Annual Report 2020-21).

ICICI Lombard General Insurance offers app-based disease management programs for customers with diabetes and cholesterol that included nutritionist counselling and coaching to help lead a healthier lifestyle in terms of diet and exercise. These programs resulted in positive outcomes for certain customers with a drop in their HBA1C and cholesterol levels. (IRDAI Annual Report 2020-21)

5. Internet of Things (IoT)

Telematics

ICICI Lombard General Insurance introduced telematics-based Pay how you drive program to identify and segment customers basis their driving behaviour using a machine learning algorithm. Driving scores were generated and shared with customers to help them understand their driving behaviour (IRDAI Annual Report 2020-21).

SBI General Insurance introduced tele-underwriting for Pre-Policy Health Check Up cases (IRDAI Annual Report 2020-21).

Smart Devices

ICICI Lombard General Insurance embraced Internet of Things (IoT) technology in applications such as fire hydrant systems (IRDAI Annual Report 2019-20).

6. Video and Remote Inspection

Drones

Tata AIA General Insurance leverage drone technology to capture detailed photos/videos of the damage due to natural catastrophes and used AI/ML tools to translate the images captured into meaningful insights and information. This helped the Loss Assessors and Tata AIG to quickly arrive at an initial estimate of liability and release interim payments to customers (IRDAI Annual Report 2018-19). ICICI Lombard General Insurance uses drones for renewable energy risk assessment: It helps in instant renewal basis real-time feed from the drones that fly above panels of solar plants and windmills to detects defects/cracks, if any (IRDAI Annual Report 2020-21).

Video-Based Solutions

ICICI Lombard General Insurance uses the motor video inspection app 'Instaspect' to provide contactless, real-time motor claims inspection and approval. It is extended to commercial property claims where surveyors could remotely inspect and authorize such claims (IRDAI Annual Report 2020-21). Acko General Insurance used Video surveys of the damaged device from customers thus has avoided physical presence of customer at repair centre and inspection team at customers place during the Covid-19 pandemic (IRDAI Annual Report 2019-20).

7. Blockchain and Secure Platforms

Digital Verification

ICICI Prudential Life Insurance has gone for Digi Locker Integration and customers can view or download their welcome kit from Digi Locker app (IRDAI Annual Report 2019-20). SBI Life Insurance uses OCR based technology helps to identify KYC documents, read the data from the documents and validate the data with proposal form data. It also matches the name entered in the Benefit Illustration and name in the KYC documents and provides percentage match (IRDAI Annual Report 2019-20).

8. Communication and Learning Platforms

Virtual Classrooms

Tata AIA Life Insurance has an ingenious learning management system called ‘Vacademy’ which conducts virtual classrooms and webinars and is extended to partner employees and agents as well. It works as a robust delivery platform to launch and monitor new initiatives and products (IRDAI Annual Report 2020-21). PNB MetLife ePathshala-mobile based App: The Company has brought the entire Sales force in a virtual classroom all together. There are more than 24,000 users of ePathshala accessing the Learning, Videos and gamified modules. More than total 1.5

lakh times, participants have attended 13,000 programs virtually across the country since lockdown (IRDAI Annual Report 2019-20).

Omni-Channel Communication

ICICI Prudential Life Insurance has Omni- channel for customers which provide a seamless standardized service experience across channels, mobile app with fingerprint, OTP based login, face-id and m-pin enabled login options and has features such as push notifications / In-app nudges, calendar sync, automated self-service (IRDAI Annual Report 2019-20).

Table 1: Summary of the technologies used by Insurance Companies in India

Company Name	Technology Category	Technology Usage	Application Name given by the company
Acko General Insurance	Machine Learning, Claims Automation, Integration	Automating claims estimation, paperless processes, video-based surveys, real-time data integration	-
Shriram General Insurance	Mobile App, AI for Health Claims	Instant policy issuance, health claims automation	Mobile App
ICICI Prudential Life Insurance	Artificial Intelligence, Facial Mapping	AI for underwriting, facial mapping for fraud prevention, chatbot for customer queries	"LiGo" (Life Insurance on the Go)
Aditya Birla Health Insurance	WhatsApp Integration, Health App, RPA	Issuing policies and tracking health scores via WhatsApp, automating servicing processes	"Healthy Heart Score", "ABC Assist"
ICICI Lombard General Insurance	AI for Break-in Inspection, IoT	Real-time vehicle inspection with AI, IoT for risk management	"InstaSpect"
Tata AIA General Insurance	Drone Technology, AI for Underwriting	Using drones for claims assessment, pay-as-you-drive insurance	-
Star Health & Allied Insurance	Auto Adjudication, Teleconsultation	Automating claims, teleconsultations for health and wellness	"Talk to Star"
SBI Life Insurance	OCR Technology, Speech-Based Search	Digital KYC, speech-based customer query handling	"Watch Out", "Smart Care"
Bajaj Allianz Life Insurance	WhatsApp BOT, Video Call Solutions	Responding to customer queries, enabling remote servicing	"i-Serv", "Life Assist"
Canara HSBC OBC Life Insurance	Cloud Services, RPA	Enhancing service delivery, compliance monitoring	"WE COMPLY"
Niva Bupa Health Insurance	Automated Chatbots, AI for Claims Adjudication	Automating pre-authorization approvals, improving customer experience	"CIA" Chatbot
PNB MetLife India Insurance	AI, Speech Recognition	Customer intent analysis, virtual classroom training	"Khushi", "ePathshala"

Source: IRDAI Annual Reports 2018-19 to 2020-21

Discussion and Conclusion

Life Insurance Companies have self-service and digital platforms for policy transactions and customer interactions. They provide mobile apps with offline calculators and video guides for ease of access, OCR-enabled pre-filled insurance applications and seamless income verification through bank integrations. They also use Chatbots and WhatsApp-based assistance for claim queries and registrations (IRDAI Annual Reports 2021-22, 2022-23). Life Insurance companies have gone for integration of products with behavioural programs rewarding healthy lifestyles. They are using predictive models for identifying fraudulent claims and lapse risks. They provide pre-approved Sum Assured offerings using analytics-driven customer campaigns (IRDAI Annual Reports 2021-22, 2022-23). Life Insurance companies provide digital claim registration and real-time dashboards for policy status tracking, Voice bots and IVR for enhanced claim services, Geo-tagging for investigator assignment and faster processing (IRDAI Annual Reports 2021-22, 2022-23).

General Insurers have Apps for tracking vitals (e.g., BP, heart rate) and calorie intake via food photos, AI-powered calculators for motor, health, and travel insurance (IRDAI Annual Reports 2021-22, 2022-23). General Insurers use Voice bots with advanced speech recognition for claim status updates, NLP-enabled chatbots on WhatsApp and Telegram for seamless customer interactions and Text analytics for automated claims data extraction from scanned documents (IRDAI Annual Reports 2021-22, 2022-23). General Insurers use mobile apps for remote crop health monitoring and risk inspections and Remote sensing and GIS for yield loss assessment in agriculture (IRDAI Annual Reports 2021-22, 2022-23). General Insurers have Video and audio-based fraud detection during claim intimations (IRDAI Annual Reports 2021-22, 2022-23). General Insurers have Telematics-based scoring for better driving behavior and reduced premiums. They use AI-based tools for vehicle inspections under challenging conditions (IRDAI Annual Reports 2021-22, 2022-23). General Insurers have provided Agent microsites and mobile apps for faster agent

onboarding and investigator management. They also use Cloud infrastructure for operational cost reduction.

The technology adoption by life and general insurers, combined with initiatives like BIMA Sugam and the IRDAI Hackathon, signify a robust push towards digital transformation in the insurance sector. These innovations not only aim to improve customer accessibility but also address broader issues like fraud, underserved demographics, and operational inefficiencies. This aligns with the vision of achieving "Insurance for All by 2047."

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