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Original Research

INDUSTRY 5.0 IN THE NEW GLOBAL CIRCUMSTANCES OF MINING WITH RISK MAPPING

Slobodan Radosavljević *

RB "Kolubara" d.o.o., Svetog Save 1, 11550 Lazarevac, R. Serbia

Abstract: Industry 5.0 represents a new evolutionary phase of process industrialization, which is based on the integration of advanced technologies with human capabilities, creating a synergy that enables greater personalization, flexibility and sustainability in production processes. In the context of mining, which faces global challenges such as: the need for smart mining technologies or completely redesigned technological processes (rapid changes), environmental pressures, legislative changes, security challenges and digital transformation, Industry 5.0 opens up new opportunities, but at the same time introduces and generates new risks. This paper investigates how the application of technologies and their techniques such as automation, artificial intelligence, Internet of Things (IoT) and robotics can partially or completely redesign technological mining operations on coal production and processing, increasing efficiency and safety, while simultaneously generating and multiplying a new format of the risk paradigm. Special attention is paid to risk mapping within the industrial framework of coal mining, with analysis of potential hazards and opportunities to reduce negative impacts through predictive analytics, digital twins and automated processes. Through the work, the complex dynamics of the relationship between new technologies and challenges in coal mining can be observed, offering strategies for effective risk management and improving sustainability in the emerging global conditions.

Keywords: Industry 5.0, mining, coal, processes, risks.

1. INTRODUCTION

This document Industry 5.0 marks a new approach in the development of industrial and production systems, which focuses on the integration of advanced technologies with human elements in order to achieve efficiency, sustainability and personalization. Unlike Industry 4.0, which was focused on automation and digitalization, Industry 5.0 emphasizes the cooperation between people and machines, creating a balanced work environment where technology, in addition to automating processes, also helps people to be more creative, safer and more

* *Corresponding author: drslobodanr@gmail.com*

Slobodan Radosavljević, ORCID: 0009-0000-3223-9743

efficient. Mining, as one of the most dangerous and risky sectors in the industry, faces constant challenges when it comes to risk management. Classical approaches, which were mainly based on human experience and risk assessment in the field, are no longer sufficient in the modern environment that is rapidly changing due to the introduction of new technologies and changes in market and environmental conditions. Industry 5.0 offers the opportunity to redefine the risk management paradigm in mining, enabling the application of advanced technologies such as IoT, artificial intelligence (AI), automation and robotics. It is realistically possible to ask one of the questions how Industry 5.0 affects the management of process risks in mining and how modern approaches can help increase safety and reduce the negative impact on the environment, among others.

2. INDUSTRY 5.0 - BASIC CHARACTERISTICS

Industry 5.0 essentially represents a new direction of development in the industry, which is based on a combination of advanced automation, digitalization and human creativity, with the aim of creating smart, flexible and sustainable production systems (Coelho et al., 2023).

Key features of Industry 5.0 include:

- Collaboration between humans and robots, (cobots): Industry 5.0 emphasizes close collaboration between workers and robots, (collaborative robots or cobots). While robots take over more difficult, repetitive or dangerous tasks, humans remain responsible for the creative, strategic and complex aspects of production.
- Product personalization: Industry 5.0 enables the production of products that are fully adapted to the needs and wishes of end users. This is achieved by using advanced technologies such as 3D printing and mass personalization of production lines.
- Sustainable development and green technology: Industry 5.0 emphasizes reducing the negative impact on the environment, using renewable energy sources, recycling and sustainability in production processes. The goal is for the production to be ecologically balanced/more acceptable and less energy intensive.
- Advanced digitalization and the Internet (IoT): Industry 5.0 uses advanced digitalization, including IoT, artificial intelligence (AI), and big data to optimize production processes, improve efficiency, and enable better real-time monitoring and analysis.
- Smart factories: Smart factories are the basis of Industry 5.0, which use digital technologies, automation and advanced analytics to manage production processes in real time, thereby increasing flexibility and efficiency.
- Focus on human values: Unlike Industry 4.0, which focused on automation and robotization, Industry 5.0 puts people at the center. The goal is for technology to enhance human creativity and well-being, not replace it entirely. This model insists on creating better working conditions, greater employee engagement and a better balance between technological innovation and human values.
- Adaptability and flexibility: Industry 5.0 enables faster adaptation to changes in the market and consumer demands, enabling production in smaller batches and with higher levels of personalization, while at the same time reducing the time required for production, (Ghobakhloo et al., 2023).
- Greater connectivity and integration: Through the integration of different technologies and systems, such as cloud computing, edge computing, and blockchain, Industry 5.0 enables better connectivity between different sectors and factories, creating a unique and efficient global production network.

- Training and skill development: As technologies evolve, so does the need for worker training. In Industry 5.0, organizations must invest in training their employees to prepare them to work in high-tech environments. Developing a culture of safety and innovation can also reduce human error and increase safety.
- Worker safety and health: Industry 5.0 puts the foregoing into focus on worker well-being, using technology to reduce physical stress, risk of injury, and improve the work environment. There are also new ways workers can use technology to improve their work performance while also having better working conditions.

The above basic features can be explained in detail, but in general they indicate that Industry 5.0 goes beyond automation and robotization, emphasizing the cooperation between people and technology, which creates a completely new, dynamic, sustainable and personalized production ecosystem, (Akundi et al., 2022; Fazal et al., 2022). At the same time, Industry 5.0 also represents a significant advance in risk management in mining, combining technology, human resources and sustainability to create a safer, more efficient and responsible working environment. This new paradigm allows companies to face the challenges and risks associated with modern mining more quickly and with better quality, quantitatively map them and define the best answers to them, (Kaswan et al., 2025).

3. CHARACTERISTICS OF SMART TECHNICAL SYSTEMS IN SURFACE EXPLOITATION OF COAL, SPECIFICITIES IN THE CONDITIONS OF NEW GLOBAL ENVIRONMENTS AND INDUSTRY 5.0

Modern smart technical systems for surface mining of coal in the conditions of new global circumstances and Industry 5.0 bring numerous technological innovations that enable greater efficiency, sustainability, safety and environmental responsibility. These systems use advanced technologies such as automation, artificial intelligence, IoT (Internet of Things), predictive analytics, and sustainable energy technologies, which are integrated to improve all aspects of the manufacturing process, (Zhironkin & Taran, 2023).

Some of the key specificities of the work of technical systems on surface coal mining can be defined through:

- Autonomous transport systems: Autonomous transport systems (smart belt conveyors) are used in modern surface mining of coal. These systems can perform tasks without human intervention, reducing the need for workers in hazardous areas while increasing productivity and safety.
- Autonomous Technical Smart Mining Systems: Technical systems and mining machines can be programmed to operate within precise parameters, which improves the efficiency of the mining process and reduces the risk of human error.
- Predictive maintenance: AI algorithms can analyze data in real time about the state of technical systems and equipment and predict when a failure or need for servicing will occur, thus minimizing downtime and extending the life of the equipment.
- Production optimization: AI is used to analyze large amounts of data from sensors and IoT devices in order to optimize the dynamics of technical systems and equipment operation, improve production parameters and reduce the consumption of energy and other resources.
- Monitoring of technical systems, equipment and working conditions: Sensors built into the excavation equipment enable the monitoring of parameters such as temperature, vibration, level of energy consumption and stress on the machines, thus enabling timely intervention and preventing damage.

- Connection to centralized management smart systems: Sensors enable constant monitoring of the situation in the field, as well as interaction with central systems for data analysis, which enables decision-making in real time.
- Digital platforms for data management: In Industry 5.0, all operations in surface coal mining are connected through digital platforms that enable the integration of all aspects of business, from planning to production. These platforms enable better monitoring of production flows and resources (Usharani et al., 2022).
- Virtual models: By using digital twins, virtual models of surface mining operations can be created. These models enable the simulation of working conditions, the testing of new technologies, as well as the optimization of work without the need for physical testing in the field.
- Robotic Burial and Transport Systems: In modern mining operations, robotic systems can perform operations such as mining, transporting, cleaning and sorting coal, all under the strict supervision of a remote control system.
- Combination of robotics with technical systems and human labor: In Industry 5.0, humans and robots work together in tandem. Robots take over heavy, dangerous, and repetitive tasks, while humans manage more complex operations and make key decisions.
- Connectivity to other industrial sectors: Modern mining systems are increasingly connected to other industries, such as the energy industry and transportation. For example, data from mining operations can be linked to energy systems to better optimize coal production and distribution.
- Supply chain optimization: Digital platforms enable better tracking of the supply chain, from mining operations to end users, reducing losses and increasing the efficiency of coal transportation.
- Energy efficiency and use of renewable energy sources: Surface coal mining technologies are being developed that reduce energy consumption in mining operations, including the use of solar panels and other renewable energy sources to power mining equipment.
- Management of waste and emissions in the production process of surface coal mining: With the aim of reducing the negative impact on the environment, smart systems for waste management, monitoring CO^2 emissions and other pollutants are implemented. Pollution monitoring and environmental impact control are becoming key in every segment of coal production in question.
- Worker monitoring and protection: Worker health and safety monitoring technologies use sensors and wearable devices to monitor their vital signs and detect potential hazards in the field, such as high temperatures or the presence of hazardous gases.
- Remote control and operations: The use of remote machine control allows workers to manage difficult and dangerous operations from a safe distance, thus reducing their physical risk.
- Supporting sustainable practices and experiences in surface coal mining: In the modern mining industry, social responsibility is becoming a key factor. Mining companies implement technologies that not only reduce the environmental impact, but also create better conditions for the communities around the mine, including training for new technologies and providing economic support.

Modern smart technical systems for surface mining of coal, based on Industry 5.0, enable much more efficient, safe and sustainable management of mining operations. The use of advanced technologies in surface coal mining, artificial intelligence, (IoT) and digitalization, enable the optimization of system operation and the reduction of negative impact on the environment, while at the same time providing better working conditions and more efficient operations (Trivedi et al., 2024; Zeb et al., 2022).

4. NEW ASPECTS OF RISK MANAGEMENT IN MINING - SURFACE EXPLOITATION OF COAL IN THE CONTEXT OF DETERMINING INDUSTRY 5.0

Industry 5.0 represents the latest phase of industrial development, which is based on cooperation between people and advanced technologies, and the goal is to create flexible, intelligent and sustainable production systems. In the context of mining, especially surface coal mining, industry 5.0 brings numerous challenges and opportunities for improving safety, productivity and sustainability (Massaro, 2023).

It is important to note that the latest smart technical systems in surface coal mining, combined with new global circumstances and the development of Industry 5.0, represent a challenge and an opportunity for the development of safer, more efficient and sustainable coal mining methods. This framework requires constant adaptation of technologies, workforce training and investment in innovation that will enable progress in the industry.

Mining is an industry that, traditionally, is recognized for high risks for technical exploitation systems, complete infrastructure logistics, workforce, environment and economy.

By introducing new modern smart technologies and risk management methodologies, the industry can become safer and more efficient, and at the same time respond to the global challenges of sustainability and environmental protection.

Industry 5.0 focuses on the integration of advanced technologies with the human factor to create a synergy between automation and creativity. In mining, this means the introduction of new technologies that can significantly improve safety, precision and sustainability in the coal mining process (Radosavljević et al., 2013).

Risk management in mining includes all processes related to the identification, analysis, assessment and minimization of risks that may arise during the exploration and surface exploitation of coal, its processing/grinding/shredding, delivery to thermal power plants and the use of coal in boilers for the production of electricity. Risks in mining can be technological, human, environmental and economic. Surface mining of coal, which means mining coal on the surface of the land/surface mining, faces specific challenges, such as soil collapse/instability and sliding of tailings mass on the excavation slopes, structural breaks of technical systems under full load conditions/experience from mining production practice, danger of explosions, emission of harmful gases and impact on local ecosystems (Radosavljević & Radosavljević, 2009).

The integration of advanced technologies into risk management strategies is becoming a key element in modern business and decision-making, as it enables organizations to recognize, analyze and respond to risks in a more efficient, faster and more accurate way.

- Predictive analysis: Ai can analysis historical data of technical systems and predict potential risks, such as collapses, structural breaks, unidentified downtimes, crashes, changes in the regulatory environment, and even natural disasters at work and exploitation sites. Based on these predictions, managers can make better informed decisions about preventive measures.
- Automation of risk assessment: Machine learning can automatically assess risks in real time, based on various variables, such as changes in the operation of technical systems, downtime, maintenance problems or deviations in prescribed regulations

related to business applications in mining, among other things, defined by certain standards for both production and risk management.

Given the huge volume of data available to organizations, technologies for analyzing big data (Big Data) are becoming crucial for risk identification. By using advanced analytics tools, organizations can:

- Analyzes data in real time: this technology enables quick detection of unforeseen events that can lead to risks, such as changes in the behavior of technical systems, complete infrastructural logistics as well as in certain sectors, maintenance and others.
- Use sophisticated and complex risk analysis models: using big data enables a deeper understanding of potential risks based on various data sources, leading to more accurate and comprehensive risk management strategies.

Blockchain is another advanced technology used in risk management, especially in sectors that require a high level of security and transparency, such as mining techniques and infrastructure logistics, maintenance and others. Blockchain works in the context of risk management on sitting determinations:

- Data transparency and immutability: Blockchain allows organizations to track transactions in real time and securely, reducing the risk of fraud and errors.
- Smart Contracts: The use of smart contracts reduces operational risks because it enables the automatic execution of contracts when predefined conditions are met, reducing human errors.

The Internet of Things allows devices to be connected to a network, which enables better monitoring and analysis of risks in real time. Some examples are:

- Real-time monitoring: IoT devices can monitor the state of technical systems, machines, infrastructural logistics and equipment at production locations, production plants, detecting potential technical problems or dangers that may cause risk. This enables timely interventions.
- Predictive maintenance: By using data from IoT devices, organizations can predict mapping and planning systems when maintenance is due, reducing the risk of unplanned downtime.

As organizations become increasingly digitized, the risk of cyber attacks increases. In the integration of advanced technologies, the implementation of modern cyber security tools becomes crucial:

- Use of advanced security systems: Using AI-based tools to detect anomalies in data traffic and prevent cyber attacks can significantly reduce the risks of hacking or other types of cyber threats.
- Cryptographic technologies: The implementation of advanced cryptographic techniques protects data and transactions, reducing the risk of data theft or manipulation.

Advanced software tools and simulations allow organizations to test their risk management strategies in different scenarios. By using methods such as Monte Carlo simulations, the potential consequences of various risks in various situations can be analysed.

- Simulations and analysis of "what-if" scenarios: These tools allow organizations to consider various possible scenarios and assess how they will affect the business, helping them to better prepare for uncertainties.

Robotic process automation (RPA) and other forms of automation can help reduce operational risks associated with human error or inefficiencies.

- Automation of repetitive tasks: By automating repetitive tasks (among others in mining, such as the work of technical systems on the surface exploitation of coal),

the risk of errors is reduced and efficiency is increased in the conditions of the spatial resource localities where the activities are performed.
- Reducing the risk of human errors: Automating complex or repetitive processes reduces the likelihood of human errors that can lead to critical and significant risks.

Integrating advanced technologies into risk management strategies enables organizations to improve the accuracy, efficiency and speed of their decisions. Using AI, machine learning, blockchain, IoT, big data, cyber security and other advanced technologies enables organizations to better predict, analyze and manage risks in an increasingly dynamic business environment. In this way, process smart technologies become a key tool for reducing uncertainty and minimizing potential risks (Radosavljević et al., 2009).

5. DIGITAL TOOLS AND SMART SOFTWARE SYSTEMS FOR ANALYSIS OF RISK AND INDUSTRY 5.0

Risk mapping in mining is a process of identification, assessment and analysis of potential hazards and accidents that may affect the safety of technical systems, infrastructure logistics, workforce, assets and work locations with the immediate and remote environment. In modern industry, including mining, the introduction of Industry 5.0 means the integration of advanced technologies that enable more efficient, accurate and proactive risk analysis, as well as reducing the possibility of accidents. Industry 5.0 brings a new paradigm that connects people and machines in synergy to improve the safety, efficiency and sustainability of processes. Within the mining industry, risk mapping becomes more accurate and enables faster response to potential hazards with preventive and proactive prescribed procedures and actions.

Modern digital tools and smart risk analysis software systems use advanced technologies (artificial intelligence (AI), machine learning, data analytics and simulation) to enable the identification, assessment and management of risks in the mining industry. These tools help organizations recognize potential threats and opportunities, minimize potential losses, and make better managerial decisions. Some of the key modern Risk Analysis Systems with compatibility with Industry 5.0 are:
- Risk Watch: A platform that enables risk analysis and security assessment, as well as monitoring compliance with regulatory standards. Uses advanced analytics and automation to identify potential risks and assess business impact. Key functionalities: Automated risk assessments; Real-time reports; Tools for monitoring and optimizing security standards.
- Palantir: A powerful big data analytics software tool used in many industries. Palantir enables the analysis of complex data sets to identify hidden risks, trends and predictive models. Key functionalities: Ability to process huge amounts of data; Advanced Predictive Analytics and Risk Modeling; Data Visualization.
- @RISK: @RISK is a risk simulation tool that uses Monte Carlo simulation to assess the probability and impact of risks on business projects. This tool is particularly useful for estimates in projects involving financial analysis, resource management and budget optimization. Key functionalities: Simulations based on the Monte Carlo method; Visualization of results in graphs and reports; Integration with Microsoft Excel.
- RiskLens: RiskLens is a tool that enables organizations to quantify and analyze cybersecurity risks. Using a value-based methodology, RiskLens helps assess the various business impacts of potential cyber threats. Key functionalities:

Quantification of cyber risk in a financial sense; Integration with existing IT infrastructure management tools; Analysis of potential losses from cyber attacks.
- SAS Risk Management: SAS is one of the leaders in the field of data analytics, and their risk management tool uses advanced models to analyze and manage financial and operational risks. It is also used in mining for risk simulation and compliance with regulatory requirements. Key functionalities: Predictive analytics and scenario analysis; Compliance with regulatory requirements; Quantification of credit, market and operational risk (Kozub, 2025).
- Resilience360 (Logistics Risk): Resilience360 is a software system that focuses on risk assessment in supply chains for mining logistics infrastructure. The tool uses big data analytics to identify potential risks such as supply disruptions, natural disasters, political uncertainties and other global threats. Key functionalities: Monitoring of global risks in real time; Assistance in developing recovery strategies; Ability to customize analyzes for specific industries (Marzhan et al., 2022).
- Monte Carlo (Data Science Platform): A platform that uses advanced machine learning methods and simulations to analyze risks in business operations. It helps organizations accurately assess the impact of uncertainty and variation in data on business results. Key functionalities: Real-time data analysis; Predictive modeling and simulations; Data visualization and optimization suggestions.

6. INDUSTRY 6.0

Industry 6.0 is a concept used to denote the next stage in the development of the industrial revolution, which goes beyond current models such as Industry 4.0. And industry 5.0. While Industry 4.0 is focused on the integration of digital technologies in production processes, Internet of Things (IoT), automation, artificial intelligence, and big data and Industry 5.0 focuses on the integration of advanced technologies with the human factor, so Industry 6.0, although still not widely defined or standardized, is generally considered as a development towards a more sustainable, ethical and humanistic industry (Das & Pan, 2022).

Some of the key aspects associated with Industry 6.0 include:
- Sustainable production: Emphasis on reducing the ecological footprint and using renewable energy sources.
- Artificial Intelligence and Human Factors: A combination of AI and human values to create a better work environment, as well as greater collaboration between humans and machines.
- Focus on social aspects: Incorporating more ethical and social considerations into business, such as labor rights, equality and health.
- Connectivity and Personalization: Advances in personalized products and services that better match the needs of individuals (Almusaed et al., 2023).

Industry 6.0 is more of a vision than a current reality, but it will certainly influence the future direction of industry and technology development (Chourasia et al., 2022).

7. RESULTS AND DISCUSSION

New world global circumstances place industry 4.0 and industry 5.0 in the context of application in completely new framework paradigmatic relations. The situation in the world circumstances is quite specific with obvious needs for new instructions as well as new focuses related to ways of application. A new integrative platform is needed, based on the foundations of the determination of the mentioned concepts, which will be valid in the world and which will be realistically possible to be further implemented with respect for all differences and developments. Therefore, a restart of the results of the application so far and a new integrative scheme are needed for further continuation. The poor in the world are still at the back, while the rich are progressing much faster and in general find it easier to navigate new industrial concepts. Serbia shares the fate of medium-developed countries. And the application of the concept of Industry 4.0 and 5.0 is at the very beginning, even when it comes to mining. Risk management has started, but still the procedures of analysis and minimization are not aligned with the mentioned concepts, so the results in a qualitative and comprehensive context are smaller.

8. CONCLUSION

Industry 5.0 represents a significant step forward in the development of the industrial sector, as it focuses on the synergy between the human factor, smart technologies and automation. In the context of mining, this revolution offers an opportunity to improve production processes, increase efficiency and safety, but also reduce negative impact and minimize risk. The implementation of advanced technologies can significantly improve operational processes and enable accurate risk mapping. In the new global circumstances, which include rapid changes in market conditions, risk mapping becomes crucial for the sustainability of mining. Industry 5.0 can improve risk analysis and assessment methods through sophisticated algorithms and simulations. However, the successful implementation of these technologies requires a serious approach in terms of workforce education, investment in infrastructure and the development of new policies that will enable the safe and sustainable management of mining resources. Also, it is important to emphasize the need for international cooperation in order to standardize technologies and approaches, thus ensuring the global competitiveness and sustainability of mining within Industry 5.0. Therefore, with proper risk mapping and application of innovations, Industry 5.0 can transform mining into a sector that is simultaneously profitable, safe and environmentally responsible.

REFERENCES

Akundi, A., Euresti, D., Luna, S., Ankobiah, W., Lopes, A., & Edinbarough, I. (2022). State of Industry 5.0-Analysis and identification of current research trends. Applied System Innovation, 5(1), 27. https://doi.org/10.3390/asi5010027

Almusaed, A., Yitmen, I., & Almssad, A. (2023). Reviewing and integrating aec practices into industry 6.0: Strategies for smart and sustainable future-built environments. Sustainability, 15(18), 13464. https://doi.org/10.3390/su151813464

Chourasia, S., Tyagi, A., Pandey, S. M., Walia, R. S., & Murtaza, Q. (2022). Sustainability of Industry 6.0 in global perspective: Benefits and challenges. Mapan, 37(2), 443-452. https://doi.org/10.1007/s12647-022-00541-w

Coelho, P., Bessa, C., Landeck, J., & Silva, C. (2023). Industry 5.0: The arising of a concept. Procedia Computer Science, 217, 1137-1144. https://doi.org/10.1016/j.procs.2022.12.312

Das, S., & Pan, T. (2022). A strategic outline of Industry 6.0: Exploring the Future. Available at SSRN 4104696. https://dx.doi.org/10.2139/ssrn.4104696

Fazal, N., Haleem, A., Bahl, S., Javaid, M., & Nandan, D. (2022). Digital management systems in manufacturing using industry 5.0 technologies. In Advancement in Materials, Manufacturing and Energy Engineering, Vol. II: Select Proceedings of ICAMME 2021 (pp. 221-234). Singapore: Springer Nature Singapore. https://doi.org/10.1007/978-981-16-8341-1_18

Ghobakhloo, M., Iranmanesh, M., Tseng, M. L., Grybauskas, A., Stefanini, A., & Amran, A. (2023). Behind the definition of Industry 5.0: a systematic review of technologies, principles, components, and values. Journal of Industrial and Production Engineering, 40(6), 432-447. https://doi.org/10.1080/21681015.2023.2216701

Kaswan, M. S., Chaudhary, R., Garza-Reyes, J. A., & Singh, A. (2025). A review of Industry 5.0: from key facets to a conceptual implementation framework. International Journal of Quality & Reliability Management, 42(4), 1196-1223. https://doi.org/10.1108/IJQRM-01-2024-0030

Kozub, V. (2025). Problems and Solutions in Building Highly Loaded Software. The American Journal of Engineering and Technology, 7(03), 230-236. https://doi.org/10.37547/tajet/Volume07Issue03-20

Marzhan, Y., Talshyn, K., Kairat, K., Belginova, S., Karlygash, A., & Yerbol, O. (2022). Smart technologies of the risk-management and decision-making systems in a fuzzy data environment. Indonesian Journal of Electrical Engineering and Computer Science, 28(3), 1463-1474. http://doi.org/10.11591/ijeecs.v28.i3.pp1463-1474

Massaro, A. (2023). Process Mining in Production Management, Intelligent Control, and Advanced KPI for Dynamic Process Optimization: Industry 5.0 Production Processes. In Perspectives and Considerations on the Evolution of Smart Systems (pp. 1-17). http://doi.org/10.4018/978-1-6684-7684-0.ch001

Radosavljević, S. and Radosavljević, M. (2009). Risk assessment in mining industry - Apply management. *Serbian Journal of Management,* Vol. 4, No. 1 pp. 91-104.

Radosavljević, S., Dašić, P. and Radosavljević, M. (2013). Appendix specifics of risk management in mining. Metalurgia International, Vol. 18, Spe. Is. No. 8, pp. 59-68.

Radosavljević, S., Lilić, N., Ćurčić, S. and Radosavljević, M. (2009). Risk assessment and managing technical systems in case of mining industry. Strojniški vestnik - Journal of Mechanical Engineering, Vol. 55, No. 2, pp. 119-130.

Trivedi, C., Bhattacharya, P., Prasad, V. K., Patel, V., Singh, A., Tanwar, S., ... & Sharma, G. (2024). Explainable AI for Industry 5.0: vision, architecture, and potential directions. IEEE Open Journal of Industry Applications. https://doi.org/10.1109/OJIA.2024.3399057

Usharani, S., Manju Bala, P., Ananth Kumar, T., Rajmohan, R., & Pavithra, M. (2022). Smart energy management techniques in industries 5.0. Hybrid Intelligent Approaches for Smart Energy: Practical Applications, 225-252. https://doi.org/10.1002/9781119821878.ch12

Zeb, S., Mahmood, A., Khowaja, S. A., Dev, K., Hassan, S. A., Qureshi, N. M. F., ... & Bellavista, P. (2022). Industry 5.0 is coming: A survey on intelligent nextG wireless networks as technological enablers. arXiv preprint arXiv:2205.09084. https://doi.org/10.48550/arXiv.2205.09084

Zhironkin, S., & Taran, E. (2023). Development of surface mining 4.0 in terms of technological shock in energy transition: a review. Energies, 16(9), 3639. https://doi.org/10.3390/en16093639