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AI Governance and Ethical Frameworks in Insurance:

Challenges and Opportunities for Tunisia

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ABSTRACT

Artificial intelligence (AI) is transforming the insurance industry, particularly in pricing, underwriting, claims management, and fraud detection. While these technologies can significantly improve operational efficiency and risk modeling, they also raise major ethical and regulatory concerns, including algorithmic discrimination, lack of transparency, privacy risks, dependence on technology vendors, and model risk. This paper proposes an AI governance framework tailored to Tunisian insurance companies. It builds on international reference frameworks—especially OECD AI Principles, guidance from the European Insurance and Occupational Pensions Authority (EIOPA), and the EU AI Act—while integrating the specific characteristics of the Tunisian market, such as the current data protection law and structural challenges identified in recent empirical research on AI in the Tunisian insurance sector. The paper outlines a governance architecture combining principles, committees, model registries, validation procedures, performance monitoring, and capacity-building initiatives, and proposes a phased roadmap for responsible AI adoption in Tunisian insurance.

1. Introduction

Insurance is historically an industry built on risk modeling, statistics, and risk pooling. The rise of big data and AI techniques—such as generalized linear models (GLMs), random forests, survival analysis, and conversational agents—has opened up new possibilities to optimize pricing, automate claims handling, and strengthen fraud detection, particularly in motor and life insurance. For emerging markets, where technical imbalances and fraud are significant, AI offers a powerful lever to improve performance and stability.

However, AI systems also introduce new categories of risk: bias and discrimination, opacity of decisions, data protection breaches, model drift, and increased dependency on external technology providers. International organizations have therefore developed high-level principles and regulatory initiatives to promote trustworthy AI, including the OECD AI Principles, the work of EIOPA on ethical AI in insurance, and the EU AI Act, which classifies insurance-related AI systems as "high-risk in certain contexts.

In Tunisia, the insurance sector faces a double challenge. On the one hand, the market remains under-developed, with low penetration and a strong dominance of motor insurance, high loss ratios in compulsory third-party liability, and persistent fraud. On the other hand, the regulatory and operational environment is evolving, with forthcoming adoption of international standards such as risk-based solvency and IFRS 17, and a growing interest in digitalization and AI pilots. Recent empirical work based on a mixed-methods study of Tunisian insurance professionals has shown that AI is perceived as a major opportunity, especially for fraud

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detection, claims management and pricing, but also that adoption is constrained by budget limitations, data quality issues, skill gaps, and regulatory uncertainty.

In this context, the central question is not whether Tunisian insurers should adopt AI, but how they can do so responsibly. This paper addresses the following guiding question: How can Tunisian insurance companies design and implement an AI governance framework that allows them to leverage the benefits of AI while controlling legal, ethical, and operational risks? To answer this question, we draw on international frameworks and adapt them to the Tunisian regulatory and market environment, building on empirical insights from the Tunisian insurance sector.

The remainder of this paper is structured as follows. Section 2 reviews key international frameworks for AI governance in insurance. Section 3 discusses the specificities of the Tunisian context, including data protection law and sector characteristics. Section 4 outlines major ethical challenges associated with AI in insurance. Section 5 proposes a governance framework for AI in Tunisian insurance companies. Section 6 presents a phased roadmap for implementation. Section 7 concludes with practical implications and future research directions.

2. International Frameworks for AI Governance in Insurance

2.1 OECD AI Principles

The OECD AI Principles, adopted in 2019, are among the most influential high-level guidelines for AI policy. They call for AI systems that are human-centered and trustworthy, emphasizing inclusive growth and well-being; respect for the rule of law and human rights; transparency and explainability; robustness, security and safety; and accountability for AI actors across the lifecycle. For financial services and insurance in particular, these principles translate into concrete expectations regarding non-discrimination, transparency of algorithms, auditability, and appropriate human oversight.

The OECD has subsequently documented how member and partner countries are turning these principles into national AI strategies and regulatory frameworks. For insurance, this implies that AI is not simply a tool for improving efficiency and profitability, but must be deployed in ways that protect policyholders and uphold fundamental rights.

2.2 EIOPA's Guidance on Ethical and Trustworthy AI

In the European Union, the European Insurance and Occupational Pensions Authority (EIOPA) has published detailed guidance on trustworthy AI in insurance. This work builds on the EU's broader ethical AI principles and adapts them to insurance-specific use cases such as pricing, underwriting, claims handling, and fraud detection.

EIOPA's guidance highlights several key pillars:
• Fairness and non-discrimination: Insurers must identify and mitigate potential biases in data and models.
• Transparency and explainability: Decisions supported by AI should be traceable and, where appropriate, explainable to customers and supervisors.
• Accountability and governance: Clear allocation of responsibilities, internal controls, and oversight mechanisms are required.
• Robustness and security: Models should be tested, validated, monitored and protected against misuse and cyber threats.
• Data protection: AI systems must comply with privacy and data protection regulations.
Although Tunisia is outside the EU and not directly bound by EIOPA, these principles are highly relevant, especially for Tunisian insurers working with European groups or reinsurers. They provide a practical reference

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to shape internal AI policies and risk management frameworks.

2.3 The EU AI Act and High-Risk AI Systems

The EU AI Act introduces a risk-based regulatory framework for AI systems. It categorizes certain applications as "high-risk," subjecting them to stringent requirements. Systems used for credit scoring, worker management, and some insurance-related assessments (for example in life and health insurance) are considered high-risk, given their potential impact on individuals' rights and access to essential services.
High-risk AI systems under the AI Act must meet requirements regarding risk management, data quality and governance, technical documentation, transparency toward users, human oversight, robustness and accuracy. Although the AI Act does not apply to Tunisia, its extraterritorial effects and its influence on global best practice are likely to be significant. Tunisian insurers cooperating with EU entities will increasingly be expected to align with these standards, at least for cross-border business, and may choose to converge voluntarily to enhance their credibility and competitiveness.

3. Tunisian Context: Regulation and Sector-Specific Challenges

3.1 Data Protection Law and Supervisory Landscape

Tunisia has a dedicated legal framework for personal data protection, established by Organic Law n°2004-63 of 27 July 2004 on the protection of personal data. The law is enforced by the National Authority for the Protection of Personal Data (INPDP). It defines the conditions under which personal data can be collected, processed, stored, and transferred, including specific provisions for sensitive data and cross-border data flows.

For insurance companies, which routinely process sensitive information related to health, accidents, financial situation, and behavior, this law represents a fundamental baseline. Any AI-powered initiative—such as telematics-based pricing, automated claims triage, or fraud detection—must be compatible with the principles of lawfulness, transparency, purpose limitation, data minimization, and security. From a governance standpoint, AI projects should be assessed in terms of their data protection impact, and the data protection officer (or equivalent function) should be integrated into the AI project lifecycle.

3.2 Structural Features of the Tunisian Insurance Market

Recent empirical research has highlighted several structural features of the Tunisian insurance market that have direct implications for AI adoption. These include:
• A relatively low insurance penetration rate compared to global averages, with significant potential for growth.
• A strong concentration in non-life insurance, particularly motor insurance, which accounts for a large share of premiums and claims.
• High loss ratios in motor third-party liability, reflecting regulated tariffs, claims inflation and, in some cases, fraud.
• The continued use of older mortality tables for life insurance pricing and reserving, creating a gap between technical assumptions and observed experience.
• A significant level of suspected fraud in motor claims, leading to substantial financial losses.

A mixed-methods study based on semi-structured interviews and a survey of more than 56 insurance professionals in Tunisia shows that AI is perceived as a major opportunity to address these challenges, especially for fraud detection, claims management and pricing. At the same time, respondents emphasized constraints related to limited budgets, data quality problems, lack of internal AI expertise, and uncertainty about the regulatory treatment of AI-based decisions. These findings underline the importance of a governance framework that is both ambitious and proportionate to local constraints.

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4. Ethical Challenges of AI Use in Insurance

4.1 Fairness and Non-Discrimination

AI models can inadvertently reinforce or amplify existing biases if they are trained on historical data that reflect structural inequalities. In insurance, this can manifest as systematically higher premiums, denial of coverage, or less favorable claims handling for certain segments of the population, such as young drivers, residents of specific regions, or individuals with particular socio-economic characteristics.
From an ethical standpoint, insurers should not rely solely on statistical correlations if these correlations lead to unjust or discriminatory outcomes. In practice, this calls for:
• Systematic testing of pricing and underwriting models for discriminatory patterns.
• Careful review of input variables to avoid the use of sensitive attributes, directly or through proxies.
• Governance procedures that include an ethical review of new models and rating factors.

4.2 Transparency and Explainability

Transparency and explainability are central to trust in AI-supported decisions. In the research underpinning this paper, different types of models were used—GLMs for motor pricing, Kaplan-Meier survival models for mortality, logistic regression for lapse prediction, random forests for fraud detection, and chatbots for claims management. These models vary significantly in their inherent interpretability.
GLMs and logistic regression are relatively easy to interpret and audit: each coefficient has a clear meaning, and their contribution to the final decision can be quantified. Random forests and other ensemble methods offer higher predictive performance in some contexts, but at the cost of opacity. Chatbots and large language models pose additional challenges, as they generate dynamic outputs that may be difficult to fully anticipate.

A sound governance framework should therefore:
• Prefer interpretable models for high-impact decisions, or complement complex models with robust explainability tools.
• Require documentation of model logic, input variables, and main drivers of output.
• Ensure that customers can receive meaningful explanations when decisions significantly affect them, such as premium increases or denial of coverage.

4.3 Privacy and Data Protection

The increasing use of granular data—telematics, behavioral data, geolocation, social data—raises critical questions about privacy and data protection. Even when each data point is not sensitive in isolation, their combination can lead to highly intrusive profiling. In the Tunisian context, any AI project involving new data sources must respect the national data protection law and, more broadly, the ethical principle of data minimization.

This implies:
• Conducting data protection impact assessments for AI projects.
• Ensuring that data collection is necessary, proportionate, and clearly communicated to policyholders.
• Implementing strong technical and organizational security measures to prevent data breaches.
• Carefully assessing cross-border data transfers, especially when using cloud or foreign AI service providers.

4.4 Accountability, Auditability and Customer Recourse

AI does not remove responsibility from human decision-makers. Insurers remain accountable to regulators and policyholders for the decisions they make, even when those decisions are supported or suggested by algorithms. From a governance perspective, this requires:

Volume 2 Issue 1 2026
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• The ability to reconstruct and audit AI-supported decisions (version of the model, data used, thresholds applied).
• Clear internal allocation of responsibilities for the design, validation, deployment and monitoring of models.
• Effective avenues of recourse for customers who wish to challenge a decision.
Without these safeguards, the use of AI risks eroding trust and exposing insurers to significant legal and reputational risks.

5. A Governance Framework for AI in Tunisian Insurance Companies

5.1 Guiding Principles

Building on international guidance and local realities, Tunisian insurers can adopt a concise set of guiding principles for AI use. A possible internal AI charter could include the following commitments:

1. Human-centric AI: Human supervision remains possible for decisions with significant impact on individuals.
2. Fairness and non-discrimination: Regular testing of models for bias, and careful choice of variables.
3. Transparency: Documentation of AI use cases and, where appropriate, communication to customers and regulators.
4. Robustness and security: Minimum requirements for data quality, validation, and monitoring of AI systems.
5. Data protection: Strict compliance with Tunisian data protection law and alignment with good international practice.
6. Proportionality: Governance measures that are commensurate with the risk and impact of each AI application.

5.2 Governance Architecture and Committees

From an organizational standpoint, AI governance should be embedded in existing risk management and internal control frameworks. A practical architecture could include:

• An AI / Data & Models Committee: bringing together representatives from business lines, actuarial, IT/data, risk management, compliance and legal. This committee would validate new AI use cases, arbitrate between performance and risk, and review incidents or complaints related to AI.
• A central model registry: documenting all material models used in the company (purpose, inputs, methods, owners, validation results, deployment environment).
• Integration with the "three lines of defence" model: business and data teams as first line, risk and compliance as second line, and internal audit as third line conducting independent reviews.

This architecture ensures that AI is treated not as a purely technical project, but as a cross-functional, strategic and risk-sensitive capability.

5.3 Lifecycle-Based Model Governance

AI governance should cover the entire lifecycle of models, from conception to retirement. A lifecycle-based approach typically involves six stages:

1. Ideation and scoping: Clarifying the business need, assessing ethical and legal risks, and determining whether AI is the appropriate solution.
2. Data collection and governance: Identifying relevant data sources, assessing data quality, documenting data lineage, and ensuring compliance with data protection rules.
3. Development and validation: Choosing model families (e.g., GLM, logistic regression, random forest) based on the trade-off between performance and interpretability; splitting data into training, validation and test sets; conducting robustness and fairness tests.

Volume 2 Issue 1 2026
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4. Deployment: Implementing models in production environments with proper version control, access management, and fallback procedures.
5. Monitoring: Continuously monitoring model performance (e.g., AUC, loss ratio, error measures), data drift, and operational incidents; conducting periodic reviews.
6. Updating or decommissioning: Recalibrating, replacing, or retiring models when performance deteriorates, data patterns change, regulations evolve, or material incidents occur.

By aligning policies, procedures and documentation with this lifecycle, insurers can make their AI practices auditable and controllable.

5.4 Roles, Skills and Culture

Beyond structures and processes, AI governance depends on people and culture. The empirical research in Tunisian insurance has highlighted the importance of investing in skills and awareness. Key priorities include:
• Training actuaries, underwriters, claims handlers and fraud experts in basic data science concepts, so that they can understand and question AI models rather than treating them as black boxes.
• Training risk, compliance and legal teams on AI-specific risks (bias, explainability limits, model risk).
• Involving the data protection officer and legal advisors early in AI projects.
• Promoting an "assist before automate" culture, where AI is first used as a decision-support tool before considering full automation in critical processes.

Such cultural and capacity-building efforts are essential to ensure that AI strengthens, rather than weakens, professional judgment and customer trust.

6. A Phased Roadmap for Tunisian Insurers

Given the resource constraints and varying levels of digital maturity across Tunisian insurers, a phased approach to AI governance is advisable.

Short term (0–18 months):
• Map existing models and algorithmic tools, even if they are simple (e.g., Excel-based rating tools).
• Adopt a short internal AI policy and ethical charter.
• Create a basic model registry and involve compliance and data protection functions in AI projects.
• Launch awareness sessions and basic training for key teams.

Medium term (18–36 months):
• Establish a formal AI / Data & Models Committee.
• Standardize model validation processes and checklists.
• Define governance indicators (number of models reviewed, incidents, customer complaints about automated decisions).
• Develop a small portfolio of AI use cases with clear value and manageable risks (for example, fraud scoring, claims chatbots).

Long term (3–5 years):
• Deepen engagement with the insurance supervisor and data protection authority on AI topics.
• Gradually align critical AI systems with EU-like standards for high-risk AI, where relevant.
• Assess concentration risks related to third-party technology providers.
• Integrate AI into actuarial, risk, and finance processes in a way that supports new solvency and accounting standards, such as risk-based capital regimes and IFRS 17.
This roadmap allows insurers to progress from ad hoc, experimental AI usage toward a more mature, documented and trusted AI ecosystem.

Volume 2 Issue 1 2026
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Published by the University of Djelfa

7. Conclusion and Future Perspectives

7.1 Synthesis of Key Findings

Artificial intelligence represents both a transformative opportunity and a complex risk landscape for Tunisian insurance companies. The potential benefits—improved pricing accuracy, accelerated claims management, enhanced fraud detection, and operational efficiency—are substantial and well-documented in emerging market contexts. Empirical evidence from the Tunisian insurance sector, based on interviews and surveys with over 50 industry professionals, confirms that AI adoption is perceived as critical for competitive survival, particularly for addressing persistent fraud in motor insurance, optimizing portfolio management, and modernizing technical underwriting practices.

However, the path to responsible AI adoption in Tunisia cannot be a simple transplant of Western models. The specific legal, operational, and market characteristics of Tunisia—including the existing data protection framework (Organic Law 2004-63), the dominance of motor insurance, budget constraints, skills gaps, and regulatory uncertainty—necessitate a tailored, incremental approach. International frameworks from the OECD, EIOPA, and the EU AI Act provide essential normative guidance, but their implementation must be proportionate to local capacity and risks.

7.2 Practical Implications for Tunisian Insurers

The governance framework proposed in this paper—centered on guiding principles, organizational committees, lifecycle-based model governance, and capacity building—is designed to be pragmatic and scalable. Rather than imposing a rigid, comprehensive system that may overwhelm smaller insurers with limited resources, the framework emphasizes a phased roadmap that allows companies to mature progressively from ad hoc AI experimentation to structured, auditable AI governance.

For immediate implementation (0–18 months), Tunisian insurers should:
• Inventory existing algorithmic tools and models in use, regardless of sophistication level
• Establish a clear, concise internal AI policy aligned with the proposed principles
• Create a basic model registry (even if initially limited in scope) and designate clear ownership of AI initiatives
• Launch awareness and training sessions for key teams (actuarial, underwriting, risk, compliance)
• Engage the data protection officer early in any new AI project.

For the medium term (18–36 months), maturation should focus on:
• Formalizing governance structures, particularly the establishment of a cross-functional AI/Data & Models Committee
• Standardizing validation procedures with clear checklists for fairness testing, explainability, and data quality
• Developing key governance indicators to monitor AI effectiveness and risks (e.g., number of models in production, incidents, customer complaints)
• Piloting a small number of well-scoped AI use cases with clear business value and manageable risks (such as fraud scoring in motor claims or chatbots for basic claims inquiries)

For the long term (3–5 years), strategic objectives should include:
• Deepening dialogue with insurance regulators and the National Authority for Data Protection (INPDP) on AI governance expectations.
• Progressively aligning critical AI systems with higher international standards (e.g., EU AI Act high-risk requirements) where relevant for cross-border operations.
• Assessing and managing concentration risks from reliance on third-party AI/cloud service providers
• Integrating AI governance into enterprise-level actuarial, risk, and financial processes in support of evolving solvency and accounting regimes (risk-based capital, IFRS 17)

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7.3 Critical Success Factors

Several elements are essential to the success of AI governance in Tunisian insurance:

1. Leadership and Culture: Boards and executive management must view AI governance not as a compliance burden, but as a strategic capability that strengthens customer trust and competitive positioning. This requires a cultural shift from viewing AI as purely technical to recognizing its cross-functional, risk-sensitive, and ethical dimensions.

2. Skill Investment: AI governance cannot be achieved without investing in people. Actuaries, underwriters, and risk professionals must understand basic data science concepts; compliance and legal teams must grasp AI-specific risks; data teams must practice rigorous quality control. Training and knowledge transfer are not one-time events but ongoing processes.

3. Data Quality and Governance: Most AI failures in insurance are rooted in poor data, not poor algorithms. Tunisian insurers must prioritize data governance—establishing clear data lineage, fixing quality issues, and ensuring compliance with data protection principles—as a prerequisite for responsible AI deployment.

4. Collaboration with Regulators: The Central Bank of Tunisia (as insurance supervisor) and the INPDP (as data protection authority) should be engaged constructively. Building a shared understanding of AI risks and governance expectations will reduce regulatory uncertainty and enable proportionate oversight.

5. Regional Learning and Benchmarking: Tunisian insurers should actively exchange experiences with peers in Morocco, Algeria, and other North African or emerging markets. Regional collaboration on AI governance standards and best practices can accelerate capacity building and reduce the cost of developing governance infrastructure.

7.4 Addressing Gaps and Research Directions

While this paper provides a foundational framework, several areas warrant further investigation:

• Fairness and Bias Mitigation: The paper acknowledges fairness as a principle but does not provide detailed technical guidance on bias detection and mitigation. Future work should develop practical fairness testing protocols tailored to Tunisian insurance products and demographic contexts.
• Model Explainability Tools: As Tunisian insurers deploy more complex predictive models, research into explainability methods suited to insurance applications—particularly techniques that preserve both performance and interpretability—will be increasingly valuable.
• Regulatory Harmonization: Tunisia has data protection law but lacks specific AI regulatory guidance. Coordination between the INPDP, the insurance supervisor, and industry bodies to clarify AI governance expectations would reduce uncertainty and enable consistent implementation.
• Third-Party Risk Management: Many Tunisian insurers will rely on cloud platforms, AI service providers, and reinsurers for AI capabilities. Developing frameworks for assessing, contracting, and monitoring third-party AI risks is an important but underdeveloped area.
• Quantifying AI Value and Risks: More rigorous empirical research quantifying the business and risk impacts of AI adoption in Tunisian insurance—measuring not only fraud detection improvements or pricing gains, but also unintended fairness consequences and customer trust effects—would strengthen the business case for governance investment.

7.5 Broader Implications

The approach outlined in this paper reflects a broader principle: that effective AI governance in emerging markets

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must balance ambition with proportionality. Borrowing from international best practice is essential, but blind replication of Western governance models is neither feasible nor appropriate. Instead, emerging market regulators and insurers must engage in strategic adaptation, retaining the spirit and core principles of trustworthy AI while tailoring implementation to local conditions, capabilities, and risks.

For Tunisia specifically, the adoption of this governance framework offers multiple benefits beyond risk mitigation. It signals to international partners, reinsurers, and customers that Tunisian insurers are committed to responsible innovation. It positions Tunisian insurance as a leader in African AI governance, potentially creating opportunities for regulatory influence and regional knowledge leadership. And it creates a foundation for sustainable, inclusive AI adoption that generates value for policyholders, shareholders, regulators, and society.

7.6 Concluding Remarks

The central question posed at the outset of this paper—not whether Tunisian insurers should adopt AI, but how they can do so responsibly—now has a substantive answer: through a pragmatic, phased governance framework that combines international best practice with local adaptation, that integrates governance into business processes rather than treating it as a parallel compliance exercise, and that emphasizes capacity building and cultural change alongside processes and procedures.

The window for establishing governance foundations is now. As AI adoption accelerates in Tunisian insurance, the costs and risks of retrofitting governance are substantial. By acting proactively to establish governance structures, principles, and competencies today, Tunisian insurers can position themselves to capture AI's benefits while mitigating its risks, and to lead African peers in demonstrating that trustworthy, responsible AI is compatible with—and indeed essential for—competitive success in emerging markets.

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