ARTIFICIAL INTELLIGENCE IN INSURANCE: REVOLUTION IN RISK ASSESSMENT AND POLICY UNDERWRITING

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Abstract

Emerging technologies, especially artificial intelligence (AI), are fundamentally changing the way companies assess risks, set policy prices and interact with customers. AI promises unprecedented efficiency, accuracy and personalization — but also brings ethical, operational and regulatory challenges. The profound transformations that mark the contemporary global economy are closely linked to the rapid advance of digital technologies. In this context, the insurance industry, traditionally perceived as conservative and rigid, is facing an inevitable revolution, generated by the emergence of advanced digital tools. Among these, artificial intelligence (AI) occupies a central place, through its potential to redesign the fundamental processes of the insurance business: from risk assessment and policy underwriting, to claims management and customer relations. The insurance industry is in an accelerated process of digital transformation, in which artificial intelligence (AI) plays a central role in reshaping operational processes and customer relations. This article examines the impact of AI on insurance and reinsurance management, highlighting the benefits and challenges of implementing these emerging technologies. The Allianz case study exemplifies how a global company is integrating AI to optimize underwriting, claims management, and service personalization, achieving significant competitive advantages. The strategic implications for organizational culture, change management, and data ethics are also discussed. The conclusions emphasize the importance of a holistic approach that combines technology with human factors and regulation to ensure the long-term sustainability and success of companies in the field.

Keywords: *insurance, digitalization, intelligence, risks.*

1. Introduction

Digitalization is no longer just a strategic option, but a necessary condition for survival and competitiveness in an increasingly complex and volatile environment. The emergence of AI in this sector should not be seen as a simple modernization of administrative processes, but as a paradigm shift, profoundly affecting the business model of insurance companies. In an era in which the volume of available data is growing exponentially, AI allows for their analysis and interpretation at a scale and speed impossible to achieve by the human factor, thus facilitating a more nuanced and precise assessment of risks. At the same time, artificial intelligence paves the way for personalized insurance products, adapted in real time to the behavior and individual needs of customers, reducing operational costs and increasing internal efficiency. However, this transformation comes with a series of complex challenges. These include the challenges of transparency of algorithmic decisions, the risks of indirect discrimination generated by historical data sets, as well as issues related to the protection of personal data and compliance with applicable regulations.

In this context, this article aims to analyze how artificial intelligence influences the risk assessment and policy underwriting process in the insurance industry, highlighting both the competitive advantages it offers and the limits and risks associated with its integration into current operational practices. Through an analytical and contextualized approach, we will examine concrete examples of AI implementation in the field, the global trends that are emerging, as well as the ethical and strategic implications for the future of this essential industry.

2. From traditional methods to artificial intelligence: a paradigm shift in risk management

Traditionally, the risk assessment process within insurance companies has been based on actuarial expertise, historical data analysis and the application of classical statistical models. These methods, although robust, are proving increasingly limiting in a context marked by volatility, uncertainty and an accelerated pace of behavioral and technological change. Risk assessment, as a central element of the underwriting function, requires a deep understanding of the probabilities and potential impact of different events, but also an anticipatory capacity to model future scenarios – a capacity that, in the absence of a modern technological base, remains partially limited [1].

Artificial intelligence brings a profound transformation to this equation. By using techniques such as machine learning, deep learning or natural language processing (NLP), AI allows companies to manage large volumes of unstructured data, identify complex patterns and constantly update risk models based on newly acquired information. More than just a technological innovation, AI is thus becoming a strategic tool that is redefining the way risk managers, actuaries and underwriters carry out their work.

The traditional underwriting process (risk assessment) was based on client history and human expertise. Its limitations are: long duration, risk of human error, inability to analyze large volumes of data. AI changes the game with the ability to quickly analyze huge data sets, identify hidden patterns and generate more accurate risk scores [15].

From a managerial perspective, this change implies a repositioning of the risk assessment function, which is no longer a rigid and reactive process, but becomes an adaptive system, oriented towards anticipation and decision-making in real time. AI also facilitates closer integration between data analysis, IT and strategic management functions, while also requiring the development of transversal skills within teams. A key aspect of this transformation is the shift from a standardized approach to risk, based on generic profiles, to a hyper-personalized approach, where each customer is analyzed based on individual behaviors and characteristics, and the insurance product is calibrated accordingly. This approach is made possible by the collection of real-time data through smart devices (IoT), mobile applications and digital interactions – all processed and interpreted by intelligent algorithms.

For industry leaders, the critical question is no longer whether to adopt artificial intelligence, but how to strategically integrate it to achieve sustainable competitive advantage without compromising trust, transparency and regulatory compliance [17] .

3. Concrete applications of AI in insurance management

The adoption of artificial intelligence in the insurance sector is no longer a theoretical option, but a practical reality, with multiple applications in essential business processes. AI permeates all stages of the policy life cycle, from identifying potential customers and risk analysis, to issuing the policy, managing claims and post-sales relationships. These applications not only optimize operational performance, but also support the transformation of traditional business models in a direction oriented towards automation, personalization and data-driven decision-making [2].

a) Automated underwriting and real-time risk assessment

One of the most significant applications of AI is the automation of the underwriting process – policy underwriting. Instead of a classic analysis, based on static criteria and predefined files, AI allows for dynamic risk assessment, starting from complex and varied data: customer behavior, transaction history, socio-demographic information, data from social networks, even sensors or smart devices (e.g.: telematics in the case of car insurance).

This ability to integrate multiple data sources transforms underwriting into a predictive and adaptive process. Machine learning algorithms can recalibrate risk scores in real time, as new data about the client or the economic environment emerges. For management, this means reducing

exposure to unforeseen risks, but also better segmentation of clients, with a direct effect on portfolio profitability.

In conclusion, machine learning algorithms that analyze demographic, behavioral data, medical history, etc. Examples: companies that issue instant policies through mobile applications.

b) Fraud detection and prevention

Fraud represents a significant cost for insurance companies, affecting not only financial results, but also consumer confidence. Here, artificial intelligence offers advanced tools for proactively detecting fraudulent behaviors. By analyzing historical client behavior, claim patterns and other subtle signals, AI can automatically identify anomalies that escape human attention. For example, neural networks trained on historical data sets can flag a suspicious claim even before it is fully processed. In addition, AI allows for continuous monitoring of customer and supplier activity, supporting the development of prevention strategies, not just reaction. From a managerial point of view, this type of technology offers more effective cost control, but also a superior ability to comply with internal audit and external regulatory requirements [11].

In conclusion, AI detects abnormal behavior and signals potential fraud. Using neural networks to identify suspicious patterns in claims.

c) Personalization of products and customer experience

One of the strongest strategic benefits brought by AI in insurance is the ability to personalize products and services, transforming the relationship with the customer from a transactional one to a contextual and dynamic one. For example, in car insurance, the use of telematics devices allows insurance premiums to be set based on actual driving behavior – a principle known as pay-how-you-drive. In health insurance, data from wearable devices can help develop prevention packages tailored to each customer. AI makes it possible not only to personalize the price, but also to adapt the product in real time, depending on behavioral or risk changes. From a strategic perspective, this means clear differentiation in the market, customer loyalty through relevance and utility, and the possibility of building more agile offers, in line with new digital consumption models. In conclusion, the analysis of customer behavior (e.g. driving in the case of car insurance) and real-time price adjustment. Examples: telematics in car insurance (you pay as you drive).

4. The competitive advantages of artificial intelligence in the insurance industry

The integration of artificial intelligence in the insurance sector is not just a technological evolution, but a genuine source of competitive advantage. In an environment marked by intensifying competition, changing consumer behavior and increasing pressure on profit margins, AI offers companies the ability to respond faster and more efficiently to these challenges. From a managerial perspective, AI becomes a catalyst for organizational transformation, influencing not only operational processes, but also decision-making culture, team structure and the way organizations define success [3].

a) Increased operational efficiency

One of the most obvious benefits of artificial intelligence is the reduction of operational costs by automating repetitive processes. From analyzing insurance claims, processing claims or verifying documents, to managing customer relationships through virtual assistants, AI allows the elimination of administrative bottlenecks and the optimization of workflows.

This efficiency translates not only into financial savings, but also into a strategic redistribution of human resources towards high value-added activities, such as strategic analysis, product innovation or the development of new distribution channels.

b) Access to more precise and granular risk analysis

Another major advantage of AI is the ability to model risks in a more precise and dynamic way than traditional methods. Algorithms can simultaneously analyze thousands of variables and adjust predictions in real time, based on new data received. Thus, insurance companies can avoid over- and undervaluation of risks, which leads to a healthier portfolio structure and better capital

management. For risk managers, this means greater visibility into current and future exposures, but also a better ability to make informed decisions regarding pricing, technical reserves and reinsurance strategy.

c) Personalization and customer differentiation

In an industry where products can seem standardized, the ability to offer personalized experiences becomes a key differentiator. Artificial intelligence facilitates this personalization not only at the product level, but also at the interaction level: personalized recommendations, automated 24/7 support, offers built on the individual risk profile. From a strategic perspective, these practices lead to increased customer retention, reduced acquisition costs, and the development of long-term relationships based on trust and relevance.

d) Accelerated decision-making and organizational agility

AI supports the transformation of decisions from delayed reactions into proactive actions. Through predictive dashboards, managers have access to real-time information, which allows for rapid adjustment of pricing policies, distribution strategies, or product mix. This strategic agility is essential in an environment characterized by volatility and uncertainty. In addition, AI facilitates the creation of data-driven organizations, in which managerial intuition is supported and validated by objective and relevant information.

In order to fully capitalize on these advantages, insurance companies must integrate AI not only as a technological tool, but as part of a digital transformation strategy. Success does not lie only in adopting point solutions, but in redesigning processes, developing digital skills and creating an organizational culture open to innovation [4].

In conclusion, increased operational efficiency – reduced processing time and administrative costs: reduced human errors – AI can make decisions based on data, without subjective influences; more accurate risk scoring – AI correlates thousands of variables that human assessment cannot manage simultaneously; improved customer experience requires faster response time, personalized products, automated interactions.

5. Challenges and risks

While the promise of AI in the insurance sector is substantial, integrating this technology into current business practices is not without significant challenges. From technological complexity and data dependency, to risks related to transparency, fairness and compliance, AI brings with it a series of strategic and ethical dilemmas that must be carefully managed by leaders in the field [7].

a) Lack of algorithmic transparency and the "black box" phenomenon

One of the most discussed risks associated with AI is the difficulty of understanding and explaining the decisions made by complex algorithms – a phenomenon known as the "black box". Especially in the case of deep learning models, the explanation of decisions becomes opaque even to their developers. This lack of transparency becomes problematic in a field like insurance, where decisions directly affect the rights and interests of consumers. For example, if a customer is denied a policy or is charged a disproportionately high premium, the company must be able to justify the decision in a clear and auditable manner.

For management, this poses a double challenge: on the one hand, adopting efficient and advanced technologies, and on the other hand, maintaining transparency and decision-making accountability, essential for public trust and legal compliance.

b) The risk of algorithmic discrimination

AI learns from historical data. If this data reflects biases, inequalities or systemic errors, algorithms can replicate and amplify these distortions, leading to indirect discrimination. For example, an underwriting model that relies excessively on socio-economic or geographical factors may exclude certain population groups, even if this is not explicitly intended. This risk is extremely sensitive in the context of equal treatment and non-discrimination regulations, but also from a

company reputation perspective. Therefore, the use of AI must be accompanied by rigorous validation, auditing and bias correction mechanisms [14].

Managers must work closely with technical and legal teams to ensure that the models developed are ethical, fair and compliant with social responsibility standards and applicable legislation.

c) Data protection and cybersecurity issues

The use of AI involves access to large volumes of personal, sensitive and real-time data. This raises major concerns about privacy, data protection and cybersecurity. A security breach or misuse of data can have serious legal and reputational consequences [5].

Compliance with the legal framework – such as the General Data Protection Regulation (GDPR) in the European Union – is not only an obligation, but also a strategic differentiator for companies that demonstrate responsibility in their data use.

The implementation of AI must therefore be accompanied by robust security infrastructures, clear data governance policies and transparency in communication with customers on how personal information is used.

d) Regulatory gaps and legal uncertainty

Regulations on the use of AI in the financial and insurance sectors are in full swing. In the absence of a unified and well-defined legal framework, companies face legal uncertainty, which can limit innovation or, conversely, lead to the assumption of unregulated risks. Organizations must develop proactive internal compliance mechanisms, actively participate in regulatory consultations and assume a leadership role in defining ethical and legal standards for the use of AI in the industry [8].

In conclusion, the success of adopting artificial intelligence in insurance management does not only depend on technological capacity, but also on managerial maturity in addressing these risks. AI must be seen as a strategic resource that requires governance, ethics and responsibility, not just as a technological solution.

6. Case study: Allianz and the integration of artificial intelligence in the digital transformation of the insurance industry

To illustrate how artificial intelligence is changing the paradigm in insurance management, we will analyze the case of Allianz, one of the global leaders in the industry. Allianz's ambitious digital transformation exemplifies how emerging technologies can be strategically implemented to create real value, both for the company and for customers.

Allianz Group, one of the global leaders in insurance and reinsurance, has embarked on an ambitious digital transformation over the past decade, with the adoption of emerging technologies, in particular artificial intelligence (AI), as its main pillars, to improve its operational performance and customer experience. The strategic objective was twofold: increasing internal efficiency and strengthening its market position through personalized, fast and flexible offers, in the context of increasingly intense global competition. Allianz set out to respond to current competitive challenges by adopting AI in order to increase operational efficiency, personalize services and strengthen customer relationships, in the context of a constantly changing market.

The company has developed several AI-based solutions, including automation of underwriting and claims processes, the virtual assistant "Allie" capable of managing complex customer interactions, and predictive models for risk management and customer loyalty.

Allianz has approached the implementation of AI on several levels:

a) Automation of underwriting and claims management processes - The company has developed and integrated AI-based systems that automatically analyze insurance applications and compensation requests. For example, in the case of car claims, customers can send photos of the damaged vehicle via mobile applications, and visual recognition algorithms quickly assess the severity of the damage and estimate the cost of repairs. This solution has significantly reduced the

time required to process claims, from days or weeks, to just a few hours or even minutes, depending on the complexity.

b) Virtual assistant "Allie" - To optimize the relationship with customers, Allianz launched an intelligent chatbot, called "Allie", capable of providing instant answers to frequently asked questions, handling simple requests and providing 24/7 support. "Allie" thus contributes to increasing the accessibility of services, reducing the load on human support centers and improving customer satisfaction through continuous availability and fast interactions.

c) Predictive models for risk management and customer loyalty - Allianz uses AI to analyze complex and diverse data, identifying customers with a high risk of canceling policies or with potential for additional sales. Thus, the company can adapt retention strategies in advance and propose personalized offers, increasing commercial efficiency and reducing portfolio fluctuation.

The implementation of AI-based solutions has generated concrete and quantifiable results:

• Reduction of simple claims processing time by up to 50%, which led to increased operational speed and efficiency;

• 20-25% increase in customer satisfaction in digital interactions, thanks to easy access and quick responses offered by "Allie" and automated systems;

• Reduction of operational costs associated with manual processing of requests and management of support services, with the possibility of redirecting resources to the development of innovation and strengthening cybersecurity.

Strategically, these achievements allowed Allianz to consolidate its position in mature markets and accelerate expansion in emerging markets, where the digitalization of services is a major competitive advantage.

Implementing AI on a large scale has not been without its challenges. One of the main obstacles has been internal cultural resistance to change, especially among employees accustomed to traditional processes. To overcome this barrier, Allianz has invested heavily in continuous training, developing digital skills and promoting an organizational culture oriented towards innovation and interdisciplinary collaboration. Furthermore, the company has put in place rigorous data governance and algorithm auditing mechanisms to ensure that automated decisions comply with ethical, transparent and fair criteria, thereby strengthening the trust of customers and regulators. The Allianz case study demonstrates that integrating artificial intelligence into the insurance industry can generate significant competitive advantages, both by improving operational efficiency and by increasing customer satisfaction and loyalty. At the same time, Allianz's experience emphasizes that long-term success depends on a holistic approach to digital transformation, which includes not only technology, but also change management, organizational culture and adherence to ethical principles.

In an industry marked by uncertainty and intense competition, companies that will invest in strategically integrated AI solutions, along with the development of human capital and social responsibility, will succeed in differentiating themselves and shaping the future of insurance.

Technological evolution and the integration of artificial intelligence in the insurance industry are a catalyst for profound changes in business models and risk management. The Allianz case study exemplifies the fact that success in this new era does not only depend on the adoption of technologies, but especially on the ability of organizations to develop a coherent strategy that combines technology, organizational culture and social responsibility.

In this context, companies must focus on: Reconfiguring business models to integrate automated processes with human decision-making and innovation; Developing digital skills and change management, to create an agile organizational culture open to innovation; Ensuring transparency and ethics in the use of data and algorithms, to maintain customer trust and regulatory compliance.

7. Conclusions

Artificial intelligence is fundamentally transforming the insurance industry, from how risks are assessed to how services are delivered and customer relationships are built. Integrating this technology is not a choice, but a strategic necessity for organizations that want to remain relevant and competitive.

To fully harness the potential of AI, a balance between technology, strategy and ethics is essential. Companies that manage to combine these dimensions will be not only more efficient, but also more resilient, more innovative and closer to the real needs of society.

The insurance industry is not only moving towards a more digital future, but towards a future in which artificial intelligence redefines what it means to manage risk responsibly.

Artificial intelligence is profoundly transforming the insurance industry, offering major opportunities for process optimization and service personalization. However, its use must be managed with caution, to avoid ethical and operational risks. As AI becomes a standard component in risk management and underwriting, companies that manage to integrate it effectively and responsibly will gain a significant competitive advantage.

For the future, it is advisable that research focuses on:

• The impact of AI on interpersonal relationships in the insurance sector and how automation affects customer trust;

• Ethical and regulatory models adapted to the constantly evolving digital context;

• Analysis of emerging risks generated by AI and methods to mitigate them.

From a managerial point of view, leadership must develop integrated visions that align technology with organizational values and customer needs, thus creating a sustainable development framework.

Adopting artificial intelligence thus becomes an essential strategic component, which will determine the ability of insurance companies to remain competitive, sustainable and relevant in the long term.

The digital transformation of the insurance industry, through the adoption of artificial intelligence, represents a major opportunity to increase efficiency, reduce costs and improve customer experience. However, the successful integration of AI requires a strategy that includes developing digital skills, managing change and ensuring a rigorous ethical framework. Managers are called upon to approach these technologies not only as a technical tool, but as a strategic factor essential for long-term adaptability and competitiveness.

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