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REGULATION OF ARTIFICIAL INTELLIGENCE IN THE EUROPEAN UNION IN THE FIELD OF INSURANCE

REVIEW SCIENTIFIC PAPER

Summary

This paper provides a concise legal analysis of the deployment of artificial intelligence (AI) in the insurance sector within the European Union (EU), with a particular focus on its relevance and utility for the regulatory approach to this area in Serbia – the future regulatory framework. AI influences and transforms a range of industries, and the insurance industry represents a significant field for the application of new technologies, including claims processing automation, service personalization, and fraud prevention. The key research problem focuses on harmonizing the dynamic development of AI with the existing regulatory framework in the EU, raising questions of algorithm transparency, legal liability, and personal data protection. The paper thoroughly examines the EU Artificial Intelligence Act, which classifies AI systems according to risk level, with systems intended for risk assessment and pricing classified as high-risk in life and health insurance. The need for continuous monitoring of insurers' compliance, increasing employee literacy regarding AI use, and significant penalties for non-compliance with regulations are emphasized.

Keywords: artificial intelligence, insurance, regulation, EU AI Act.

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I. Introductory considerations

The primary objective of this paper is to analyze the current state and prospects of AI regulation in the insurance industry of the European Union. The paper specifically and comprehensively examines the approach to identifying key regulatory challenges and potential implications for insurance companies and insurance service users, and consequently investigates relevant EU initiatives and regulations relating to the deployment of AI. This primarily concerns the Artificial Intelligence Act (AI Act), together with an assessment of its potential impact on innovation and the protection of rights in the insurance industry. The issue of legal liability and personal data protection is particularly significant in the field of insurance and the deployment of artificial intelligence in the context of the General Data Protection Regulation (GDPR).[2] Finally, the paper seeks, to a significantly lesser extent, to provide insights that may be useful for consideration of the future regulatory framework in Serbia in this field.

To achieve the previously defined research objectives, the paper employs a combination of qualitative research methods. Primarily, an analysis of relevant EU regulations and legal acts was conducted. The adopted version of the Artificial Intelligence Act was examined as the primary focus, along with other sector-specific regulations that indirectly affect the deployment of AI in insurance. An analysis of selected approaches and solutions in the EU regarding the regulation of AI in insurance were analysed, based on available studies, reports, academic and professional literature, as well as reports from EU institutions and other international organizations dealing with issues of artificial intelligence and insurance.

II. Legal framework for AI in the European Union and the insurance sector

The EU approach to artificial intelligence is based on excellence and trust, where the European Union views AI as "part of our lives".[3] Citizens and companies should be able to use AI and benefit from its advantages while enjoying a sense of safety, protection, and respect for fundamental rights. It appears to us that the preceding sentence holds great significance in the insurance sector. Prior to the adoption of the Artificial Intelligence Act, the EU adopted a series of documents, i.e. specific rules and measures that enable the realization of the stated approach (for example, the European Parliament Resolution on AI in the digital age was adopted

[2] Regulation (EU) 2016/679 on the protection of natural persons with regard to the processing of personal data and on the free movement of such data, *OJ L 119*, 4. 5. 2016.

[3] *https://digital-strategy.ec.europa.eu/en/policies/european-approach-artificial-intelligence,* accessed on September 17, 2025.

in 2022, and the European Central Bank, among other institutions, issued its Opinion on the Artificial Intelligence Act).[4]

The European Commission Communication in the document "Artificial Intelligence for Europe2 emphasizes the following: "Artificial intelligence makes life easier and helps to solve some of the world's biggest challenges."[5] The EU White Paper on Artificial Intelligence indicates that the focus of AI use is precisely on those sectors in which Europe should become a global leader, such as the automotive industry, healthcare, energy, agriculture, and, particularly significant in the context of this paper, financial services.[6]

In 2018, the European Commission established the High-Level Expert Group on Artificial Intelligence (AI HLEG), which adopted Ethics Guidelines for Trustworthy Artificial Intelligence. The Ethics Guidelines define the concept of trustworthy artificial intelligence and its three components, which should be respected throughout the entire lifecycle of the system: 1) lawful AI – compliance with all applicable laws and regulations; 2) ethical AI – respect for ethical principles and values; and 3) robust AI from both technical and social aspects, as AI systems can cause harm even with good intentions.[7] In this regard, it is highly significant to mention the report of the EIOPA (European Insurance and Occupational Pensions Authority) expert advisory group – Artificial Intelligence Governance Principles: Towards Ethical and Trustworthy Artificial Intelligence in the European Insurance Sector. The Artificial Intelligence Governance Principles presented by EIOPA summarize certain ethical and trustworthy AI principles in insurance, precisely due to its proliferation in this sector, with numerous advantages for insurance companies (more detailed risk assessments and pricing practices, more effective claims management, efficient fraud prevention, predictive accuracy, automation, new products and services, cost reduction, etc.).[8] However, it

[4] European Parliament resolution of 3 May 2022 on artificial intelligence in a digital age (2020/2266(INI)), available at: https://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:52022IP0140; European Central Bank, Opinion on the AI Act, https://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:52021AB0040, accessed on September 17, 2025.

[5] Communication from the Commission to the European Parliament, the European Council, The Council, The European Economic and Social Committee and the Committee of the Regions Artificial Intelligence for Europe, available at: COM/2018/237, *https://eur-lex.europa.eu/legal-content/HR/ALL/?uri=CELEX%3A52018DC0237*, accessed on September 18, 2025, 1.

[6] European Commission, White Paper On Artificial Intelligence – A European approach to Excellence and Trust, , Directorate-General for Communications Networks, Content and Technology, available at: *https://op.europa.eu/en/publication-detail/-/publication/ac957f13-53c6-11ea-aece-01aa75ed71a1*, accessed on September 18, 2025, 3.

[7] High-Level Expert Group on Artificial Intelligence, Ethics Guidelines for Trustworthy AI, available at: *https://ec.europa.eu/newsroom/dae/document.cfm?doc_id=60419*, accessed on September 18, 2025, 2.

[8] EIOPA, Artificial Intelligence Governance Principles (EIOPA Principles): Towards Ethical and Trustworthy Artificial Intelligence in the European Insurance Sector, 2021, available at *https://www.eiopa.europa.eu/eiopa-publishes-report-artificial-intelligence-governance-principles-2021-06-17_en*, accessed on September 18, 2025.

is necessary to ensure fairness, transparency, non-discrimination, and the provision of adequate explanations, which is not an easy task for insurance companies.

Therefore, EIOPA sets out principles for insurance companies using AI systems throughout their entire lifecycle. Although these principles are not binding, EIOPA notes that they will require ongoing revision in the future. The principles for insurers when using AI systems throughout the entire lifecycle are as follows: Proportionality – governance measures proportionate to the potential impact of a particular AI use case on consumers and/or insurance companies in order to achieve ethical and trustworthy use of AI; Fairness and non-discrimination – consideration of AI system outcomes, with balanced interests of all involved stakeholders; existing inequalities should not be reinforced, financial inclusion issues should be considered, the impact of rating factors (e.g. credit scores) should be mitigated, practices such as "willingness to pay" should be avoided, the principle of human autonomy should be respected, explainable algorithms should be used, etc.; Transparency and explainability – use of explainable AI models, provision of access to adequate mechanisms, and explanations should be meaningful and easily understood so as to enable stakeholders to make informed decisions; insurers must explain decisions made with the assistance of AI; Human oversight – establishment of adequate levels of human oversight, organizational structure with clearly defined roles and responsibilities, and provide training for employees; Data governance and record-keeping – insurers must ensure proper data governance in line with data protection legislation; data must be securely protected and stored; appropriate records must be kept to enable monitoring and auditing; Robustness and performance – AI systems resilient and robust; analyze potential for causing harm, monitor and continuously evaluate system performance; ensure protection against cyberattacks and the AI deployment in secure IT infrastructures.[9]

1. The European Union AI act and the insurance sector

This section of the paper is narrowly focused on a detailed analysis of the Artificial Intelligence Act, as well as its key provisions relevant to insurance, starting from risk classification and concluding with the obligations to establish and maintain requirements for high-risk systems in insurance.

The EU Artificial Intelligence Act (AI Act)[10] was initially proposed in April 2021 by the European Commission. This Act aspires to be, at the global level, the leading

[9] EIOPA, Artificial intelligence governance principles: towards ethical and trustworthy artificial intelligence in the European insurance sector, available at: *https://www.eiopa.europa.eu/document/download/30f4502b-3fe9-4fad-b2a3-aa66ea41e863_en?filename=Artificial%20intelligence%20governance%20principles.pdf*, accessed on September 18, 2025, 8.

[10] Artificial Intelligence Act (Regulation (EU) 2024/1689 laying down harmonised rules on artificial intelligence), *OJ L 2024/1689*, 12 July 2024, available at: *http://data.europa.eu/eli/reg/2024/1689/oj*, accessed on May 9, 2025.

and comprehensive legal framework for AI and the risks it entails. It was finalized in 2024, when it also entered into force, while its full application is scheduled within 24 months of its entry into force. The intention is to regulate the development and deployment of AI systems in various sectors, including insurance.[11] The Act categorizes AI systems according to the level of risk they pose (unacceptable – prohibited; high; limited – transparency risk; minimal).[12] The European Commission has launched a series of activities expressing the need for, or seeking, contractors (subcontractors) – third parties to provide *technical assistance in the field of AI safety*. Key areas are: high-tech crime, AI safety, loss of control, manipulation, mitigation of Chemical, Biological, Radiological and Nuclear Materials Risk (CBRN) and related risks.[13]

The Artificial Intelligence Act defines an AI system as: "...a machine-based system designed to operate with varying levels of autonomy and that may exhibit adaptiveness after deployment, and that, for explicit or implicit objectives, infers from the input it receives how to generate outputs such as predictions, content, recommendations, or decisions that can influence physical or virtual environments".[14] AI systems in insurance that are contrary to EU values and principles shall be prohibited, along with the elimination of those AI systems in the healthcare sector that pose significant risks to health, safety and the natural environment (critical infrastructure, education, employment, law enforcement, biometric identification).[15]

The fundamental principle of the said Act is the risk-based approach – regulation proportionate to the risk in relation to different economic sectors, circumstances and specific applications and uses and levels of technological development.[16] Limited-risk AI systems belong to a special category, with avoidance of manipulative content, dissemination of information through communication technologies, or the misuse of emotion-recognition systems. The general rule relates to the transparency of providers of certain AI systems and of deployers, whereby natural persons receive notification that they are interacting with an AI system.[17] Insurers are required to inform potential and existing clients transparently about the AI technologies they use, and how they comply with simple mechanisms for policyholders to terminate contracts.

[11] EU Commission, EU Artificial Intelligence Act: Up-to-date developments and analyses of the EU AI Act, available at: *https://artificialintelligenceact.eu/*, accessed on May 9, 2025

[12] Artificial Intelligence Act (AI Act), Art. 1.

[13] EU CBRN Risk Mitigation – European Union, available at: *https://cbrn-risk-mitigation.network.europa.eu/index_en#:~:text=The%20acronym%20'CBRN'%20defines%20chemical,release,%20dissemination,%20or%20impacts*, accessed on May 19, 2025.

[14] AI Act, Art. 3(1).

[15] EIOPA, Regulatory Framework Applicable to AI Systems in the Insurance Sector, available at: *https://www.eiopa.europa.eu/document/download/b53a3b92-08cc-4079-a4f7-606cf309a34a_en?filename=Factsheet-on-the-regulatory-framework-applicable-to-AI-systems-in-the-insurance-sector-july-2024.pdf*, 2024, accessed on May 23, 2025.

[16] AI Act, Recital 26.

[17] AI Act, Art. 50.

Minimal-risk AI systems belong to the group considered to potentially cause minimal negative effects on people and the environment. This may be, for example, misuse of video games, spam filters that essentially eliminate actual information and communication, special requirements for additional insurance registration with local authorities.[18]

The Artificial Intelligence Act classifies insurance as a high-risk system with regard to the use of AI – specifically, AI systems intended for risk assessment and pricing in relation to natural persons in the case of life and health insurance, thus not directly within the rules on classification of high-risk AI systems (Article 6 of the Act). The reason is the significant impact on the well-being and livelihood of individuals and fundamental human rights – these sensitive systems must comply with strict and precise regulatory requirements.

Accordingly, a set of rules applies to high-risk artificial intelligence systems, encompassing obligations for AI systems in insurance relating to fundamental rights impact assessments, risk management systems, data and data governance, technical documentation, record-keeping, transparency and provision of information to deployers, quality management, human oversight, etc.[19]

The use of AI systems in the insurance sector imposes a number of additional specific requirements, primarily regarding providers of developed AI systems, such as provider quality management systems, their obligations concerning documentation (insurance companies using AI systems must maintain technical documentation as part of existing documentation); financial institutions keep records automatically generated by the high-risk AI system as part of the documentation retained pursuant to the relevant EU financial services legislation.[20] Providers of high-risk AI systems, pursuant to Article 72 of the Act, establish a post-market monitoring system and create documentation for the system (proportionate to the nature and risks of the AI system). Financial institutions that already have their own post-market monitoring system and plan may integrate them into their existing processes, in order to ensure consistency, accuracy and reduce burden.

Furthermore, the Artificial Intelligence Act (AI Act) prohibits the use of AI systems that deliberately manipulate human behavior (manipulative or deceptive techniques) or exploit vulnerabilities of sensitive social groups.[21] The application of social scoring and citizen scoring is strictly prohibited, as is the misuse of biometric data for impermissible purposes (e.g. inferring trade union membership, race, etc.). This regulation consequently treats the use of biometric data in insurance as either

[18] European Commission, Shaping Europe`s digital future, available at: *https://digital-strategy.ec.europa.eu/en/policies/regulatory-framework-ai*, accessed on May 23, 2025.
[19] AI Act, Section 2 – Requirements for high-risk AI systems.
[20] Analysis pursuant to Articles 8 to 23 of the AI Act, Section 2.
[21] AI Act, Art. 5.

high-risk or entirely prohibited. The *Digital Services Act (DSA)* and the *Digital Markets Act (DMA)* aim to create a safer and more secure digital environment in the EU, ensuring the protection of users' fundamental rights and establishing market stability that offers a level playing field for all participants.[22]

It is also important to emphasize the activities of other international organizations in the field of AI. The Organisation for Economic Co-operation and Development (OECD) adopted AI Principles, which are not legally binding, and cooperates with the European Commission regarding global monitoring and analysis of AI development.[23] The United Nations also promotes global cooperation on AI regulation, and has adopted a series of documents in this area, as has the Council of Europe.[24]

2. Application and challenges of AI Regulation in Insurance

The challenges and risks in the insurance sector relate to transparency, fairness and non-discrimination, and insurance companies have broad discretion in selecting governance measures in specific AI use cases throughout the entire lifecycle of the AI system, all with the aim of achieving the advantages it offers (faster and automated claims processing, more precise and detailed risk assessment, effective fraud prevention). According to the EIOPA Principles for Insurers, insurance companies should consider the following: certain lines of insurance are significant for social and financial inclusion (corporate social responsibility of insurance companies) – acting appropriately and assessing AI system outcomes, so that AI does not further reinforce inequalities through disproportionate impact on consumers in vulnerable situations due to personal circumstances; using explainable AI systems; establishing human oversight (appointing an employee, i.e. a data protection officer and an AI officer); defining clear roles and responsibilities of employees, as well as ensuring employee training; in order to ensure accountability of insurance companies, it is necessary to eliminate bias in training data, keep records of the modeling methodologies used and the manner in which datasets are processed; applying AI systems in resilient and secure IT infrastructures, monitoring the accuracy of AI system predictions; adhering to applicable laws, as legislation specifically influences the selection of AI governance measures.[25]

[22] European Commission, „The Digital Services package", available at: *https://digital-strategy.ec.europa.eu/en/policies/digital-services-act-package*, accessed on May 25, 2025.

[23] *https://ai-watch.ec.europa.eu/about/collaborations/oecd-ai-policy-observatory_en*, accessed on September 18, 2025.

[24] https://unric.org/en/artificial-intelligence-in-the-international-sphere/; https://www.coe.int/en/web/artificial-intelligence/the-framework-convention-on-artificial-intelligence, accessed on September 19, 2025.

[25] EIOPA Opinion on AI Governance And Risk Management, 2025, available at: *https://www.eiopa.europa.eu/document/download/88342342-a17f-4f88-842f-bf62c93012d6_en?filename=Opinion%20on%20Artificial%20Intelligence%20governance%20and%20risk%20management.pdf*, accessed on September 19, 2025, 5–17.

Relevant legal analysis of the application of artificial intelligence (AI) in the insurance sector in the EU is significant due to the fact that such a legal-regulatory approach will be transplanted into the regulatory segment in this area in Serbia. The new relationships that will arise in our country regarding the deployment of AI in various sectors require new regulation, i.e. legal framework. The Government of the Republic of Serbia has adopted the second Artificial Intelligence Development Strategy for the period from 2025 to 2030, which contains new objectives and measures to ensure a clear and functional institutional and legal AI framework, improve education in this field, apply AI solutions in the public and private sectors, etc. The aforementioned Strategy also identifies risks associated with AI, especially in procedures for exercising rights such as credit provision, employment, insurance, etc., as well as risks related to privacy violations when large volumes of data are collected and processed.[26]

AI is transforming numerous industries, sectors and activities in the EU. One of the most significant areas is certainly the insurance sector, which serves as a cornerstone of the European Union's financial and banking system, and at the national level of member states. The insurance sector in Serbia is predominantly under foreign ownership of major insurance companies from the EU, which, along with the parallel process of Serbia's accession to the EU, requires that insurance law particularly closely follows the emergence and development of this new regulation. Automation of claims processing is becoming evident. The insurance services offering is increasingly personalized. Models are used for sophisticated quantitative and qualitative risk assessment, as well as fraud prevention. Insurers are offered unprecedented opportunities for improving operational efficiency, with continuous cost reduction and achieving savings, and equally importantly, improving customer experience. Thus, AI introduces the next technological revolution, but also certain unknowns and risks, which will be particularly complex in the sphere of regulation, ethics, and protection of insurance users' personal data.

Different challenges will be determined by different situations of its use. The impact of AI is like an avalanche of unstoppable and profound changes, whose ultimate course, objectives and effects cannot be precisely understood at present. EU AI legal regulation establishes an entire set of rules that national governments (creating and implementing regulations, imposing penalties), AI user companies (identifying AI systems in use, assessing risks, maintaining documentation for high-risk systems, ensuring transparency, ensuring human oversight, etc.), consumers or citizens regarding information and protection), and others. According to the AI Act (Art. 77, paragraph 2), each Member State designates public authorities, i.e. public

[26] Strategy for the Development of Artificial Intelligence for the Period 2025–2030, available at: *https://www.srbija.gov.rs/extfile/sr/437304/strategija_vestacka_inteligencija054_cyr6.zip*, accessed on September 18, 2025, 2.

bodies that will monitor and enforce obligations related to the protection of fundamental rights when using high-risk AI systems.[27] Additionally, national competent authorities and single points of contact are established[28] to handle notifications, monitor the market and take certain measures regarding the appropriate level of cybersecurity.[29]

On this platform, we have defined the key research problem arising from the very need to harmonize the dynamic development of AI with the existing regulatory framework and practice in the EU, which is still in its early stages. At the EU level, cooperation between EU bodies and member states, information exchange, better cooperation, as well as consideration of regulatory simplification in this area is very significant, with caution that the regulatory protection provided by the AI Act remains unchanged.[30] An important issue is the transparency of algorithms, their public verification, i.e. who will review them and confirm their validity and correctness.[31] The next question concerns who is legally and actually responsible for decisions made using AI. In practice, problems of potential discrimination of policyholders will arise, raising the question of how to effectively protect clients' sensitive and vital data.

Insurance companies originating from the EU will certainly have to comply with the AI Act. However, the same applies to companies providing services to EU citizens (e.g. insurers from the United Kingdom, if they plan to use AI systems in business operations on the single market or merely make them available for use on EU territory, regardless of the actual physical location of the company). After Brexit, the UK is increasingly aligning and harmonizing most of its regulation in almost all fields with the EU, either through regulatory cooperation agreements, albeit with certain delays in applying the AI Act. However, a formal adoption is expected in the near future, despite having a multitude of its own legal solutions and regulations governing this area, through a "light-touch regulatory approach".[32]

[27] For example, Croatia has appointed various ombudsmen and agencies to protect citizens' fundamental rights in the context of AI development and deployment, available at: *https://mpudt.gov.hr/news-25399/list-of-competent-authorities-under-artificial-inteligence-act-notified/29658*, accessed on September 17, 2025.

[28] For more on the transposition of AI Act enforcement requirements in Italy, Germany, Luxembourg, and Spain: Theodoros Karathanasis, The AI Act: Balancing Implementation Challenges and the EU's Simplification Agenda, available at: *http://dx.doi.org/10.2139/ssrn.5311501*, 2025, accessed on May, 2025, 4–9.

[29] AI Act, Art. 70.

[30] T. Karathanasis, 20–23.

[31] EIOPA, Impact Assessment of EIOPA's Opinion on AI governance and risk management, 2025, available at: *https://www.eiopa.europa.eu/document/download/197892cf-5100-4cba-9f10-143b5e893559_en?filename=EIOPA-BoS-25-008%20-%20AI%20Opinion%20-%20Impact%20Assessment.pdf&prefLang=bg*, accessed on May 20, 2025.

[32] European Parliament, The United Kingdom and artificial intelligence, available at: *https://www.europarl.europa.eu/RegData/etudes/ATAG/2024/762285/EPRS_ATA(2024)762285_EN.pdf*, accesed on May 19, 2025.

Harmonization with the AI Act is the next step for insurers, including risk assessment of AI systems in practice, conducting reviews of necessary measures and implementing continuous regulatory monitoring of their application. Insurance employees should be educated and informed about the use of AI, about all AI systems, not only high-risk ones, but also limited-risk application systems.

The Act stipulates strict sanctions for non-compliance. Financial penalties may reach up to 7% of the company's total global annual turnover for the preceding financial year for violations of provisions on prohibited AI applications, up to 3% for breaches of other obligations, and up to 1.5% for providing inaccurate, incomplete or misleading information.[33]

The EU AI Act was created to ensure responsible and trustworthy use of artificial intelligence. The EU AI Act is designed to ensure responsible and trustworthy AI use. The Act promotes a regulatory framework that benefits everyone while simultaneously addressing potential risks to health, safety and fundamental human rights. In the context of imposing penalties, the role of market supervisory authorities in EU member states is significant. In the case of high-risk systems used by financial institutions, the national body that provides financial supervision over them will also be involved.[34]

III. Legal regulation of specific issues in the use of AI in insurance

The AI Act regulation is the result of a lengthy process and cumulative efforts and investment. The next step is for insurance companies to adopt it and develop it within their value creation chain.[35] The Commission's objective is to ensure that the future of insurance is based on public trust, respect for human values and civil rights, with reliance on new risk assessment methods and enhancement of human safety, rights and freedoms. The AI Act introduces new corporate governance standards, with the aim that the Commission and the European AI Board cooperate effectively in implementing legal regulation, where most legal solutions will apply from August 2, 2026.

AI will impact pricing mechanisms and policies, risk assessments, as well as the provision of certain guarantees in the field of insurance. Specific regulatory requirements relate to data quality, the accounting concept of "true and fair" pre-

[33] AI Act, Art. 99.

[34] AI Act, Art. 74.

[35] EIOPA, Consultation Paper on Opinion on Artificial Intelligence Governance and Risk Management, 2025, available at: *https://www.eiopa.europa.eu/document/download/8953a482-e587-429c-b416-1e24765ab250_en?filename=EIOPA-BoS-25-007-AI%20Opinion.pdf*, 2025, accessed on May 23, 2025, 3.

sentation, technical documentation, and strict human oversight. AI systems will have to possess a certain system of autonomy from unnecessary human intervention, self-learning and self-development capabilities, and the ability to change and adapt. Complex actuarial models in practice will become part of future AI systems classified as high-risk models that will have to have the technical capability to be used by internal and external audits. Big data scientists are entering through wide-open doors of AI in insurance.

One of the first steps awaiting insurers in the EU is the assessment of the risk level of existing and planned AI applications, along with the creation of new corporate governance models, insurance risk management and claims assessment processes. Many insurance companies are expected to establish AI corporate governance boards tasked with creating and overseeing the implementation of an AI development strategy throughout its lifecycle. Alongside the AI Act, the following legislation is also relevant: the Insurance Distribution Directive[36] in the context of improving consumer protection standards, the Solvency II Directive,[37] as well as legal solutions for occupational retirement institutions, and the highly significant and far-reaching Anti-Money Laundering Directive.

In the EU insurance sector, algorithm-based AI systems are entering in full force. Previously, the insurance sector is required to adapt rapidly, to adopt and further develop AI systems, use machine learning, textual databases (large language models), especially in the application of so-called "smart contracts" in insurance.[38]

The process of accelerated and perhaps excessively chaotic transformation of insurance in the EU has begun with the introduction of AI. Whether this will be a controlled or partially controlled course remains to be seen.[39] Certainly, a revolution in the introduction of AI in insurance and the rapid abandonment of significant segments of traditional insurance as it is now is unfolding before our eyes. Crucial changes in the quantification and risk management process are underway. New insurance services are being developed in the insurance sector. Improving the quality and scope of communication with clients is becoming imperative for insurers. In practice, new models of information and data analysis are emerging, predictive techniques are being used for making, implementing and monitoring insurance

[36] Directive on insurance distribution, *OJ L 26, 02/02/2016*, available at: *http://data.europa.eu/eli/dir/2016/97/oj*, accessed on May 24, 2025.

[37] Iva Tošić, "Poslovanje osiguravajućih društava u digitalnom okruženju – Šta nam donosi DORA?", *Tokovi osiguranja*, No. 1/2025, 73.

[38] Angelo Borselli, "Osiguranje putem algoritma", *Časopis za teoriju i praksu osiguranja,* No. 2/2018, 35–38.

[39] Branko Pavlović, Vesna Minić-Pavlović, „Snagom podataka do osiguranja budućnosti", *Coolection of Papers SORS*, 33rd Meeting of Insurers and Reinsurers, 2022, available at: *http://sors.ba/UserFiles/file/SorS/2022/Zbornik/03%20Sors%202022%20-%20Zbornik%20radova%20-%20Pavlovic.pdf*, accessed on May 20, 2025, 153–182.

business operations. The objective is effective risk management, as well as the development of new approaches to delivering highly personalized insurance services.

AI participation in the insurance value chain is growing, starting from automation processes, service personalization, fraud prevention, and risk assessment and management methods.[40] The AI regulatory system in insurance in the EU is aimed at creating a solid, stable and coherent legal framework that effectively addresses risks. On the other hand, concerns are growing in the scientific and general public regarding personal data protection, confidentiality, privacy loss, and personal security. The strategic development pathway goes through strengthening and investing in IT, expanding the possibilities of obtaining new analytical insights into data, with active participation of policyholders in the development of AI technology.

The relationship and interaction of the EU AI Act in the insurance sector and the GDPR is one of feedback loops, but also of unresolved and contradictory regulatory elements, as the issues were not harmonized during the development of these two significant frameworks.[41] AI in insurance will create new data streams that will be possible to collect, systematize, analyze and used for effective decision-making and operational management in insurance in accordance with regulation. This is precisely due to the fact that the introduction of AI systems used for life and health insurance risk assessment and pricing will be classified as high-risk.

The feedback loop between the AI Act and the GDPR is crucial. The Regulation is primarily aimed at achieving the objectives of personal data protection and individual rights, while the AI Act addresses AI system safety, security, and reliability. The Act specifies aspects of complementarity by setting out the technical and organizational requirements for high-risk AI systems in insurance. The approach implies that through the application of GDPR requirements, lawfulness is ensured in policyholder data processing, which means data minimization, clear and transparent purpose of processing, limitation of insurers' rights to the data retention period, enhanced data and privacy protection.

In Croatia, an EU member state, the insurance sector is going through the storm of a true digital revolution, where new software applications and other IT technologies improve service quality and accelerate communication with clients,[42] all in the function of profit maximization. Vehicle owners in Croatia can already assess damage using a mobile phone or tablet, with remote assistance from an insurance

[40] Mihovil Anđelinović, "Potencijal primjene umjetne inteligencije u osiguranju", *Croatian Insurance Journal*, No. 10/2024, 95–107.

[41] Maja Nisevic, Arno Cuypers, Jan De Bruyne, "Explainable AI: Can the AI Act and the GDPR go out for a Date?", SSRN, 15 January 2024, available at: *https://ssrn.com/abstract=5056022*, accessed on May 24, 2025.

[42] Zoran T. Ćirić, „Važnost komunikacije s klijentima u delatnosti osiguranja", *Tokovi osiguranja*, No. 1/2024, 211–212.

expert, and the process is completed quickly.[43] For example, "Croatia osiguranje" has developed a special application that enables quick settlement of minor claims and on-the-spot payment without delay.[44] The advantage is better and more competitive pricing, but also fraud prevention in claims payment. At the same time, AI helps in creating highly customized offers tailored to client needs, online policy purchases, self-service data entry and access, appointment scheduling for medical examinations within health insurance policies, etc. Special attention among insurance companies in Croatia is directed toward aspects of data security protection, given the growing frequency of attacks and they are becoming increasingly risky.

A good example of the use of AI in the insurance sector in Slovenia is one of the largest companies, Zavarovalnica "Triglav", which uses a chatbot called AI TRIA with the aim of providing customer support and answering FAQs; AI that directs requests to appropriate sectors, AI for document processing and analysis, AI for damage assessment, AI for customer data analysis, etc.[45] A study by the European Parliament cites the use of AI in the insurance sector even prior to the adoption of the AI Act. Thus, the company "Royal Dutch Touring Club ANWB" provides a discount on car insurance to drivers who download an application that will monitor their driving behavior. In other companies, applications have been developed that track customer activity and lifestyle, thereby providing a discount on health insurance. A particularly controversial use of AI is found in the company 'WeSee,' which employs an emotion-recognition application aimed at detecting insurance fraud and similar practices.[46]

The question will also arise as to which uses of AI by insurance companies will be considered disputable. Therefore, the insurance sector in EU countries is very seriously preparing for the digital transformation of deployment of artificial intelligence.[47] New forms of insurance companies are emerging, narrowly specialized in information technologies in insurance that deal with digitalisation of processes and services (*InsurTech*), but also new risks.[48] This type of company can be defined as

[43] "Croatia osiguranje", available at: *https://www.netokracija.com/osiguranje-digitalizacija-croatia-osiguranje-233536*, accessed on May 16, 2025.

[44] Insurance Europe, Consumer hub, available at: *https://www.insuranceeurope.eu/priorities/2943/consumer-hub*; *https://www.osiguranje.hr/ClanakDetalji.aspx?22482*, accessed on May 16, 2025.

[45] *https://www.triglav.eu/en/media/press-releases/press-release/when-ai-tria-speaks*; *https://www.microsoft.com/en/customers/story/1752754742242485191-zavarovalnica-triglav-azure-openai-service-insurance-en-slovenia*, accessed on September 17, 2025.

[46] European Parliament, Regulatory divergences in the draft AI act, Differences in public and private sector, 2022, available at: *https://www.europarl.europa.eu/thinktank/en/document/EPRS_STU(2022)729507*, accessed on September 17, 2025, 17-22.

[47] Martina Perković, "Umjetna inteligencija i big data tehnologija u industriji osiguranja", *Ilab Working Papers Series*, No. 01-05, available at: *https://iilab.efzg.hr/images/Istrazivanja/iilab-wp-2021-5.pdf*, accessed on May, 2025, 4 *et seq.*

[48] Anat Keller, Clara Martins Pereira, Martinho Lucas Pires , "The European Union's Approach to Artificial Intelligence and the Challenge of Financial Systemic Risk", *Multidisciplinary Perspectives on Artificial Intelligence and the Law* (eds. Henrique Sousa Antunes *et. al.),* Springer, Cham, 2024, 415–416.

innovative use of technology in insurance and as a subset within FinTech, companies focused on financial technology.[49] Such companies develop solutions in the sphere of digital insurance services. Big data is of crucial and increasing importance as primary sources of information for insurance, being utilized for machine learning and the development of AI models. In analyses, there are also contrary views that AI will not reduce, but increase the workload of employees. Business efficiency and success will be measured by client retention and acquisition, which will in turn require growing investments in IT infrastructure and continuous employee training with the growing presence of InsurTech companies in the insurance market.[50] Climate risks, which are largely unknown, represent the greatest risks for business models and insurance market stability, as physical risks that create new challenges, with an exponential increase in various settled claims.[51] All of this, in turn, requires strengthening the role of insurance and policyholder protection. Aspects of establishing legal liability for damage in the era of AI require an adequate regulatory framework. The EU opts for harmonized legal solutions, which is the correct path, whereby the focus of the regulatory response shifts toward developers in insurance, alongside the strengthening and clarification of legal liability.[52]

Rules and regulations on non-contractual liability concerning AI represents a significant challenge in the EU, especially in light of mitigating risks associated with the use of AI and its deployment.[53] In this regard, the key elements of legal regulation of non-contractual liability regarding AI are rules relating to the burden of proof, collection of information about high-risk AI systems by persons seeking compensation for damage, strict liability in certain cases,[54] adaptation of national civil liability rules for AI, stricter regulation and stronger international cooperation, assessment and insurance of company liability exposure, AI system liability insurance, legal certainty, and more.[55]

Legal and ethical challenges of AI deployment in insurance are numerous. Automation of claims assessment and payment will open growing potentials for

[49] Sonja D. Radenković, Azra Sućeska, Hasan Hanić, "Technological Foundations of Fintech", *Fintech in the Context of the Digital Economy Opportunity and Challenges* (ed. Hasan Hanić, Radislav Jovović), 2023, 98–99.
[50] Rastko Filipović, "Integracija veštačke inteligencije u svakodnevnost osiguranja", available at: *https://www.deloitte.com/ce/en/about/story/our-markets/deloitte-serbia/integracija-ve-take-inteligencije-u-svakodnevnost-osiguranja.html*, accessed on May 20, 2025.
[51] EIOPA, "The role of insurers in tackling climate change: challenges and opportunities", *The EUROFI Magazine, Stochkolm,* 2023, available at: *https://www.eiopa.europa.eu/publications/role-insurers-tackling-climate-change-challenges-and-opportunities_en*, accessed on May 21, 2025.
[52] Ivana. B. Ljutić, "Legal Implications of Fintech", *Fintech in the Context of the Digital Economy Opportunity and Challenges,* 2023, 194-208.
[53] Liability Rules for AI, available at: *https://commission.europa.eu/business-economy-euro/doing-business-eu/contract-rules/digital-contracts/liability-rules-artificial-intelligence_en*, accessed on May 9, 2025.
[54] Emmanuela Truli, "Non-contractual Liability in the Context of Artificial Intelligence: The Long Way to New EU Legislative Tools", *European Review of Private Law*, Vol. 31, No. 1/2023, 47.
[55] European Commission, Proposal for a Directive of The European Parliament And of The Council on adapting non-contractual civil liability rules to artificial intelligence (AI Liability Directive), COM/2022/496 final.

insurance, especially for travel insurance. A tourist will be able to submit a repair receipt via mobile application, using NLP (natural language processing) and computer vision, identify relevant data (amount, date, type of service). This is followed by comparison with policy conditions and automatic approval of payouts or redirection of complex cases to an employee operator. New challenges and risks arise here, particularly related to personal data protection and the General Data Protection Regulation (GDPR).[56] The system will have to ensure policyholder data security at all stages (lawful, transparent, fair data processing, limitation to what is necessary in relation to the purpose of processing, accuracy and timeliness, archiving only as long as necessary in accordance with the purpose of processing, etc.).[57] Future steps are data anonymization using pseudonymization wherever possible, with necessary explicit policyholder consent for processing personal data through AI.

Insurers will encounter a certain degree of skepticism and concern that clients may lose trust and be inclined to initiate disputes. The solution is to resolve complaints clearly and effectively without using AI. An increasing level of policy personalization is anticipated. For vehicles, telematic data will be used: speed, kilometers traveled, driving style. AI will offer lower premiums based on risk assessment for good drivers, whereby some companies will offer more attractive (cheaper) policies to drivers who travel fewer kilometers in a certain period.

The deployment of AI raises a series of ethical issues from the aspect of applying GDPR regulation, including policyholder consent, equal treatment of policyholders, e.g. in differently populated areas, whether the habits of "sharper and more offensive" drivers are pre-classified as increased risk, and more (respect for the autonomy of natural persons, harm prevention, transparency, security, prohibition of discrimination, etc.).[58] The question of national-level regulatory alignment arises – whether policyholders are treated consistently across all countries. AI systems already store enormous amounts of data that provide the possibility of analysis and preventive identification of suspicious claims, frequent reports of similar claims, and use of potentially fraudulent service providers.

IV. The impact of European Union regulation in the field of AI and the future in the insurance sector

In the sphere of AI regulation, the EU faces challenges of false positives. Specifically, there is a risk that legitimate claims insurance claims may be incorrectly

[56] European Parliament, The impact of General Data Protection Regulation (GDPR) on artificial intelligence, 2020, available at: *https://www.europarl.europa.eu/RegData/etudes/STUD/2020/641530/EPRS_STU(2020)641530_EN.pdf*, accessed on May 23, 2025.

[57] GDPR, Art. 5.

[58] The impact of GDPR on artificial intelligence, 50, 73 *et seq.*

flagged as fraudulent. This, in turn, causes policyholder dissatisfaction and increases the risk of potential legal disputes. Regulation and practice should enable and establish a balance between insurance efficiency and accuracy of claims compensation. Algorithms can be biased and nationally determined by specific data, cultural elements and social norms, and social objectivity is a necessary condition.[59] Algorithms in the future will have to be transparent and enable continuous revision, and AI systems must adapt more quickly in order to maintain efficiency. The future development of AI in insurance has prospects only with models of better risk assessment and development of insurance services.[60] Particularly significant in this regard are risk assessments of natural and artificially caused disasters with human factors (floods, earthquakes, wildfires, tsunamis, etc.). AI will analyze geolocation and climate data, historical time series, topography, demographic flows, and more. The use of AI in the previous context results in better and more precise policy design. Regulatory compliance and oversight by supervisory authorities, increased client trust, and strict adherence to ethical standards, and enhanced transparency of insurance services are all of critical importance.

The implementation of the AI Act will have profound and far-reaching positive, but also negative effects on the insurance sector in the EU, as application already exists in practice.[61] One of the leading insurance companies, "Munich Re", has been preparing and investing in AI development over an extended period. In brief, through the following paragraphs we will paraphrase this approach, which, in our opinion, is very significant and based on the cited source. They believe that an insurer can improve its operational efficiency by using AI, machine learning and standardizing business processes. In the insurance contracting process, big data is used to enhance the accuracy of risk prediction models, guide the intentions and behavior of insurers, identify new cross-selling opportunities and insurance services sales, all while ensuring a positive experience for satisfied policyholders. Existing *know-how*, experience and resources are no longer adequate for insurers to fully exploit vast datasets.

Negative critiques in the context of the complexity of AI Act implementation are numerous in the literature, starting from the complexity of the regulation itself,

[59] EIOPA, Final Report on the Prudential Treatment of Sustainability Risks for Insurers, 2024, available at: *https://www.eiopa.europa.eu/publications/final-report-prudential-treatment-sustainability-risks-insurers_en*, accessed on May 23, 2025, 103–121.

[60] Petra Hielkema, "The Future of Cloud Computing and AI in the EU Insurance Sector", *Contribution to the Eurofi Magazine*, September 2024, available at: *https://www.eiopa.europa.eu/publications/future-cloud-computing-and-ai-eu-insurance-sector_en*, accessed on May 23, 2025.

[61] Patric Greene, "AI transformation in insurance underwriting: Unlocking the power of predictive models," July 2024, available at:
https://automation-solutions.munichre.com/AI-Insurance-ebook.html?utm_source=website_medium=CTA-blog&utm_campaign=AI-underwriting-blogpost&utm_content=GC, accessed on May 25, 2025.

numerous challenges in its implementation, potential administrative burdens, and more.[62] In February 2025, the Commission published Guidelines on the definition of AI systems, precisely with the aim of simplifying the Act. These guidelines provide practical application of the legal concept outlined in the AI Act, as a kind of assistance to providers and all persons involved in this area, to ensure effective implementation. The aforementioned guidelines were published together with the Guidelines on prohibited AI practices. Strengthening of EU-level initiatives, especially through the AI Continent Action Plan from April 2025, is currently underway. Europe strives to become a global leader in the field of AI.[63]

The adoption, development and successful deployment of AI will be a major challenge for insurers in the EU, as well as for non-EU European countries, particularly candidate countries. This is due to the underdeveloped institutional and regulatory infrastructure and practices, which remain at a lower level by all criteria compared with EU members.

V. Implications and recommendations for Serbia

The future outlook for Serbia, as a candidate country for EU membership, and the fact that dominant insurance companies are under foreign ownership, particularly from the EU, lies in predictive risk assessment models and operations management. Harmonization with the EU Artificial Intelligence Act is of exceptional importance. When the aforementioned regulation is adopted, insurers will also have to comply with it. Artificial intelligence will open new possibilities for Serbian insurance companies to perform tasks in a faster and more efficient manner, achieve cost savings and enable particularly more effective utilization of human resources. AI-based models will make reinsurance processes faster. New opportunities will open for highly personalized marketing campaigns. Claims reporting, assessment and settlement processes will be simplified, resulting in higher policyholder satisfaction, fewer disputes, abuses and frauds. Human resources – employees within the insurance sector, will be deployed more efficiently, providing complex support in the final verification of AI-driven decisions. Policyholder experiences will be improved. Personalized offers and monitoring throughout the policy lifecycle will ensure that many unpleasant instances in this process are justifiably eliminated. Plans will be

[62] Patric Greene, "AI transformation in insurance underwriting: Unlocking the power of predictive models", July 2024, available at: *https://automation-solutions.munichre.com/AI-Insurance-ebook.html?utm_source=website_medium=CTA-blog&utm_campaign=AI-underwriting-blogpost&utm_content=GC*, accessed on May 25, 2025.

[63] *https://digital-strategy.ec.europa.eu/en/library/commission-publishes-guidelines-prohibited-artificial-intelligence-ai-practices-defined-ai-act*; *https://digital-strategy.ec.europa.eu/en/factpages/ai-continent-action-plan*, accessed on September 17, 2025.

better aligned with policyholder needs and market development, while ensuring privacy protection and elimination of the prevalence of insurance agents. Fraud detection will reduce the need for expensive external systems with human factors. The main challenges will be in the process of creating new tools, whereby insurance companies in Serbia will in most cases receive already standard tools used by their EU-based parent companies and groups. This will require engagement of talent as a sensitive and long-term process.

Insurance companies in the EU and in Serbia have long operated in a highly complex environment of legal and regulatory norms and systems. It is reasonable to expect that the deployment of AI will increase regulatory engagement, not only in the EU but also at the global level. The future belongs to ethical AI deployment, transparent from decision-making models to monitoring of the insurance cycle and data-security protection. Insurers in Serbia will have to ensure responsible use of AI, promoting fairness, corporate responsibility and credibility, transparency, and full legal compliance. This approach certainly opens a series of important questions relating to Serbia's regulatory harmonization with the EU framework.[64]

The National Association of Insurance Commissioners has determined that all participants in this process (insurers, intermediary entities, those playing an active role in this process throughout the AI lifecycle, rating agencies, data-service providers, advisory organizations, promoters, and others) should respect the principles on AI.[65] These principles represent guidelines for participants operating at the intersection of AI and insurance, although they do not impose legally binding obligations, as deployment is not legally compulsory. Their purpose is to inform and establish general expectations for all participants and AI systems by strengthening the concepts of responsible business conduct, regulatory compliance, transparency, security and fair yet robust results. The development of supplementary voluntary health insurance in Serbia will be significantly based on the introduction of AI as a complementary service to compulsory health insurance, opening perspectives for effective health risk management.[66]

Enhancement of cross-border interdisciplinary cooperation will gain new momentum through AI deployment, and exponentially increase the number of investigated cases. Advanced methods and technologies introduced through AI will be

[64] Ivana B. Ljutić *et al*., "European Sustainability Reporting Standards: Lack of Progress, Alignment, and Harmonization in Western Balkans", *Economic Analysis: Applied Research in Emerging Markets, Special Issue articles,* Vol. 57, No. 2/2024, 45–46.

[65] NAIC, "National Association of Insurance Commissioners (NAIC) Principles on Artificial Intelligence (AI)," Aug. 14, 2020, available at: *https://content.naic.org/sites/default/files/inline-files/AI%20principles%20as%20Adopted%20by%20the%20TF_0807.pdf,* accessed on May 25, 2025.

[66] Nataša Petrović Tomić, "Dopunsko zdravstveno osiguranje u funkciji doprinosa razvoju održivog sistema zdravstvene zaštite u Republici Srbiji", *Tokovi osiguranja*, No. 1/2024, 7 *et seq*.

an indispensable tool in the effective fight against fraud in the insurance domain.[67] Insurance companies in Serbia will, through intensive use of AI, increase turnover, make insurance services available to a wider range of users, with continuous cost reduction, especially in the domains of digital operational resilience (DORA), GDPR and the AI Act.

VI. Conclusion

The deployment of artificial intelligence (AI) in the insurance sector in the European Union represents a fundamental transformation that brings significant operational advantages, but simultaneously poses complex legal and ethical challenges. The EU Artificial Intelligence Act (AI Act) provides a comprehensive regulatory framework aimed at ensuring responsible, trustworthy and ethical use of AI, especially in high-risk insurance areas, such as pricing and risk assessment. The analysis has demonstrated that algorithmic transparency, legal liability for decisions made with the assistance of AI, and the protection of personal data (in accordance with the GDPR) are of crucial importance for building user trust and market stability. Implementation of the AI Act requires insurance companies to assess the risk level of existing and planned AI deployment, establish new corporate governance and risk management models, as well as to ensure continuous compliance monitoring. Although AI promises increased efficiency, service personalization, and more effective fraud prevention, challenges such as potential discrimination of policyholders and the need for independent algorithm auditing must be addressed. For Serbia, as an EU candidate country, with dominant insurance companies under foreign ownership from the EU, alignment with EU regulation in the field of AI is imperative. This implies not only the adoption of relevant legal solutions, but also strengthening of IT infrastructure, continuous employee training and development of domestic experts. The future of insurance lies in the ethical and transparent deployment of AI, which will enable faster and more efficient processes, from policy underwriting to claims settlement, with simultaneous protection of policyholder rights and privacy. Regulatory bodies, both in the EU and in Serbia, will have a crucial role in creating a dynamic balance between innovation and necessary protection, ensuring that the development of AI in insurance serves the welfare of society.

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