

**BOOK OF
PROCEEDINGS** **U**

**3rd INTERNATIONAL CONFERENCE ON
SOCIAL AND HEALTH SCIENCES**

December 4th 2024, Prishtina – Kosovo



3rd INTERNATIONAL CONFERENCE ON SOCIAL AND HEALTH SCIENCES

Crafting a sustainable horizon for new generations

1. Session on Sustainable Innovation through Design, AI, and Business Leadership
2. Session on Advancing Sustainability in Health and Wellbeing
3. Session on Shaping Global Cooperation: Legal, Media, and Political Strategies

Book of Proceedings

EDITORS:

Valon Murati, Stephen Keck, Bekim Ramabaja and Fitim Gashi

December 4, 2024, Prishtina, Kosova

EDITORS:

Valon Murati, UNI – Universum International College, Kosova
Stephen Keck, UNI – Universum International College, Kosova
Bekim Ramabaja, UNI – Universum International College, Kosova
Fitim Gashi, UNI – Universum International College, Kosova

International Conference on Social and Health Sciences**Book of Proceedings****Crafting a sustainable horizon for new generations**

1. Session on Sustainable Innovation through Design, AI, and Business Leadership
2. Session on Advancing Sustainability in Health and Wellbeing
3. Session on Shaping Global Cooperation: Legal, Media, and Political Strategies

Building on the themes introduced, the 3rd International Conference on Social and Health Sciences seeks to deepen the conversation around sustainability by focusing on practical, interdisciplinary approaches. The objective is to foster collaboration across fields such as design, AI, business, healthcare, and governance, emphasizing innovative solutions that can shape a sustainable future. Through focused panel discussions, the conference will highlight actionable strategies and best practices that address today's challenges while creating long-term positive impacts for future generations.

CONFERENCE TITLE:

International Conference on Social and Health Sciences

EDITORS:

Valon Murati, Stephen Keck, Bekim Ramabaja, Fitim Gashi

SCIENTIFIC COMMITTEE MEMBERS:

Prof. Dr. Rainer Busch, Ludwigshafen University, Germany; Prof. Dr. Stephen Keck, UNI - Universum International College, Kosova; Prof. Dr. Tonin Gjuraj, University of "Luigj Gurakuqi", Albania; Prof. Dr. Felipe Gómez Isa, University of Deusto, Spain; Assoc. Prof. Susana PESCADA, Universidade do Algarve, Portugal; Ass. Prof. Fernando TEIXEIRA, Instituto Politécnico de Beja, Portugal; Assoc. Prof. Libor Klimek, Matej Bel University, Slovakia; Assoc. Prof. Veland Ramadani, South East European University, North Macedonia; Assoc. Prof. Esat Durguti, University "Isa Boletini", Kosova; Assoc. Prof. Frank Cibulka, Zayed University, UAE; Ass. Prof. Valon Murati, UNI - Universum International College, Kosova; Ass. Prof. Donjeta Zejnullahu Pllana, UNI - Universum International College, Kosova; Ass. Prof. Sejdi Xhemajli, UNI - Universum International College, Kosova; Ass. Prof. Marigona Krypa, UNI - Universum International College, Kosova; Ass. Prof. Ganimete Podvorica, UNI - Universum International College, Kosova; Ass. Prof. Arianit Krypa, UNI - Universum International College, Kosova; Ass. Prof. Besart Prebeza, UNI - Universum International College, Kosova; Ass. Prof. Muhamet Hajdari, UNI - Universum International College, Kosova; Ass. Prof. Samet Dalipi, UNI - Universum International College, Kosova; Ass. Prof. Ketrina Çabiri Mijo, European University of Tirana, Albania; Ass. Prof. Fitim Gashi, UNI - Universum International College, Kosova; Ass. Prof. Bekim Ramabaja, UNI - Universum International College, Kosova; Ass. Prof. Seyma Akin, Necmettin Erbakan University, Turkey; Prof. Muhamad Olimat, Anwar Gargash Diplomatic Academy, UAE; Ass. Prof. Rrezart Prebeza, UNI - Universum International College, Kosova; MSc. Vigan Kiseri, UNI - Universum International College, Kosova; PhD cand. Donjet Bislimi, UNI - Universum International College, Kosova; PhD cand. Redon Jashari, UNI - Universum International College, Kosova; PhD cand. Ibrahim Ömer, UNI - Universum International College, Kosova; PhD cand. Hana Domi, UNI - Universum International College, Kosova; PhD cand. Gentiana Berisha, South East European University, North Macedonia; PhD student. Tevide Shabani, UNI - Universum International College, Kosova; MSc. Nesrin Jahja, UNI - Universum International College, Kosova; MA. Nazim Haliti, UNI - Universum International College, Kosova; MA. Artan Aliu, UNI - Universum International College, Kosova.

ORGANIZING COMMITTEE:

Ass. Prof. Valon Murati, Chair of the Conference; Prof. Dr. Stephen Keck, Co-Chair of the Conference; Members: Ass. Prof. Donjeta Zejnullahu Pllana, Ass. Prof. Fitim Gashi, Redon Jashari (PhD Candidate), Donjet Bislimi (PhD Candidate), Vigan Kiseri MSc.

ISBN: 978-9951-531-30-6

Publishing House: Universum Press, 2025



TABLE OF CONTENTS

1.INTEREST RATES, CREDIT AND BLOCKCHAIN	11
2. THE DIGITAL CONSUMER AND IT’S IMPORTANCE ON SOCIAL MEDIA: A CASE STUDY OF THE RC COLA BRAND.....	24
3. STARTUPS - BEARERS OF THE IDEA OF SUSTAINABILITY IN ECONOMICS.....	37
4. CONTRIBUTING TO THE UNITED NATIONS SUSTAINABLE DEVELOPMENT GOALS WITH THE ISO STANDARD FOR ARTIFICIAL INTELLIGENCE MANAGEMENT SYSTEM.....	51
5. SHIFT IN ORGANISATIONAL DESIGN: BIBLIOMETRIC MAPPING OF POST-BUREUCRACY AS A NEW DIRECTION OF INNOVATIVE BUSINESS PRACTICES.....	67
6. THE SHARING ECONOMY - THE NEW DISRUPTIVE WAY OF A SUSTAINABLE ECONOMY.....	79
7. REVOLUTIONIZING HUMAN ANATOMY EDUCATION: THE ROLE OF VIRTUAL AND AUGMENTED REALITY.....	93
8. IMPACT OF TRACTION IN PATIENTS WITH LUMBAR DISC HERNIATION IN KOSOVO: A STUDY AT CLINIC DIO DOR IN FERIZAJ.....	103
9. THE IMPACT OF AIR POLLUTION IN PATIENTS WITH ASTHMA.....	111
10. AI IN HEALTHCARE AND EDUCATION	117
11. EVALUATION OF THE MENINGITIS SURVEILLANCE SYSTEM (2020-2023) – REPUBLIC OF KOSOVA.....	128
12. SUSTAINABLE STRATEGIES FOR HOSPITALS OF TOMORROW.....	143
13. MAKING URBAN LIFE SUSTAINABLE: JOHN RUSKIN’S VISION FOR A MUSEUM IN SHEFFIELD.....	151
14. PROTECTING THE ENVIRONMENT THROUGH CRIMINAL LAW.....	167
15. PUBLIC SECTOR SALARIES IN KOSOVO – CHALLENGES OF SALARY HARMONIZATION AND ESTABLISHING THE IMPORTANCE OF PROFESSIONS.....	179
16. ANALYSIS OF THE LEGAL FRAMEWORK OF MIGRATION MANAGEMENT IN KOSOVA – WHAT DO WE NEED FOR EU INTEGRATION?.....	190
17. FROM POLICY TO PEACE: LEADERSHIP’S ROLE IN SHAPING PEACE AND COOPERATIVE JUSTICE ON A GLOBAL SCALE.....	203
18.THE IMPACT OF AI ON ACHIEVING SUSTAINABLE DEVELOPMENT GOALS.....	214

INTEREST RATES, CREDIT, AND BLOCKCHAIN

Fernando Teixeira

Instituto Politécnico de Beja, Smart Cities Research Center, Portugal

fernando.teixeira@ipbeja.pt

Susana Pescada

Universidade do Algarve, Cin Turs - Research Center for Tourism, Sustainability and Well-being, Portugal,

spescada@ualg.pt

Válter Machado

Instituto Politécnico de Beja, Portugal

valterfilipemachado@gmail.com

ABSTRACT

The integration of blockchain systems into the financial ecosystem has catalysed the emergence of innovative approaches and tools that complement or replace traditional financial mechanisms. In this context, the study presents a model for analysing decentralized peer-to-peer financing as an alternative to conventional funding methods. The research explored the potential for investors from developed countries to provide credit to investors in developing countries. To achieve this, a linear regression analysis was conducted to examine the relationship between interest rates in developed and developing economies, revealing variations that suggest favourable conditions for investments from developed countries. Subsequently, a linear regression analysis investigated the relationship between interest rate fluctuations and credit volume in Developing countries, concluding a significant positive correlation between these variables. This research advances the field of blockchain and cryptoasset studies, particularly in the context of developing economies.

Keywords: *blockchain, cryptoassets, interest rates, credit volume, sustainability.*

INTRODUCTION

Financial systems demonstrate an inherent adaptability, continuously evolving their processes to meet the dynamic requirements of the markets they serve (Challoumis and Eriotis, 2024). This adaptability has historically been underpinned by fundamental prerequisites, particularly regarding trust between participants, whether individual or institutional (Manta and Palazzo, 2024). However, in the realm of crypto-assets, trust operates alongside other crucial determinants (Koroma et al., 2022). Investors place significant emphasis on factors such as value fluctuations, volatility patterns, and market inefficiencies, as evidenced by various empirical studies (Hayes, 2017; Corbet et al., 2019 and Kyriazis, 2021). The progressive acceptance and adoption of blockchain technology and cryptocurrencies within financial markets reflect this multifaceted approach (Shin and Ibahrine, 2020). This financial innovation has fundamentally transformed established methodologies by introducing unprecedented mechanisms (Wang et al., 2024). A notable shift has been the reduced reliance on traditional banking institutions and central banks, replaced by peer-to-peer trust enhanced through distributed cryptographic systems and user-controlled asset custody via smart contracts (Kapsis, 2020 and McGurk and Reichenbach, 2024). The impact on financial markets has been substantial, particularly in diminishing human factors within monetary circuits (Gomber et al., 2018). Traditional processes have given way to automated computational executions of ledger records, cryptographically secured on the blockchain, independent of the agents responsible for data processing, storage, or management (Javaid et al., 2022). This transition has necessitated the implementation of sophisticated liquidity stabilisation mechanisms, particularly liquidity pools (Han et al., 2024). These pools serve multiple crucial functions: maintaining value preservation, facilitating transactions, providing price reference points, and generating profitability for investors (Harvey and Rabetti, 2024). Executed through smart contracts, these systems incorporate robust safeguards against risks, errors, omissions, and potential manipulation (Gramlich et al., 2023). A key feature is the transparency afforded to users, who can access liquidity pools at any time to assess liquidity levels, monitor fluctuations, and review applicable rates (Jensen et al., 2021). This transparency, combined with the inherent reliability of blockchain mechanisms, enhances user confidence whilst ensuring streamlined, secure, and sustainable financial transactions (Dong et al., 2023).

The research specifically examined banking interest rates across developed and developing economies to identify structural differences between these groups. Utilising data from The World Bank, OECD, and IMF spanning 2010-2020, the analysis employed a two-tailed t-test methodology. The findings confirmed that developed nations typically demonstrate lower and more stable interest rates compared to their developing counterparts. This investigation into the economic and financial potential of

cryptocurrencies as alternatives to fiat currencies revealed their capacity to serve as financing mechanisms for credit in developing economies whilst potentially reducing inflationary pressures. The framework particularly highlighted the role of international investors from developed economies in facilitating this transition.

1. LITERATURE REVIEW

Davidson et al.'s (2018) seminal definition conceptualises blockchain as a digital technology comprising an encrypted database of records distributed amongst various participants, characterised by immutability and public registration and access. This system ensures that all information contained within it remains secure, immutable, and accessible at any time (Reyna et al., 2018). Powell et al. (2021) emphasise the distinctive role of encryption in the sharing and distribution of information, which operates on the principle of consensus among network participants. Hamilton (2020) assert that blockchain technology possesses the necessary conditions to modify the existing banking system through smart contracts, whilst Raddatz et al. (2023) highlight its efficiency through reduced transaction costs for users. The potential benefits of blockchain technology extend beyond financial applications, offering alternatives to existing social and governance models, particularly through decentralisation (Merrell, 2022). Among its key distinguishing features, security is especially noteworthy (Chen et al., 2024). Mohammad (2022) explains that blockchain's structure creates a chain of blocks containing all transaction-related information, such as date, quantity, participants, and details of the preceding block, in the form of immutable records. These records resemble a ledger, permanently inscribed in blocks that are subsequently encrypted in a sequential manner (Kassen, 2024). Nakamoto (2008) explains that each block in the blockchain contains a portion of information from its predecessor, known as a 'hash', which ensures continuity in the interlinked structure, with the data set being encrypted to generate a unique result for that sequence, while each subsequent block incorporates the hash of its predecessor, thereby influencing future hashes and enhancing the security and integrity of the system. At the time of writing, corrupting the blockchain network in its entirety is deemed virtually impossible (Kaplan, 2021). As Hamdi et al. (2024) observe, such an act would require altering more than 51% of the blocks, a task of immense complexity and improbability. One of the primary distinguishing features of blockchain is its protection against double-spending attacks (Nicolas et al., 2020). Rosenfield (2014) describes this type of attack as a sequence of events where an attacker successfully creates the illusion of using a single resource to pay for multiple products or services. This leaves the attacked party without the product or payment, while the attacker retains both the payment and the reason for payment (Jesus et al., 2018). Blockchain technology effectively addresses this issue by ensuring that each transaction is completed and verified before being added to the chain

(Kumar, 2020). Blockchain's emergence as a transformative solution within the financial sector is particularly noteworthy for its ability to maintain transaction integrity and prevent fraudulent activities (Odeyemi et al., 2024). The system's architecture guarantees that every transaction is unique and verifiable, creating an unalterable chain of information that serves as a permanent record of all operations (Zhu et al., 2021). This characteristic represents a significant advancement in financial security and transaction reliability, eliminating the possibility of duplicate transactions and ensuring the authenticity of every operation (Centobelli et al., 2022). Additionally, the distributed nature of blockchain technology ensures that all network participants have simultaneous access to the same information, fostering a transparent and trustworthy environment for financial transactions (Xue et al., 2021). The decentralised and democratic access to information provided by blockchain, coupled with the impossibility of altering recorded data, establishes a new paradigm for financial transactions (Casado-Vara et al., 2018). Trust is inherently built into the system's architecture, negating the need for intermediary institutions (Tapscott and Tapscott, 2017). The immutability of recorded data, secured through the cryptographic linkage of blocks, creates a reliable and transparent record of all transactions (Stephen and Alex, 2018). This feature facilitates easy verification and auditing of operations when necessary (Bonsón and Bednárová, 2019). In the context of financial regulations and compliance requirements, blockchain's unalterable records provide an invaluable resource for ensuring accountability and adherence to regulatory standards (Hashimzai and Ahmadzai, 2024). The decentralised nature of blockchain further enhances its security by eliminating a single point of failure, making the network more resistant to attacks and technical malfunctions (Bodkhe et al., 2020). This distributed architecture ensures the system's continuity even if certain nodes become unavailable, thereby offering greater reliability and stability for financial operations (Zkik et al., 2024). Moreover, the consensus mechanism required for transaction validation ensures that all participants in the network agree on the validity of new transactions before they are added to the chain (Xiao et al., 2020). This process creates an additional layer of security and reliability within the system (Minoli and Occhiogrosso, 2018).

Blockchain's innovative features and applications position it as a groundbreaking solution across various domains, particularly in the financial sector (Varma, 2019). Its ability to maintain the integrity and authenticity of transactions, provide transparency and accountability, and ensure system resilience marks a substantial leap forward in technological advancement (Bhumichai et al., 2024). By addressing long-standing issues such as double spending and creating a decentralised, trustworthy system, blockchain represents a transformative development with the potential to reshape financial systems and beyond (Vanmathi et al., 2024).

2. GOALS, RESEARCH HYPOTHESIS AND METHODOLOGY

The primary objective of this study was to analyse the economic and financial potential of a cryptocurrency as an alternative to fiat currencies, serving as a financing mechanism for credit in developing economies, while simultaneously aiming to reduce inflation. This objective also considered the involvement of international investors originating from developed economies as a fundamental factor in the proposed framework. To achieve this overarching goal, the study defined a specific aim: to investigate the interest rates charged by banking systems in the provision of credit across developed and developing countries, thereby assessing the existence of differences between these two groups. The core hypothesis underpinning this investigation was articulated as follows: Hypothesis 1 – An investment margin exists in developed countries that can be leveraged to finance mutual credit in developing countries. The study encompassed a selected sample of developing and developed countries. Data were collected from reliable international sources, namely The World Bank, OECD, and IMF, ensuring a robust foundation for analysis. The dataset spanned the period from 2010 to 2020, representing 11 years of observations. This timeframe was deliberately chosen for its comprehensive availability of relevant data concerning the countries under examination. Additionally, this period aligns with the creation of cryptocurrencies in 2008 and mitigates the confounding impact of the COVID-19 pandemic on the global economy. To test the formulated hypothesis, a two-tailed t-test for mean differences (t-student test) was employed. This statistical approach aimed to determine whether the observed differences in interest rates between developed and developing countries were statistically significant at a 5% significance level. The analysis specifically compared the average interest rates applied to private credit in the two country groups, seeking to confirm whether developed countries consistently exhibited lower interest rates than their developing counterparts. The results of this analytical approach were expected to elucidate the potential for investment in developing economies, facilitated by leveraging the lower interest rate environments prevalent in developed countries, thereby contributing to a more sustainable and equitable financial ecosystem.

3. RESULTS AND DISCUSSION

As outlined in Table 1, which summarises the average banking sector interest rates for private credit across the two groups of countries, there is a distinct positive variation in the interest rates applied by the banking systems of Developed and Developing countries (Haggard et al., 2019). The findings suggest that Developed countries typically demonstrate lower fluctuations in interest rates when

compared to their Developing counterparts, highlighting a more stable financial environment, as similarly observed in the study conducted by Edwards (2019).

Table 1 – T-Test Between the Average Interest Rates of Developed and Developing Countries

	Australia	Canada	Germany	Spain	France	Italy	Luxembourg	Mexico	Portugal	USA
Angola	14,6690	17,5754	17,1326	14,4445	17,1891	18,5578	19,4631	14,3377	12,6188	19,6397
Argentina	3,8899	6,7393	4,3551	4,0602	4,6026	4,7673	4,8642	4,4128	3,9142	4,7948
Chile	0,5658	5,3787	0,5007	-1,5186	2,1186	3,2277	3,9104	0,8703	-2,3251	3,5424
Dem. Rep. Congo	5,3931	5,0193	5,9580	5,5428	6,2907	6,5221	6,6589	6,0105	5,3322	6,5668
Colombia	10,3601	14,9607	11,9213	8,1506	12,0629	13,8905	15,1357	8,7515	6,0104	15,4633
Costa Rica	7,7739	13,9964	6,6360	5,1972	7,4925	8,2788	8,7609	6,3484	4,4254	8,5622
India	10,2383	27,2654	16,5791	7,4992	12,6523	15,7208	18,0960	7,4628	3,8459	20,4585
Nigeria	29,3212	73,5741	29,3588	21,9041	24,2487	27,1117	29,2775	17,4811	16,7781	31,6034
Vietnam	3,3223	5,7976	3,6210	2,1460	4,6523	5,4629	5,9563	3,5964	1,4211	5,7058
South Africa	9,3875	24,8900	11,9401	5,5726	10,8304	13,4288	15,3404	6,5640	2,8128	16,5622

Source: own elaboration

Among the Developing countries analysed, Angola, Argentina, the Democratic Republic of Congo, Colombia, Costa Rica, India, Nigeria, Vietnam, and South Africa exhibit significant differences in interest rates when compared to all Developed countries. Notably, Chile stands as an exception, showing no statistically significant differences in interest rates, particularly in comparison with Spain and Portugal.

This anomaly underscores Chile's relatively stable position within the Developing group. An analysis of the interval reveals that interest rate fluctuations in Developing countries demonstrate greater variability than those in Developed countries, as observed by Sachs (2018). This variability reinforces the viability of the proposed model, which rests on the premise that financiers will seek higher rates of return on their investments (Valibeigi et al., 2020), while borrowers in Developing countries benefit from improved financing conditions through comparatively lower interest rates (Guérineau and Léon, 2019). Furthermore, the analysis highlights that the standard deviation of interest rates is considerably lower in Developed countries than in Developing countries, a finding also noted by Blanchard (2019). This observation emphasises the stability of financial systems in Developed countries, suggesting that the interest rates offered on the proposed platform will correspond to the funding demand, as suggested by Ebirim and Odonkor (2024). The lower standard deviation in Developed countries implies a degree of predictability that could attract investors seeking stable returns, as similarly found by Vukovic and Prosin (2018). The duality in standard deviation between the two groups offers valuable insights into mutual investment opportunities, as also identified by Robiatti (2021). It highlights a degree of certainty that is particularly attractive to investors with a higher tolerance for risk, as demonstrated by Oberholzer and Maritz (2019). Such investors, as classified by Pompian (2016), are those willing to accept a higher probability of financial losses in pursuit of superior returns. Moreover, the standard error for Developed countries is minimal, reinforcing the perceived stability of these economies. A similar result was observed in Rafaty's (2018) study. This stability underpins the assumption that Developed countries provide a reliable foundation for the financial flows required to support the model, ensuring the platform effectively balances the interests of investors and borrowers while fostering cross-border financial cooperation, as stated by Vijayagopal et al. (2024).

CONCLUSION

The advent of blockchain systems within the financial sector has introduced a range of innovative approaches and tools, either complementing or replacing existing traditional mechanisms. Despite their transformative potential, the dissemination and adoption of blockchain technology have been uneven. Countries with more conventional or rudimentary financial systems remain lagging in their integration of these advancements. Against this backdrop, the present study proposed a decentralised peer-to-peer financing model as an alternative to conventional financial systems. This model is grounded in the principle of resource optimisation, aiming to explore the feasibility of enabling investors from developed countries to finance credit in developing countries. To address this, a comparative analysis of interest rates between developing countries and developed countries was conducted. The observed variations between the two

groups of countries indicated the existence of favourable conditions for investment returns in Alpha countries. Moreover, the analysis of the interval showed that interest rate fluctuations in developing countries are significantly more variable than in developed countries. This variability forms the foundation of the proposed model, demonstrating its feasibility. The model posits that financiers will naturally seek higher rates of return on their investments. At the same time, borrowers in developing countries stand to gain access to more favourable financing conditions, including lower interest rates compared to the typically higher rates imposed by their domestic financial systems. The study contributes to the existing body of knowledge in several important ways. First, it aims to stimulate further research into blockchain and crypto-assets, particularly their interaction with conventional financial systems. This includes a special focus on developing countries, which often face systemic barriers to accessing traditional financing. Second, the study underscores the critical importance of blockchain technology as a tool for economic transformation and financial inclusion. The findings of this research also offer practical insights into the mutual benefits of economic interactions between agents in countries at different stages of development. Specifically, the proposed model supports the optimisation of financial operations, improving financing and investment conditions while simultaneously reducing exchange rate risks and enhancing liquidity. These improvements can lead to more efficient capital flows between developed and developing economies, ensuring that resources are directed towards areas where they can generate the highest returns and foster economic growth. In this context, the decentralised peer-to-peer financing model provides a unique mechanism for bridging the gap between global financial disparities. It empowers investors with risk appetites to access opportunities in developing markets while offering borrowers from these regions a viable alternative to high-cost traditional credit systems. Furthermore, the use of blockchain technology ensures transparency, security, and efficiency in transactions, addressing some of the systemic inefficiencies and trust issues inherent in traditional financial systems. Overall, this study highlights the transformative potential of blockchain-enabled financing models to reshape global financial dynamics, particularly by fostering inclusive economic growth in developing regions. Future research should further explore the scalability of this model and its broader implications for financial stability and economic development on a global scale.

REFERENCES

- Bhumichai, D., Smiliotopoulos, C., Benton, R., Kambourakis, G., & Damopoulos, D. (2024). The convergence of artificial intelligence and blockchain: the state of play and the road ahead. *Information*, 15(5), 268. <https://doi.org/10.3390/info15050268>.
- Blanchard, O. (2019). Public debt and low interest rates. *American Economic Review*, 109(4), 1197-1229. <https://doi.org/10.1257/aer.109.4.1197>.
- Bodkhe, U., Tanwar, S., Parekh, K., Khanpara, P., Tyagi, S., Kumar, N., & Alazab, M. (2020). Blockchain for industry 4.0: A comprehensive review. *IEEE Access*, 8, 79764-79800. <https://doi.org/10.1109/ACCESS.2020.2988579>.
- Bonsón, E., & Bednárová, M. (2019). Blockchain and its implications for accounting and auditing. *Meditari Accountancy Research*, 27(5), 725-740. <https://doi.org/10.1108/MEDAR-11-2018-0406>.
- Casado-Vara, R., Prieto, J., De la Prieta, F., & Corchado, J. M. (2018). How blockchain improves the supply chain: Case study alimentary supply chain. *Procedia computer science*, 134, 393-398. <https://doi.org/10.1016/j.procs.2018.07.193>.
- Centobelli, P., Cerchione, R., Del Vecchio, P., Oropallo, E., & Secundo, G. (2022). Blockchain technology for bridging trust, traceability and transparency in circular supply chain. *Information & Management*, 59(7), 103508. <https://doi.org/10.1016/j.im.2021.103508>.
- Challoumis, C., & Eriotis, N. (2024). A historical analysis of the banking system and its impact on Greek economy. *Edelweiss Applied Science and Technology*, 8(6), 1598-1617. <https://doi.org/10.55214/25768484.v8i6.2282>.
- Chen, Q., Li, D., & Wang, L. (2024). Blockchain Technology for Enhancing Network Security. *Journal of Industrial Engineering and Applied Science*, 2(4), 22-28. <https://doi.org/10.5281/zenodo.12786723>.
- Corbet, S., Lucey, B., Urquhart, A., & Yarovaya, L. (2019). Cryptocurrencies as a financial asset: A systematic analysis. *International Review of Financial Analysis*, 62, 182-199. <https://doi.org/10.1016/j.irfa.2018.09.003>.
- Davidson, S., De Filippi, P., & Potts, J. (2018). Blockchains and the economic institutions of capitalism. *Journal of Institutional Economics*, 14(4), 639-658. <https://doi.org/10.1017/S1744137417000200>.
- Dong, S., Abbas, K., Li, M., & Kamruzzaman, J. (2023). Blockchain technology and application: an overview. *Peer J Computer Science*, 9, e1705. <https://doi.org/10.7717/peerj-cs.1705>.
- Ebirim, G. U., & Odonkor, B. (2024). Enhancing global economic inclusion with Fintech innovations and accessibility. *Finance & Accounting Research Journal*, 6(4), 648-673. <https://doi.org/10.51594/farj.v6i4.1067>.
- Edwards, S. (2019). Real Exchange Rates in Developing Countries Concepts and Measurement 1. In *International financial markets and agricultural trade* (pp. 56-108). CRC Press. <https://doi.org/10.3386/w2950>.
- Gomber, P., Kauffman, R. J., Parker, C., & Weber, B. W. (2018). On the fintech revolution: Interpreting the forces of innovation, disruption, and transformation in financial services. *Journal of management information systems*, 35(1), 220-265. <https://doi.org/10.1080/07421222.2018.1440766>.

- Gramlich, V., Guggenberger, T., Principato, M., Schellinger, B., & Urbach, N. (2023). A multivocal literature review of decentralized finance: Current knowledge and future research avenues. *Electronic Markets*, 33(1), 11. <https://doi.org/10.1007/s12525-023-00637-4>.
- Guérineau, S., & Léon, F. (2019). Information sharing, credit booms and financial stability: Do developing economies differ from advanced countries?. *Journal of Financial Stability*, 40, 64–76. <https://doi.org/10.1016/j.jfs.2018.08.004>.
- Haggard, S., Maxfield, S., & Lee, C. H. (Eds.). (2019). *The politics of finance in developing countries*. Cornell University Press. <https://doi.org/10.7591/9781501744495>.
- Hamdi, A., Fourati, L., & Ayed, S. (2024). Vulnerabilities and attacks assessments in blockchain 1.0, 2.0 and 3.0: tools, analysis and countermeasures. *International Journal of Information Security*, 23(2), 713–757. <https://doi.org/10.1007/s10207-023-00765-0>.
- Hamilton, M. (2020). Blockchain distributed ledger technology: An introduction and focus on smart contracts. *Journal of Corporate Accounting & Finance*, 31(2), 7–12. <https://doi.org/10.1002/jcaf.22421>.
- Han, Y., Wang, C., Wang, H., Yang, Y., & Wang, X. (2024). A study of liquidity cross-chain models based on convex optimization. *Scientific Reports*, 14(1), 29603. <https://doi.org/10.1038/s41598-024-78995-y>.
- Harvey, C. R., & Rabetti, D. (2024). International business and decentralized finance. *Journal of International Business Studies*, 1–24. <https://doi.org/10.1057/s41267-024-00705-7>.
- Hashimzai, I. A., & Ahmadzai, M. Z. (2024). Navigating the Integration of Blockchain Technology in Banking: Opportunities and Challenges. *International Journal Software Engineering and Computer Science (IJSECS)*, 4(2), 665–679. <https://doi.org/10.35870/ijsecs.v4i2.2656>.
- Hayes, A. S. (2017). Cryptocurrency value formation: An empirical study leading to a cost of production model for valuing bitcoin. *Telematics and informatics*, 34(7), 1308–1321. <https://doi.org/10.1016/j.tele.2016.05.005>.
- Javaid, M., Haleem, A., Singh, R. P., Suman, R., & Khan, S. (2022). A review of Blockchain Technology applications for financial services. *BenchCouncil Transactions on Benchmarks, Standards and Evaluations*, 2(3), 100073. <https://doi.org/10.1016/j.tbench.2022.100073>.
- Jensen, J. R., von Wachter, V., & Ross, O. (2021). An introduction to decentralized finance (defi). *Complex Systems Informatics and Modeling Quarterly*, (26), 46–54. <https://doi.org/10.7250/csimq.2021-26.03>.
- Jesus, E. F., Chicarino, V. R., De Albuquerque, C. V., & Rocha, A. A. D. A. (2018). A survey of how to use blockchain to secure internet of things and the stalker attack. *Security and communication networks*, 2018(1), 9675050. <https://doi.org/10.1155/2018/9675050>.
- Kaplan, A. (2021). Cryptocurrency and corruption: Auditing with blockchain. In *Auditing Ecosystem and Strategic Accounting in the Digital Era: Global Approaches and New Opportunities* (pp. 325–338). Cham: Springer International Publishing. https://doi.org/10.1007/978-3-030-72628-7_15.
- Kapsis, I. (2020). Blockchain and cryptocurrencies: essential tools in a two-tier financial system. *Capital Markets Law Journal*, 15(1), 18–47. <https://doi.org/10.1093/cmlj/kmz025>.
- Kassen, M. (2024). Blockchain and public service delivery: a lifetime cross-referenced model for e-government. *Enterprise Information Systems*, 18(4), 2317175. <https://doi.org/10.1080/17517575.2024.2317175>.

- Koroma, J., Rongting, Z., Muhideen, S., Akintunde, T. Y., Amosun, T. S., Dauda, S. J., & Sawaneh, I. A. (2022). Assessing citizens' behavior towards blockchain cryptocurrency adoption in the Mano River Union States: Mediation, moderation role of trust and ethical issues. *Technology in society*, *68*, 101885. <https://doi.org/10.1016/j.techsoc.2022.101885>.
- Kumar, A., Liu, R., & Shan, Z. (2020). Is blockchain a silver bullet for supply chain management? Technical challenges and research opportunities. *Decision Sciences*, *51*(1), 8-37. <https://doi.org/10.1111/decis.12396>.
- Kyriazis, N. A. (2021). A survey on volatility fluctuations in the decentralized cryptocurrency financial assets. *Journal of Risk and Financial Management*, *14*(7), 293. <https://doi.org/10.3390/jrfm14070293>.
- Manta, O., & Palazzo, M. (2024). Transforming Financial Systems: The Role of Time Banking in Promoting Community Collaboration and Equitable Wealth Distribution. *FinTech*, *3*(3), 407-423. <https://doi.org/10.3390/fintech3030022>.
- McGurk, B., & Reichenbach, S. (2024). Blockchain and distributed ledger technology. In *Financial Services Law and Distributed Ledger Technology* (pp. 12-46). Edward Elgar Publishing. <https://doi.org/10.4337/9781035300884.00009>.
- Merrell, I. (2022). Blockchain for decentralised rural development and governance. *Blockchain: Research and Applications*, *3*(3), 100086. <https://doi.org/10.1016/j.bcra.2022.100086>.
- Minoli, D., & Occhiogrosso, B. (2018). Blockchain mechanisms for IoT security. *Internet of Things*, *1*, 1-13. <https://doi.org/10.1016/j.iot.2018.05.002>.
- Mohammad, A., & Vargas, S. (2022). Challenges of Using Blockchain in the Education Sector: A Literature Review. *Applied Sciences*, *12*(13), 6380. <https://doi.org/10.3390/app12136380>.
- Nakamoto, S. (2008). Bitcoin: A peer-to-peer electronic cash system. Decentralized business review. <https://dx.doi.org/10.2139/ssrn.3440802>.
- Nicolas, K., Wang, Y., Giakos, G. C., Wei, B., & Shen, H. (2020). Blockchain system defensive overview for double-spend and selfish mining attacks: A systematic approach. *IEEE Access*, *9*, 3838-3857. <https://doi.org/10.1109/ACCESS.2020.3047365>.
- Oberholzer, M., & Maritz, L. (2019). The association between South African investors' financial risk tolerance and demographic variables. *Journal of Economic and Financial Sciences*, *12*(1), 1-12. <https://doi.org/10.4102/jef.v12i1.469>.
- Odeyemi, O., Okoye, C. C., Ofodile, O. C., Adeoye, O. B., Addy, W. A., & Ajayi-Nifise, A. O. (2024). Integrating AI with blockchain for enhanced financial services security. *Finance & Accounting Research Journal*, *6*(3), 271-287. <https://doi.org/10.51594/farj.v6i3.855>.
- Pompian, M. (2016). *Risk profiling through a behavioral finance lens*. CFA Institute Research Foundation. <https://doi.org/10.2470/rfbr.v2.n1.1>.
- Powell, W., Cao, S., Miller, T., Foth, M., Boyen, X., Earsman, B., del Valle, S. & Turner-Morris, C. (2021). From premise to practice of social consensus: How to agree on common knowledge in blockchain-enabled supply chains. *Computer Networks*, *200*, 108536. <https://doi.org/10.1016/j.comnet.2021.108536>.
- Raddatz, N., Coyne, J., Menard, P., & Crossler, R. E. (2023). Becoming a blockchain user: understanding consumers' benefits realisation to use blockchain-based applications. *European Journal of Information Systems*, *32*(2), 287-314. <https://doi.org/10.1080/0960085X.2021.1944823>.

- Rafaty, R. (2018). Perceptions of corruption, political distrust, and the weakening of climate policy. *Global Environmental Politics*, 18(3), 106-129. https://doi.org/10.1162/glep_a_00471.
- Reyna, A., Martin, C., Chen, J., Soler, E., & Díaz, M. (2018). On blockchain and its integration with IoT. Challenges and opportunities. *Future generation computer systems*, 88, 173-190. <https://doi.org/10.1016/j.future.2018.05.046>.
- Robiatti, R. Z. (2021). *National Development Banks in South America: Governance, Financial Performance and Development Impact*. Springer Nature. <https://doi.org/10.1007/978-3-658-34728-4>.
- Rosenfeld, M. (2014). *Analysis of hashrate-based double-spending*. arXiv preprint arXiv:1402.2009. <https://doi.org/10.48550/arXiv.1402.2009>.
- Sachs, J. D. (2018). External debt and macroeconomic performance in Latin America and East Asia. In *Modern Political Economy And Latin America* (pp. 209-216). Routledge. <https://doi.org/10.2307/2534445>.
- Shin, D., & Ibahrine, M. (2020). The socio-technical assemblages of blockchain system: How blockchains are framed and how the framing reflects societal contexts. *Digital Policy, Regulation and Governance*, 22(3), 245-263. <https://doi.org/10.1108/DPRG-11-2019-0095>.
- Stephen, R., & Alex, A. (2018, August). A review on blockchain security. In *IOP conference series: materials science and engineering* (Vol. 396, No. 1, p. 012030). IOP Publishing. <https://doi.org/10.1088/1757-899X/396/1/012030>.
- Tapscott, D., & Tapscott, A. (2017). How Blockchain Will Change Organizations. *MIT Sloan Management Review*, 58(2), 10. <https://doi.org/10.7551/mitpress/11645.003.0010>.
- Valibeigi, M., Mohammadi, A., Valibeigi, M., & Zamani, A. (2020). A Framework for Knowledge-Based Enterprise Financial Support in Iran. *Global Economics Science*, 50-55. <https://doi.org/10.37256/ges.12202086>.
- Vanmathi, C., Farouk, A., Alhammad, S. M., Mangayarkarasi, R., Bhattacharya, S., & Kasyapa, M. S. (2024). The Role of Blockchain in Transforming Industries Beyond Finance. *IEEE Access*. <https://doi.org/10.1109/ACCESS.2024.3468611>.
- Varma, J. R. (2019). Blockchain in finance. *Vikalpa*, 44(1), 1-11. <https://doi.org/10.1177/0256090919839897>.
- Vijayagopal, P., Jain, B., & Ayinippully Viswanathan, S. (2024). Regulations and Fintech: A Comparative Study of the Developed and Developing Countries. *Journal of Risk & Financial Management*, 17(8). <https://doi.org/10.3390/jrfm17080324>.
- Vukovic, D. B., & Prosin, V. (2018). The prospective low risk hedge fund capital allocation line model: evidence from the debt market. *Oeconomia Copernicana*, 9(3), 419-439. <https://doi.org/10.24136/oc.2018.021>.
- Wang, Z., Yu, L., & Zhou, L. (2024). Navigating the Blockchain-Driven Transformation in Industry 4.0: Opportunities and Challenges for Economic and Management Innovations. *Journal of the Knowledge Economy*, 1-43. <https://doi.org/10.1007/s13132-024-02007-7>.
- Xiao, Y., Zhang, N., Lou, W., & Hou, Y. T. (2020). A survey of distributed consensus protocols for blockchain networks. *IEEE Communications Surveys & Tutorials*, 22(2), 1432-1465. <https://doi.org/10.1109/COMST.2020.2969706>.

Xue, X., Dou, J., & Shang, Y. (2021). Blockchain-driven supply chain decentralized operations–information sharing perspective. *Business Process Management Journal*, 27(1), 184–203. <https://doi.org/10.1108/BPMJ-12-2019-0518>.

Zhu, P., Hu, J., Li, X., & Zhu, Q. (2021). Using blockchain technology to enhance the traceability of original achievements. *IEEE Transactions on Engineering Management*, 70(5), 1693–1707. <https://doi.org/10.1109/TEM.2021.3066090>.

Zkik, K., Belhadi, A., Kamble, S., Venkatesh, M., Oudani, M., & Sebbar, A. (2024). Cyber resilience framework for online retail using explainable deep learning approaches and blockchain-based consensus protocol. *Decision Support Systems*, 182, 114253. <https://doi.org/10.1016/j.dss.2024.114253>.

THE DIGITAL CONSUMER AND IT'S IMPORTANCE ON SOCIAL MEDIA: A CASE STUDY OF THE RC COLA BRAND

Shqiprim Jashari,
University "Kadri Zeka" Kosova
Email: shqiprimjashari@gmail.com

Lulzim Rashiti
Universiity "Kadri Zeka", Kosova
Email: lulzim.rashiti@uni-gjilan.net

ABSTRACT

Understanding consumers is crucial for success in digital marketing. A digital consumer is an individual who selects products through online channels, utilizing the internet to search for and generate information about them. Comprehending consumer behaviors and preferences is essential for successful marketing, and effective marketers have the ability to deeply understand their target audience. Analyzing online consumers requires a thorough examination, as the geographical and cultural spread of the audience is often much broader than offline. Digital consumers exhibit varied attitudes towards information and purchasing online, creating a dynamic that marketers must understand and manage. In this context, the same person may have different behaviors and attitudes when online compared to when shopping in-store. Therefore, marketers must carefully analyze online consumer behavior to optimize their strategies. As a case study, we examine the American beverage brand RC Cola, which provides a clear example of how to engage consumers in the digital environment and foster a stronger connection with them. This will be explored through an analysis of RC Cola's campaigns in Kosovo. The study will offer insights into consumer preferences in the digital realm by examining real-time data from the company's social media platforms, evaluating how the digital campaigns are performing and resonating with the audience.

Keywords: *Consumers, marketers, digital consumer, e-commerce.*

INTRODUCTION

In the era of digital transformation, understanding the digital consumer is more important than ever for marketers and businesses. The digital consumer not only uses online platforms to search for products but also engages with brands through the content they produce. Social media, particularly platforms like TikTok, has become a critical space where brands can connect with their audience and measure consumer engagement and perception.

This paper examines the significance of the digital consumer through a case study of the renowned American beverage brand RC Cola and its presence in the Kosovo market. A key focus is placed on RC Cola's activities on TikTok, analyzing how its recent social media campaigns have been received by digital consumers. By studying the engagement metrics, video views, and audience reactions, we aim to understand how digital consumers perceive the RC Cola brand and interact with its content.

This analysis not only highlights the effectiveness of RC Cola's TikTok campaigns but also provides practical insights into how brands can leverage social media platforms to enhance their connection with digital consumers and build a stronger brand presence in the digital space.

1. LITERATURE REVIEW

Today's consumers increasingly seek personalized experiences tailored to their specific needs. Preferences and demands not only need to be met but also anticipated. As a result, tools like marketing automation, chatbots, and artificial intelligence have become essential allies for brands and marketers aiming to understand and engage digital consumers effectively.

In the context of social media platforms like TikTok, these technologies enable brands to analyze user behavior, predict trends, and deliver content that resonates with their audience. For instance, AI-powered tools can identify patterns in how users interact with content, providing insights into which campaigns drive the most engagement and how brands can optimize their approach to captivate digital consumers.

This approach aligns with the case study of RC Cola, where the analysis of TikTok activity offers a real-world example of leveraging these tools to understand consumer behavior and preferences. By studying video views, engagement levels, and audience feedback, brands can refine their strategies to foster deeper connections with their audience.

2. THE DIGITAL CONSUMER

According to Doka, E (Elsa, 2018) while human interaction still holds value in certain contexts, in others, digital tools have become equally effective. For instance, 40% of consumers believe it is indifferent whether customer service is managed by a human or a chatbot, as long as they receive the answers they seek and find useful information. Furthermore, e-commerce businesses that send personalized communications and propose ad hoc products to their customers benefit from a 78% higher conversion rate, highlighting the effectiveness of maintaining a personalized relationship with consumers.

The digital consumer spends an average of two hours per day on social media and uses approximately seven channels to post, comment, and interact. With 42% of the global population active on social platforms, this represents significant potential for companies aiming to sell online. To capitalize on this, businesses must implement targeted marketing activities. Among the most popular social platforms (International, 2023) are Facebook (2.17 billion users), YouTube (1.5 billion users), and WhatsApp Messenger (1.3 billion users), making them essential components of any comprehensive digital strategy. Additionally, digital consumers favor video content, as demonstrated by the success of Instagram and Snapchat, where creative, engaging video formats play a pivotal role in capturing attention.

According to Doshlaku G (Granit, 2021) , the benefits of digital marketing may no longer be novel to most of us. In Kosovo, nearly every business has a presence on at least one digital platform, whether it be through a website, Google, Facebook, Twitter, or similar channels. This shift reflects changes in consumer habits, with people spending the majority of their time online—on social networks, reading news, or using search engines to find information. The essence of marketing has always been about delivering messages to audiences where they spend the most time, maximizing opportunities for engagement. A decade ago, this might have been through TV, radio, or print media. Today, it is through social networks, search engines, mobile devices, and electronic media, which are now widely available in Kosovo.

Euromonitor International conducted a survey of 602 global professionals in September 2018 to gather their perspectives on the ongoing digital transformation. One key finding was that improving the customer experience was considered the most important initiative for 2019, with around two-thirds of respondents prioritizing it. Technology plays a critical role in helping companies and brands deliver memorable online experiences.

Moreover, 59% of professionals expect artificial intelligence (AI) to enhance consumer engagement. AI is anticipated to be one of the most impactful technological advancements for businesses in the next five years. Nearly 60% of the 602 industry professionals surveyed by Euromonitor in

September rated AI's impact as more powerful than other technologies like the Internet of Things, robotics, automation, or cloud computing.

These insights underline the need for businesses to adapt to the preferences of the digital consumer by leveraging advanced technologies and targeting strategies, particularly on social media platforms where much of the consumer's time is spent. Based on our research we have seen some review about Social media, and importance of TikTok in digital consumer field. TikTok has emerged as a powerful tool for brands aiming to engage with the modern digital consumer. With over 1 billion monthly active users, it offers an unparalleled opportunity for brands like RC Cola to reach a younger, tech-savvy audience through creative and authentic content (Report, 2024). This aligns with the findings of our study, as TikTok allows RC Cola to showcase its brand personality while fostering deeper connections with its audience.

Furthermore, TikTok's algorithm ensures that even smaller brands or regional campaigns can achieve viral success if their content resonates with the platform's culture and audience preferences (Arlia & Zarnaz, 2022). This makes it a critical platform for engaging digital consumers who value relatability and authenticity, as demonstrated by RC Cola's ability to use creative videos to capture attention and drive brand engagement.

The modern digital consumer spends an average of two hours daily on social media platforms and actively interacts with short-form video content, which plays a pivotal role in driving engagement and brand loyalty (Elsa, 2018). By leveraging TikTok, RC Cola has effectively utilized this trend, creating campaigns that align with consumer behavior and preferences. This demonstrates how targeted digital strategies can convert online interactions into brand awareness and long-term customer relationships.

These insights highlight the transformative potential of platforms like TikTok in engaging digital consumers and underline the importance of creative, data-driven strategies in modern marketing efforts.

3. THE ROLE OF AI IN ENHANCING DIGITAL CONSUMER ENGAGEMENT

As digital consumers increasingly demand personalized experiences, the development of technological approaches, particularly through the use of Artificial Intelligence (AI), has transformed how brands create and manage their marketing campaigns. AI has enabled the automation of marketing processes, such as product recommendations, content optimization, and personalized communications, offering unique experiences for each consumer (International, 2023).

This is particularly significant for brands operating on platforms like TikTok, where personalized content and authentic experiences are crucial for engaging users. With the help of AI algorithms, brands can analyze consumer behavior, predict interests, and create campaigns that resonate more deeply with the audience. For instance, TikTok uses AI to analyze how users engage with videos and recommend content that is most likely to capture their attention, increasing engagement and brand loyalty (Report, 2024).

In this context, AI is not only a tool for automation but also an opportunity to create stronger, more personalized connections with consumers. AI also helps brands collect and analyze real-time data, improving campaign relevance and maximizing conversion opportunities for digital consumers.

4. COMPANY HISTORY – ROYAL BEVERAGE (RC COLA BRAND)

Founded with the primary goal of offering high-quality products, Royal Beverage (Bev, 2024) is now the largest beverage manufacturer in Kosovo and the Balkans, specializing in natural and carbonated drinks with international licenses. Since its establishment, Royal Beverage LLC has prioritized customer care. The company began with the launch of "Extra Lëngje" carbonated drinks, with initial production capacity of 5000 liters per hour, from Fludi Company that was first name of company. The positive consumer feedback led to expanded production and quality investments.

In 2004, company introduced the globally recognized brand, RC Cola, through a partnership with "Royal Crown Cola International," allowing company to distribute RC Cola in Albania, North Macedonia, and Serbia. This partnership helped RC Cola gain a strong foothold in these markets and beyond. Company has invested heavily in production lines, laboratories, and human resources, earning two international licenses for best manufacturing practices: ISO 22000:2005 and HACCP.

Today, Royal Beverage LLC has launched new flavors for consumers, including Frostea – ice tea, Royal Water with lemon flavor, and various other flavors that complement the RC brand. It is worth mentioning that the company is highly active in marketing, especially in digital marketing through platforms like Facebook, Instagram, TikTok, and LinkedIn.

An interesting note for TikTok: The company effectively uses short-form, creative video content on TikTok to engage with a younger audience, leveraging the platform's dynamic algorithm to maximize brand visibility and foster strong consumer connections. This approach is vital for staying relevant in a rapidly changing digital landscape.

During the marketing meetings, they shared with us some interesting TikTok campaigns and provided tables to assess the impact of TikTok on the company's brands. They highly valued the digital approach to marketing development, recognizing the significant effects it has.

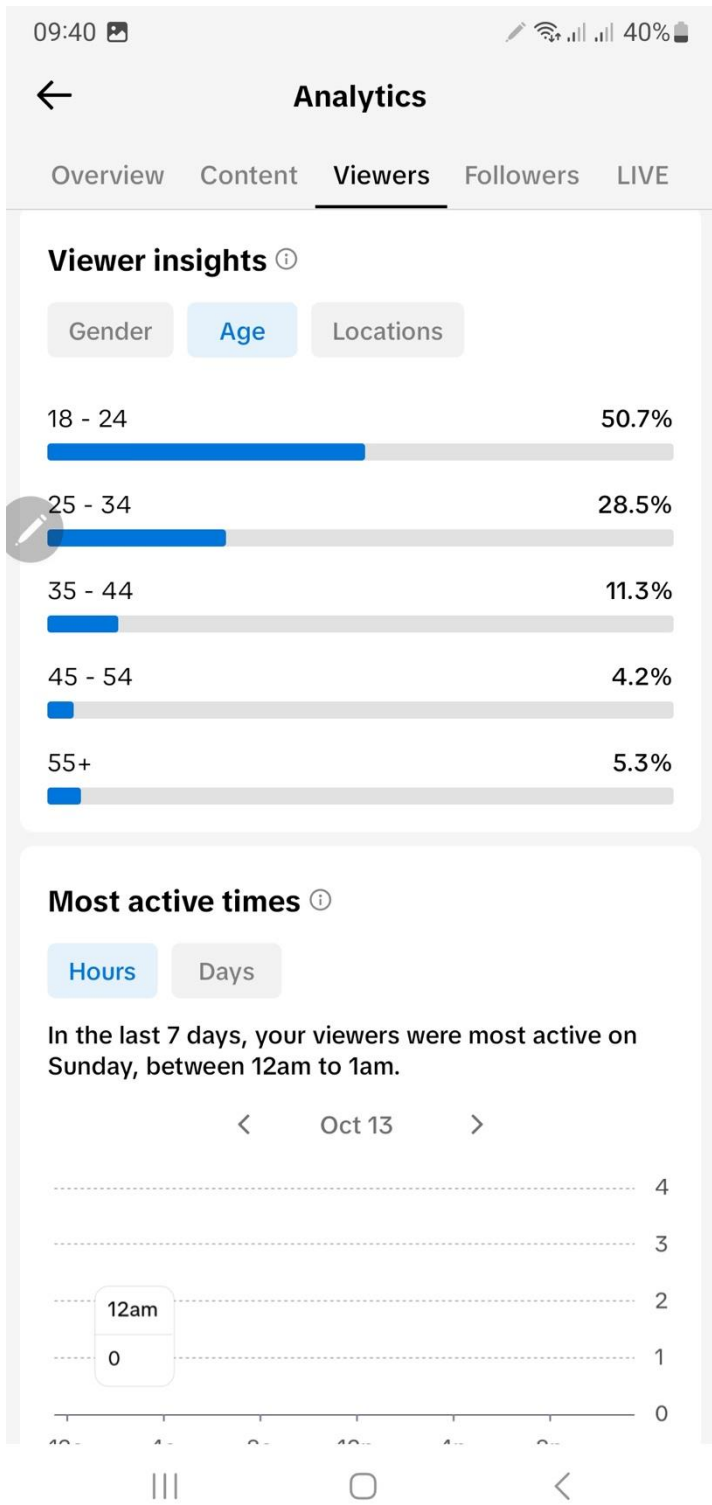
On TikTok, this approach comes to life through engaging, short-form videos that captivate audiences, creating a deeper connection between the brand and its followers. The platform's interactive features allow for real-time engagement, making it an essential tool for boosting brand awareness and fostering loyalty in the digital age.

5. ROYAL BEVERAGE LLC TIKTOK CAMPAIGN

The company has provided valuable insights through a set of detailed TikTok (Royal, 2024) analytics, which have been presented in various graphical formats. The data shows that the digital marketing strategy on TikTok has yielded impressive results in terms of audience engagement and brand visibility.

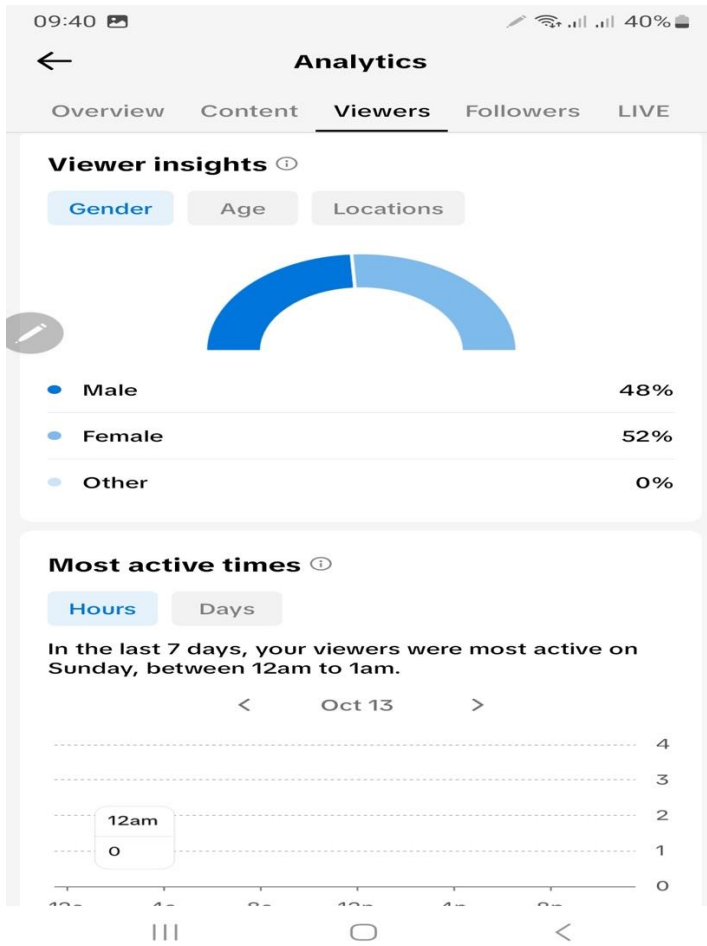
For instance, the general analysis provides an overview of the campaign's performance, with key metrics such as reach, engagement rates, and overall interaction. These metrics are visually represented in the accompanying General Analytics chart, which highlights the growth in interactions over time and demonstrates the overall success of the TikTok campaigns.

The age analysis offers a breakdown of the audience by age group, helping to understand which demographics are most engaged. The corresponding Age Analytics chart visually showcases the distribution of views across different age groups, allowing for a more targeted approach to future campaigns. The graph reveals which age ranges show the most interest, offering guidance on content creation tailored to these groups. Here is the graphics presentation:

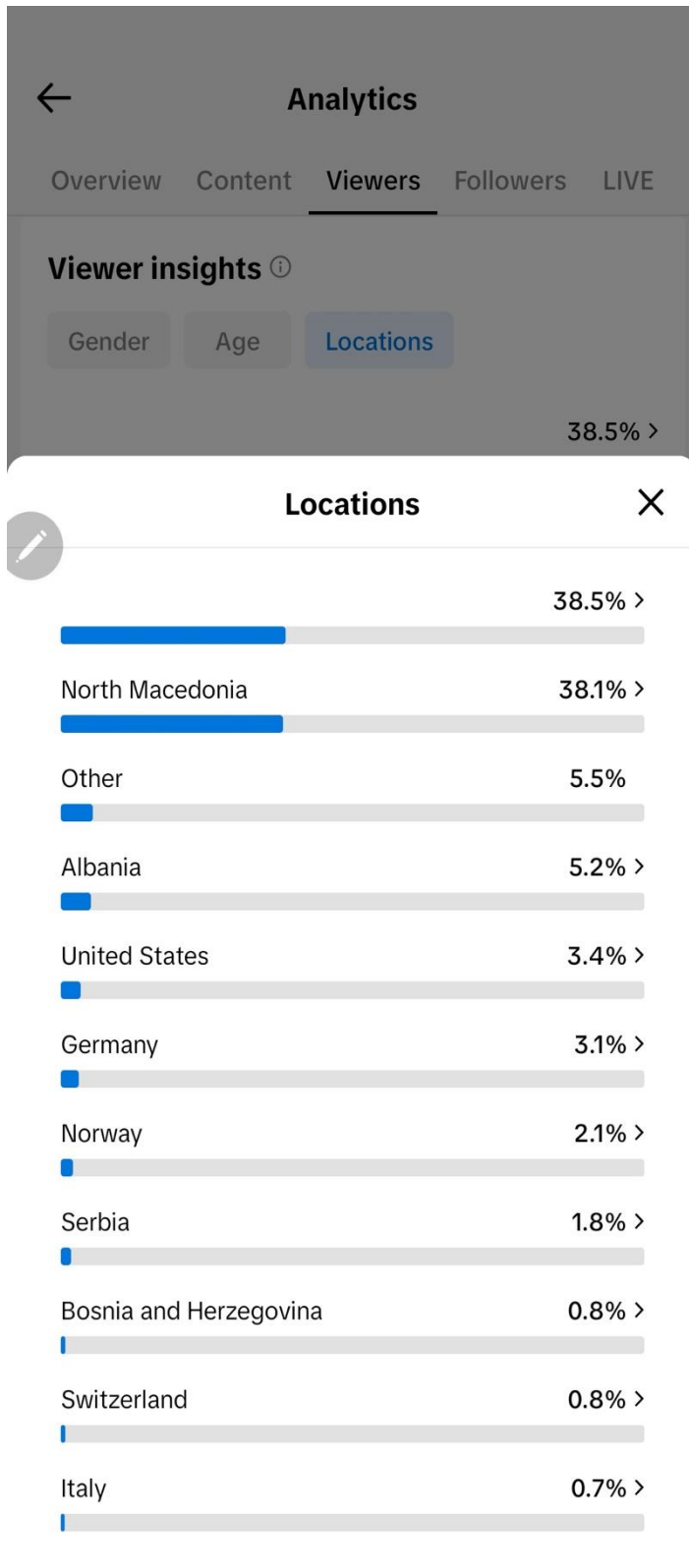


The gender analysis further enriches this understanding by illustrating the male-to-female engagement ratio. This is depicted in the Gender Percentage chart, which emphasizes the balance

between male and female viewers. This helps refine content to ensure it resonates with both genders, maximizing engagement across all groups. You can see below the graphics presentation:



The location analysis presents geographical insights, showing where the majority of the audience is located. The Locations chart provides a visual representation of this data, illustrating the regions with the highest engagement and enabling the company to optimize their regional marketing efforts accordingly. You can see below the graphics presentation:



Lastly, the Series Banners data highlights the effectiveness of this format in driving consumer interaction. The graphical representation of the Series Banners shows how this type of content has

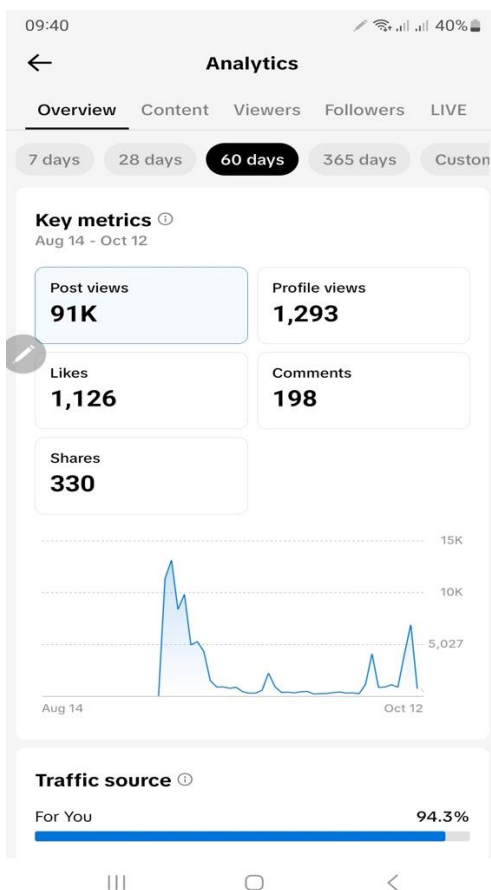
contributed to higher engagement rates, indicating its successful role in the overall digital strategy. You can see below the graphics presentation:



Together, these visual aids and the data presented in the charts demonstrate how TikTok has become a powerful tool in digital marketing, enhancing the connection between the brand and its audience.

The provided charts offer a comprehensive look at the effectiveness of their TikTok strategy, including key performance indicators such as reach, engagement, audience demographics, and regional distribution. By analyzing these visual representations, we can gain a clearer understanding of how the company's content is performing and identify patterns in consumer behavior and engagement. This data will be used to evaluate the growth in consumer interaction with the brand and assess how TikTok has helped to increase its visibility and audience reach.

The insights from this data are crucial for understanding how digital platforms, particularly TikTok, are playing a pivotal role in shaping the company's marketing efforts, and how effectively the brand is connecting with its target audience through creative and engaging content. You can see below the graphics presentation for general views from TikTok audience:



Based on the data provided by Royal Beverage LLC and the insights gathered from TikTok analytics, it's clear that the platform has had a significant positive effect on the brand's marketing efforts. Here are some key observations and recommendations based on the TikTok data:

Increased Consumer Engagement: TikTok's short-form, engaging video content has successfully captured the attention of the audience, resulting in higher engagement rates. This can be seen in the growth in interactions with brand posts, as shown by the engagement metrics in the provided analytics.

Wider Audience Reach: The location and age analysis show that TikTok has expanded the brand's reach to a broader and younger audience, with a significant portion of viewers from younger age groups (e.g., teens and young adults). The geographic data also reveals that the brand is gaining traction in various regions.

Effective Use of Series Banners: The Series Banners data reveals that these types of posts have been effective in generating sustained interest and engagement. This format has been successful in fostering brand loyalty and keeping the audience engaged over time.

Impact of Gender-Specific Content: The gender analysis shows a balanced engagement from both male and female viewers. Tailoring content to appeal to both genders will ensure that the brand resonates with a broad audience base.

REFERENCES

- Arlia, & Zarnaz. (2022). TikTok's Takeover Of Marketing And Commerce In 2022. *Forbes.com*.
- Bev, R. (2024). *www.royalbev.com*. Retrieved from [www.royalbev.com](https://royalbev.com): <https://royalbev.com>
- Dave, C., & Pr, S. (2017). *Digital marketing eccellente* (Vol. V). UK: Butterworth - Heinemann.
- Elsa, D. (2018). Kush është, çfarë bënë dhe si blen konsumatori digjital. *DDA Academy, NA*.
- Granit, D. (2021). 11 arsyeje pse duhet të investoni në marketingun digjital. *Marketing Digjital www.granidolshaku.com, NA*.
- Gustafson, T., & Chabot, B. (2007). Cornell Maple Bulletin 105.
- International, E. (2023, November). *2024 costumer trends*. Retrieved from ip.euromonitor.com: <https://ip.euromonitor.com/white-paper/2024-global-consumer-trends/>
- Percy, L., & Rossiter, J. (1992). A Model of Brand Awareness and Brand Attitude Advertising Strategies. *Academia, 262-263*.
- Report, H. S. (2024). *Hootsuite Social Media Trends Report trends 2025*. Retrieved from Hootsuite Social Media Trends Report: https://www.hootsuite.com/research/social-trends?srsId=AfmBOooum9WtbtBazYUr1MhTGwQt3pIlyidYyYLUr_gxKSbHAZ2Lux1
- Royal, T. (2024). *TikTok Royal Beverage*. RoyalBeverage LLC - www.royalbev.com/ TikTok Royal Beverage

STARTUPS - BEARERS OF THE IDEA OF SUSTAINABILITY IN ECONOMICS

Veronika Tóthová
 Newton University, Economic Centre, Slovak Republic,
 e-mail address: veronika.tothova@newton.university

Milan Fiľa
 College of Applied Psychology, Czech Republic
 e-mail address: FILA@VSAPS.CZ

Filip Nemeč
 University of Žilina, Faculty of Operation and Economics of Transport and Communications, Slovak Republic,
 e-mail address: FILIP.NEMEC@HOTMAIL.SK

ABSTRACT

In recent years, we have seen, that people and also public authorities try to solve are trying to solve the ever-increasing problem of climate change and the ever-decreasing supply of limited factors of production currently available to us. Scientists and the general public are trying to find innovative ways to preserve the environment and non-renewable sources of raw materials for future generations. For this purpose, they are looking for sustainable ways of economic growth as well as an innovative approach to traditional sectors such as agriculture and food production, energy, manufacturing, and waste management, which are also areas of economic sustainability where firms seek their opportunities to help to achieve sustainable goals defined by United Nations. Through our analyses of different statistics, we have found that startups seem to be one of the solutions in the business field for economic sustainability because even though these are young companies in the initial stages of development, they are also fast-growing carriers of innovation, a disruptive view of the problem being solved, as well as companies changing traditional models and approaches. Although startups have a low survival rate, a huge number of them are created every year precisely to bring an unusual solution to a current problem affecting customers' lives.

Keywords: *startups, economic sustainability, sustainability.*

INTRODUCTION

In recent years, we have encountered more intense climate changes and increased consumption by the population, which leads to a faster depletion of the limited production factors that we currently use to produce final consumption goods. However, how to reverse this negative trend while maintaining economic growth considering the environment and future generations? This question has been troubling experts and the general public for a long time, and everyone agrees that the answer is precisely an innovative approach to existing ways of doing business, consumption, and production. One of the answers to this question appears to be startups that are carriers of innovative ideas and offer new perspectives on existing or traditional models of thinking and doing business.

1. ECONOMIC SUSTAINABILITY

When we see the term economic sustainability, the first question is whether economic growth can coexist with environmental sustainability. The answer to this was given by Fuest (2023), who states that the limitations of economic growth at the expense of the environment are evident, and sustainable economic prosperity can only be achieved in the long run if it is coupled with ecological sustainability. To better understand the motives behind the efforts of individuals to approach the economic sustainably, we must first understand what is hidden under the term economic sustainability. Based on the University of Mary Washington (2024), economic sustainability refers to practices that support long-term economic growth without negatively impacting the community's social, environmental, and cultural aspects. Bish (2021) also agrees with this definition, by whom economic sustainability refers to practices supporting a company's or nation's long-term economic development while protecting environmental, social, and cultural elements.

He sees some areas, which can help businesses and individuals inspire a change. These areas based on his opinion are: Air-to-Water Innovations (for example Zero Mass Water system); Growth of Recycling (zero-waste goal); Micro-Farming or urban farming (sustainable food growth); Solar Energy Expansion for Low-Income Families (goal of decreasing overall energy usage); Sustainable Fish Farming (Bish, 2021). Rinalducci (2024) brings also his view on this topic and says, that economic sustainability is the economic aspect of sustainable development: the practice of maintaining the profitability of an organization by considering its environmental, social, and financial impact over time. He sees opportunities for economic sustainability in the so-called 6 Rs of sustainability: Recycle waste; Recycle energy; Reuse water; Reduce waste; Reduce consumption; and Reuse materials. Pratt (2022), on the other hand, points out that some of the most impactful economic sustainability approaches have focused on:

- Reducing land usage.
- Making supply chains more efficient with fewer resources required to operate or maintain them.
- Reducing harmful emissions and pollutants in every stage of the business.
- Balance economic growth and opportunities with less environmental impact.

She also mentions that economic sustainability is supported by economic viability, environmental protection, and social equity. Bolt (2023) on the other hand sees economic sustainability as the practice of preserving natural and financial resources to achieve long-term financial stability. And also mentions some economic sustainability examples like the Growth of Recycling, Sustainable Farming Practices, Micro-farming, Sustainable Fish Farming, Alternative Energy, Solar Energy Expansion for Low-Income Families, Air-to-Water Innovations, Cryptocurrencies, and Blockchain Technology. Rowse (2024) mentions, that economic sustainability may be viewed as finding a way to grow the economy without damaging or depleting natural resources. And economic sustainability is figuring out how to use resources in such a way that is not harmful to current or future generations, or to the environment. He mentions also some examples, of how can economic sustainability look like in action: Reduced Reliance on Fossil Fuels, Increased Recycling, Improved Public Health, More Sustainable Agriculture, and a Circular Economy. International Institute for Management Development (IMD, 2024) sees also economic sustainability as one of the three pillars of sustainability, alongside environmental and social sustainability, whose goal is to keep a healthy balance between economic growth and responsible resource use. This can be done for example by using/ providing: Circular fashion; Sustainable consumer goods; Green building materials; Energy sector transformation; and Sustainable agriculture. By these examples IMD (2024) demonstrates how economic sustainability can drive innovation across sectors, helping businesses improve their environmental and social impact while ensuring long-term economic viability. As Urbaníková et al. (2020) suggest the level and intensity of innovation activity in individual companies does not only depend on the interest and ability of the company to engage in innovation but is also influenced by external factors. Bailey (2023) suggests that economic sustainability can be considered regarding communities, as well as businesses. And points out that an economically sustainable community has affordable housing for all, enough jobs, income stability, and support for small businesses. On the other hand, an economically sustainable business is resilient to unforeseen changes or disruptions (i.e. the business should not be dependent on artificially low energy costs). Prysmian magazine INSIGHT (2024), mentions that economic sustainability is about balancing economic growth and generating profit with the impact on the

environment and people and it is incorporated into the United Nations Sustainable Development Goals (SDGs). It also says that technology is becoming a driving force in helping companies achieve economic sustainability by making it easier to monitor their operations and engage with customers. All these definitions can be seen in Figure 1 where economic sustainability represents the intersection of the environmental and economic pillars of sustainability which is marked by the term viable and which corresponds to efficiency and minimization of resource use.



Figure 1

Three pillars of sustainability and their interrelationships. Source: Paredes and Hedera, 2020

Economic Sustainability also reflects the ability to generate wealth through sustainable and inclusive economic development and to measure economic sustainability through a combination of economic and business indicators related to sustainability we can use the Economic Capital Index. It is based on 31 quantitative indicators related to innovation, sectoral balance and strength, inclusiveness, self-sufficiency, and development performance (Solability, 2024). Kučera and Nemeč (2022) focused on sustainable public finance which is also a crucial part of economic development.

Based on all definitions of economic sustainability, we can say that all authors agree with the idea that economic sustainability means economic growth, provided sufficient resources are preserved for current and future generations. However, to achieve this goal, we have to approach the existing ways of using

production factors innovatively. With this idea, most authors also agreed on several ways to accomplish this goal, such as recycling, a waste-free economy, sustainable agriculture, use of renewable energy sources, etc.

2. STARTUPS

When we speak about startups, we need to understand what this term means. As Bilal (2014) mentions a startup is about solving problems. Invent an offering that has never been done before. With this agrees also Sethi (2024), who points out, that the startup has the freedom to look for the best possible solution for the customer. Köseoğlu (2023) suggests, that startups have become a prominent feature of the modern economy, with their potential to create new markets, disrupt existing industries, and drive innovation. She also mentions that a startup is a new business enterprise that is in the process of developing and testing a unique product or service. This opinion is followed by Banudas (2017), whose opinion is that every startup should have a „higher purpose“ for its existence. But what a startup exactly is? It is a young company with a business model that supports innovation. Unlike large corporations, a startup is lean in its operations and focuses on rapid growth right from the start (TRUiC Team, 2022). A startup is not a permanent stage of a business, it is a vital early stage of the business life cycle and can be applied to virtually any industry. In general, startups tend to have few employees and rapid growth potential. They provide products with broad appeal that either don't exist yet or solve a problem better than options currently available. Also, Gründerplattform (2022) states that although startups are a very small part of founding activities, they are still talked about everywhere. They are considered an important engine of economic development and social progress because they not only create jobs but also help new ideas and technologies achieve breakthroughs. With innovative business models, they challenge the established top leaders in the industry and initiate the modernization of the entire economy. Karminder and Sahil (2023) suggest that startups are often driven by innovation and disruption. They aim to introduce new and groundbreaking ideas, technologies, or approaches to solve existing problems or meet untapped needs.

Aman et al. (2024) see startups as a synonym for innovation, rapid growth, and disruption. Startups represent a unique form of business that can redefine industries and create new markets. He also sees startups as the engine of innovation, which are driving economic growth and creating new opportunities. Based on Baldrige and Curry (2024), startups are businesses that want to disrupt industries and change the world—and do it all at scale. Startup founders dream of giving society something it needs but hasn't created yet—generating eye-popping valuations that lead to an initial public offering (IPO) and an astronomical return on investment. This can be achieved thanks to the basic definition of

startup, where we can see, that a startup is an entrepreneurial venture in the early stages of operations, typically created for resolving real-life problems. As many startups solve society's needs, they attract investors and funders because of the tremendous growth opportunities (Indeed Editorial Team, 2024).

According to Jurgens, J. (2022), executive director of the World Economic Forum, startups are of fundamental importance in bringing about social change, as well as in supporting economic recovery and responsible growth, and at the same time they are a catalyst for economic growth both globally and locally. The value created by startups is almost at the same level as the GDP of the G7 economies, and the volume of funding for start-ups in 2021 exceeded USD 600 billion, breaking financial records. The number of unicorns is well over 1,000 and growing exponentially. Corl (2019) states that startups that significantly affect the economy are the so-called "transformational" startups that have the greatest impact on the economy and want to become a national or international enterprise. These "high" growing companies make up only 15% of all companies. However, they account for an estimated 50% of the total number of jobs created. He also goes on to outline the ways startups are disrupting the economy and forcing it to evolve, taking technology one or more steps up. Among these ways, he includes advanced technology, the opening of new markets, increased production of goods and services, increased employment, and direct local impacts. At the same time, he also defines startups as the driving force of the economy and engines of growth. When we talk about startups, the first thing that always comes to mind is the currently infamous failure rate that is reported in every blog or newspaper article about startups. According to statistics, 90% of startups generally fail, 75% of VC-funded startups fail, and only 50% of startups make it past the fifth year of business. Even though these statistics are not encouraging, the truth is that the number of new startups is increasing year after year, and even in the pandemic-affected year 2020, venture capital firms gave more money to startups (Embroker Team, 2022).

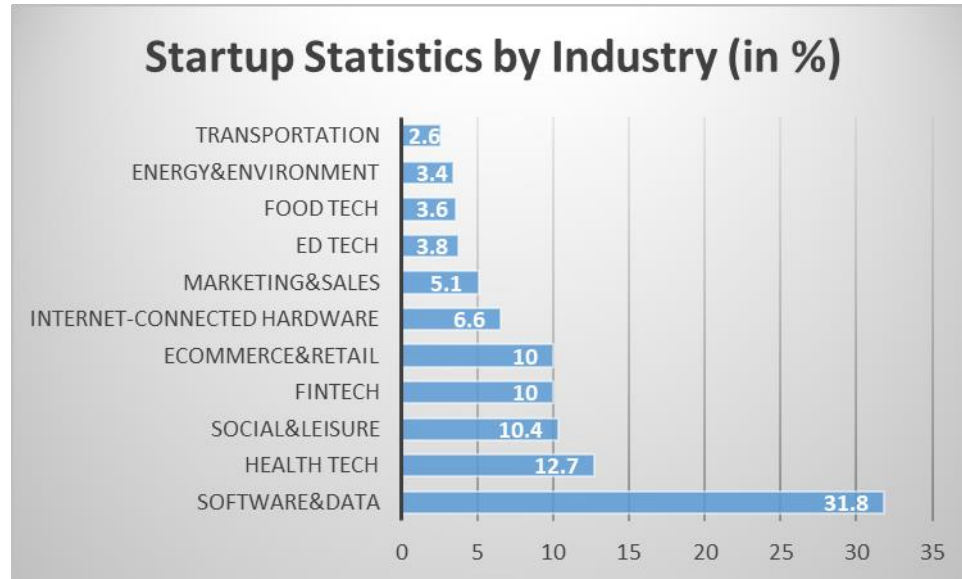


Figure 2

Startup Statistics Based on Industry. Source: Saini, 2024

As we can see in Figure 2, there are 11 main industries, where we can find startups. The biggest one is the data and software industry where we can find 31.8% of all startups. The second one is health tech with 12.7% of startups. As we can see also Food tech and Energy and Environment industries are interesting areas for startups even though we can see that less than 5% of all startups go to these industries. In the next Figure, we can see the share of unicorns within the global industries. And even though the fintech industry ranks 4th in terms of the number of all startups, it ranks first among industry sectors in terms of the percentage of unicorns (16% of unicorns). Second place with 9% of unicorns belongs to the Software-as-a-Service (SaaS) industry. As we can further see, we can find some unicorns also in the Blockchain industry (5% of unicorns), the Health tech industry (4% of unicorns), and New energy (3% of unicorns).

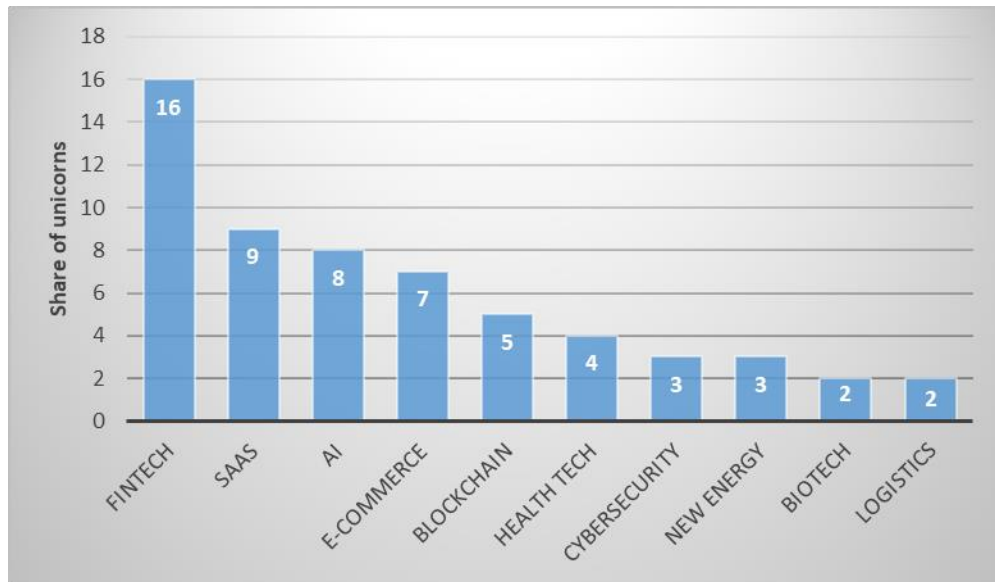


Figure 3

Industries with the highest share of unicorns worldwide as of 2023. Source: Statista.com, 2024

When we speak about startups, we can see, that there are about 3.2 million startups built every year just in the US and only about 1% of startups evolve into a unicorn startup, which is associated with a high rate of failure of startups, where 9 out of 10 startups fall apart (Saini, 2024). Based on the definition startup is a new business in its early stages, with a high growth rate, and an innovative idea, but with a low financing level. So when such a startup does not find the right market for launching its innovative solution it has problems finding financial sources and dies. Even if these statistics are not good, there are still new startups, that come with new innovative a disruptive ideas and hope to become unicorns so they can bring benefits to society. Kučera et al. (2023) suggested Data Envelope Analysis as a suitable tool for measuring activity and efficiency which can be applied also to same-sector startups.

3. STARTUPS AND ECONOMIC SUSTAINABILITY

As Mura et al, (2023) suggest, business units are at the forefront of development activities, which are characterized by dynamic and flexible approaches, and interest in implementing innovations in their entrepreneurial activity. This can be also applied to startups which represent a good way of dealing with economic sustainability. Feld (2020) mentions the dream of Bala Kamallakharan, who in 2012 said, that he dreams that Icelandic startups grow up to be global companies sustainably serving global customers. When discussing startups in connection to sustainability, we speak about so-called „Green Startups“. These innovative ventures are gaining traction and are poised to revolutionize industries, attract significant investment, and capture the public’s imagination. Also, investors are increasingly recognizing the potential of green startups, leading to a surge in funding for sustainable ventures, and while the potential is vast, green startups also face unique challenges. High initial costs, longer ROI periods, and the need for specialized knowledge can be barriers. However, these challenges also present opportunities for innovation. For instance, startups that can develop cost-effective green technologies or create scalable sustainable solutions will have a competitive edge (RAISE, 2024). The concept of sustainable startups has attracted increasing attention in the global economy, highlighting a growing concern with sustainable development and the search for innovative solutions to tackle environmental challenges. Sustainable startups are those that integrate environmental, social, and governance (ESG) practices into their business models, seeking not only profit but also a positive impact on society and the environment (Martins de Souza et al., 2024). As Mühle et al. (2024) mention, startups not only bear the responsibility but also can help and ensure meeting the challenges connected with sustainable goals to make a difference in today’s society. Operating sustainably means generating revenue while also providing value socially and environmentally, meaning acting mindful regarding material use, the usage of water, emissions, waste, and labor conditions. The number of climate tech startups and scaleups in North America and Europe reached almost 45,000 in 2022 and in the next Figure 4, we can see, that the USA is the country with the biggest number (14 332) of climate tech startups and scale-ups. In second place with 5 279 companies is the UK, the third place belongs to Germany with 3 656 companies, followed by France with 3 063 companies, and in fifth place with 2 504 companies we can find Canada. The last place with the smallest number of startups (243) belongs to Russia.

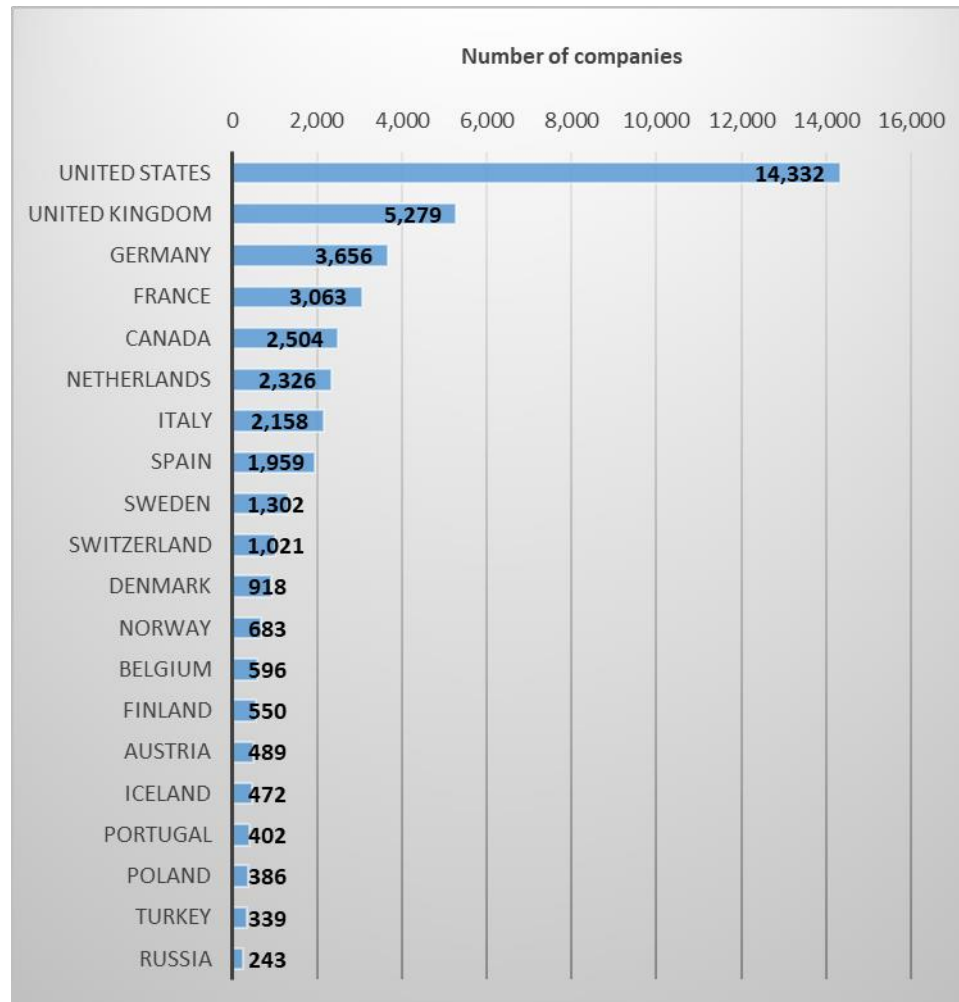


Figure 4

Number of climate tech startup and scaleup companies in Europe and North America in 2022, by select country. Source: Statista.com, 2022

When we speak about climate tech firms, we need to mention that these firms focus on various areas that address the impacts of global warming, such as energy, farming and food production, mobility, and greenhouse gases (GHG) removal. At the same time, these areas overlap with the areas cited by several authors as examples of economic sustainability, so we can say, that climate tech firms are the answer to economic sustainability. When we look at the same countries, that are mentioned in Figure 4 from the view of the Economic Capital Index. We can see that in 2023 Germany was in the 8th place (score 53,3), the USA was ranked 21st (49,9 score), France was 39th (46,6 score), Russia – 42nd (46,3 score), the UK was 46th (46,2) and Canada with 43,4 score was ranked as 72nd (Solability, 2024).

CONCLUSION

Based on our comparative analyses of various documents and startups and economic sustainability statistics, we can say that startups with their approach to solving existing problems, appear to be an ideal choice for solving economic sustainability. We can also state that, despite the high failure rate, millions of new startups are created yearly, striving to contribute to improving societal needs. The most frequented industries, where startups see their future are Software and Data, Health tech, Social and Leisure, and Fintech industries. Some of the startups are also interested in food, farming, and renewable energy areas. These green or climate tech startups, focus on areas that are also part of the orientation of companies focusing on economic sustainability (such as sustainable farming, waste reduction, renewable energy, etc.). When we compare the countries with the largest number of climate tech startups with their ranking through the Economic Capital Index measuring economic sustainability, we can say that the number of climate tech startups does not correspond with the ranking. Just for example, the USA had in 2022 the biggest count of climate tech startups and scaleup companies but their place in the ranking through the Economic Capital Index with the score of 49,9 was 21st place. But at the same time, we can say that innovations and the disruptive view of startups on existing problems are one of the answers to solving economic sustainability, and therefore it is worth considering building startup ecosystems to support their further development.

REFERENCES

Aman, S. et al. (2024). Startup Guides A Guide to Building and Growing Your Own Business: Startups: Innovation, Growth, and Navigating Challenges. (n.d.). (n.p.): Aman Singh.

Bailey, L. (2023). What are the Three E's of Sustainability? <https://populationeducation.org/what-are-the-three-es-of-sustainability/>.

Baldrige, R.; Curry, B. (2024). What Is A Startup? The Ultimate Guide. <https://www.forbes.com/advisor/business/what-is-a-startup/>.

Banudas, A. (2017). Sack the Startup: The Attitude You Wear to Work (1st ed.). Notion Press.

Bilal, A. (2014). The Startup Book: Entrepreneurship Training Manual (null ed.). CreateSpace Independent Publishing Platform.

Bish, J.J. (2021). Economic Sustainability Examples that Inspire Change. <https://www.populationmedia.org/the-latest/what-is-economic-sustainability>.

Bolt, O. (2023). 8 Economic Sustainability Examples that Inspire Change and Growth. <https://energytheory.com/economic-sustainability-examples/>.

Corl, E. (2019). How Startups Drive the Economy. Dostupné na internete: <https://medium.com/@ericcorl/how-startups-drive-the-economy-69b73cfbae1>.

Embroker Team. (2022). A Guide to Startup Risks and How to Manage Them. <https://www.embroker.com/blog/startup-risks/>.

Feld, B. (2020). Startup Communities: Building an Entrepreneurial Ecosystem in Your City (2nd ed.). Wiley.

Fuest, C. (2023). Can Economic Growth and Ecological Sustainability Coexist? <https://www.econpol.eu/opinion-economic-growth-ecological-sustainability>.

Gründerplattform. (2022). Gründe dein eigenes Startup und mach dein Ding. Alles was du zur Gründung deines Startups wissen musst. <https://gruenderplattform.de/startup-gruenden>.

IMD. (2024). Economic Sustainability: principles and practices for long-term success. <https://www.imd.org/blog/sustainability/economic-sustainability/>.

Indeed Editorial Team, (2024). What Is A Startup? (With Definition, Types And Advantages). <https://in.indeed.com/career-advice/career-development/what-is-a-startup>.

INSIGHT. (2024). Definition of economic sustainability. <https://www.prysmian.com/en/insight/sustainability/economic-sustainability-what-is-it>.

Jurgens, J. (2022). How startups drive economic recovery while growing responsibly. <https://www.weforum.org/agenda/2022/05/how-startups-help-drive-economic-recovery-and-growth/>.

- Karminder, G., Sahil, M.C. (2023). How to Raise Startup Funding in India. Blue Rose Publishers.
- Köseoğlu, S.D. (2023). A Practical Guide for Startup Valuation. An Analytic Approach (2023rd ed.). Springer.
- Kučera, J., Zimková, E., Nemeč, J., & Nemeč, M. (2023). A comparative analysis of the efficiency of public funding policies for sports in the European Union. *Cogent Social Sciences*, 9(2). <https://doi.org/10.1080/23311886.2023.2280335>.
- Kučera, J.; Nemeč, J. (2022). Allocation of Public Funds from The State Budget to The National Sports Associations in Slovakia. *SciPap, Univ. Pardubic. Ser. D Fac. Econ. Adm.* 2022, 30, 1405, <https://doi.org/10.46585/sp30011405>.
- Marion, T., Reese, V., & Wagner, R. F. (2018). Dermatologic features in good film characters who turn evil: The transformation. *Dermatology Online Journal*, 24(9), Article 4. <https://escholarship.org/uc/item/1666h4z5>.
- Martins de Souza, A.; Puglieri, F.N.; de Francisco, A.C. (2024). Competitive Advantages of Sustainable Startups: Systematic Literature Review and Future Research Directions. *Sustainability* 2024, 16, 7665. <https://doi.org/10.3390/su16177665>.
- Moran, A., & Toner, J. (2017). A critical introduction to sport psychology (3rd ed.). Routledge.
- Mosek, E. (2017). Team flow: The missing piece in performance [Doctoral dissertation, Victoria University]. Victoria University Research Repository. <http://vuir.vu.edu.au/35038/>.
- Mühle, Ch.; Berrones-Flemmig, C. N.; Hattula, C. (2024). Sustainability in start-ups: A literature review, *IU Discussion Papers - Business & Management*, No. 3 (February 2024). IU Internationale Hochschule, Erfurt.
- Mura, L.; Zsigmond, T.; Bakó, F; Kupi, M. (2023). New Organizational Environment Types Based on Garvin and Quinn -the Case of Slovakian Small and Medium Enterprises. *TEM Journal* 12(2):691-699. DOI: 10.18421/TEM122-12.
- Paredes, G., Herrera, R.F. (2020). Teaching Multi-Criteria Decision Making Based on Sustainability Factors Applied to Road Projects. *Sustainability* 12(8930):1-25, DOI: 10.3390/su12218930.
- Pratt, L. (2022). How Does Sustainability Affect the Economy? <https://future-business.org/how-does-sustainability-affect-the-economy/>.
- RAISE. (2024). The Rise of Green Startups: Entrepreneurship at the Forefront of Sustainability. <https://theraise.eu/startup-news/the-rise-of-green-startups-entrepreneurship-at-the-forefront-of-sustainability/>.
- Rinalducci, S.N. (2024). Economic Sustainability EXPLAINED. <https://sustainability-success.com/economic-sustainability/>.
- Rowse, B. (2024). What Is Economic Sustainability? <https://sustainabilityeducationacademy.com/economic-sustainability-defined/>.

Saini, M. (2024). 75+ Startup Statistics & Trends Entrepreneurs Must Know [2024]. <https://jobera.com/startup-statistics/>.

Sethi, A. (2024). From Startup to Unicorn. An Essential Guide to Build, Scale and Sustain Value for Platform and Tech Startups (1st ed.). Springer.

Solability. (2024). Economic Capital Index. <https://solability.com/the-global-sustainable-competitiveness-index/the-index/economic-sustainability-index>.

Statista.com. (2022). Number of climate tech startup and scaleup companies in Europe and North America in 2022, by select country. <https://www.statista.com/statistics/1410682/number-of-climate-tech-companies-worldwide-by-country/>.

Statista.com. (2024). Industries with the highest share of unicorns worldwide as of 2023. <https://www.statista.com/statistics/1092753/share-of-unicorns-worldwide-by-industry/>.

The University of Mary Washington. (2024). Economic Sustainability. <https://sustainability.umw.edu/areas-of-sustainability/economic-sustainability/>.

TRUiC Team, 2022. What Is a Startup? <https://startupsavant.com/what-is-a-startup>.

Urbaníková, M.; Štubňová, M.; Papcunová, V.; Hudáková, J. Analysis of Innovation Activities of Slovak Small and Medium-Sized Family Businesses. *Adm. Sci.* 2020, 10, 80. <https://doi.org/10.3390/admsci10040080>.

CONTRIBUTING TO THE UNITED NATIONS SUSTAINABLE DEVELOPMENT GOALS WITH THE ISO STANDARD FOR ARTIFICIAL INTELLIGENCE MANAGEMENT SYSTEMS

Tzvetelin Gueorguiev
Technical University of Gabrovo, Bulgaria
tz.georgiev@tugab.bg

ABSTRACT

The current edition of the United Nations Sustainable Development Goals (UN SDGs) focuses on global sustainable development efforts and cover the period from 2016 to 2030. Since 2019 the International Organization for Standardization (ISO) has been aligning the its standards to the 17 UN SDGs. In December 2023 ISO published the first edition of the international standard on Artificial Intelligence Management Systems (AI MS). The technical progress known as Industry 4.0 and the emerging Industry 5.0 trends make AI a valuable asset to any organization's management system. This recent development brings along not only desirable benefits and opportunities to integrate AI in the planning, implementation, control and improvement of operations. It also introduces uncertainty and risks to the processes of the MS. To address those risks and opportunities and to manage the innovation processes organizations can use the guidelines for contributing to the UN SDGs. They are published in September 2024 by ISO as the Publicly Available Specification ISO/UNDP PAS 53002:2024. The purpose of this paper is to provide a roadmap for organizations of any size and industry sector how to integrate AI and UN SDGs in the processes of their management systems.

Keywords: *Artificial Intelligence (AI), Management Systems (MS), United Nations Sustainable Development Goals (UN SDGs), ISO/IEC 42001:2023, ISO/UNDP PAS 53002:2024.*

INTRODUCTION

The United Nations Sustainable Development Goals are in the focus of public attention at least for a decade. They promote awareness of the far-reaching effects of the activities of humans and organizations. Furthermore, they are aligned with 169 specific targets, more than 4000 events, more than 1300 publications, and nearly 8000 actions (*THE 17 GOALS / Sustainable Development*, n.d.).

The UN Secretary General has been presenting an annual SDG Progress Report since 2016. Its 2024 edition (United Nations [General Assembly Economic and Social Council], 2024) outlines some sobering if not alarming trends if we are to achieve the global transformation presented in the UN 2030 Agenda for Sustainable Development.

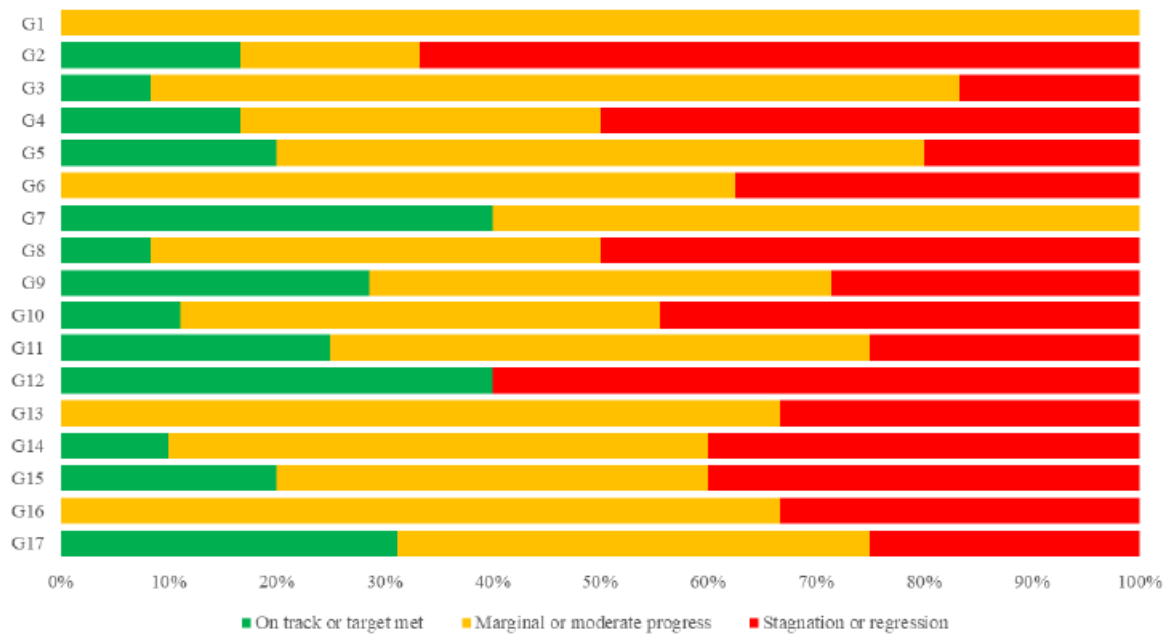


Figure 1:

Trends in achieving the targets for the UN Sustainable Development Goals (United Nations [General Assembly Economic and Social Council], 2024)

Figure 1 is extracted from the 2024 SDG Progress Report, p. 4/26, Figure 2. "Progress assessment for the 17 Goals based on assessed targets with trend data, by Goal, 2024 or the latest data".

It demonstrates that the most significant advance is achieved towards SDG 7 "Affordable and clean energy" and SDG 12 "Responsible consumption and production". On the other extreme of the spectrum are SDG 2 "Zero hunger", SDG 4 "Quality Education", SDG 8 "Decent work and economic growth", and strikingly SDG 12 "Responsible consumption and production" again. This proves the disparity that is evident on global scale. Three SDGs are in dire need of urgent action because they are seriously

lagging behind their targets: SDG 1 “No poverty”, SDG 6 “Clean water and sanitation”, SDG 13 “Climate action”, and SDG 16 “Peace, justice and strong institutions”.

Two recent UN press releases highlight the importance to work tirelessly on implementing the topics discussed in this paper: “WMO confirms 2024 as warmest year on record at about 1.55°C above pre-industrial level” (Yinuo, 2025), and “Era of AI: Internet Governance Forum closes with call for stronger multistakeholder action to harness digital promise and tackle threats” (Yinuo, 2024).

A reputable global organization, ISO – the International Organization for Standardization, does its fair share and fully supports the UN by developing and publishing standards that support the 17 UN SDGs. As of 2025-01-15, ISO has published numerous standards that align with one or more of the UN SDGs (see Fig. 2). 38499 matches with UN SDGs can be proven out of 31486 standards.

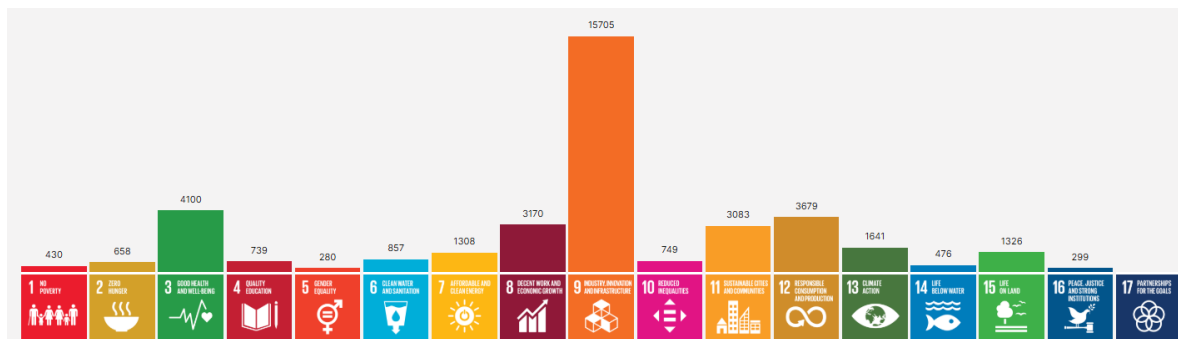


Figure 2:

ISO standards and the UN Sustainable Development Goals (*ISO - Sustainable Development Goals, n.d.*)

This meaningful relationship between ISO standards and UN SDGs creates value and changes organizational culture and people’s attitudes. It focuses on several domains and types of management systems and is discussed in several research publications:

- Environmental management systems (Mosgaard & Kristensen, 2023);
- Occupational health and safety management systems (Giménez et al., 2023);
- Corporate social responsibility (Chabin & Rochard, 2023);
- Facility management (Lok et al., 2023);
- Accredited laboratories (Cundeva-Blajer et al., 2024);
- Geographic Information–Land Administration Domain Model (Chen et al., 2024), etc.

This topic has been of interest to the author since 2018. It was presented at several seminars and has resulted in the publication of two research papers:

- “ISO Standards Do Good: A New Perspective on Sustainable Development Goals” (Gueorguiev & Kostadinova, 2021), and
- “An approach to integrate Artificial Intelligence in ISO 9001-based quality management systems” (Gueorguiev, 2025).

1. ARTIFICIAL INTELLIGENCE MANAGEMENT SYSTEMS

ISO/IEC 42001:2023 is the first standard published by ISO and dealing with artificial intelligence (AI) management systems (MS) (*ISO/IEC 42001:2023*, n.d.). It was developed by a special Technical Committee of ISO (*ISO/IEC JTC 1/SC 42 - Artificial Intelligence*, 2023) and officially published on 2023-12-18. This standard contributes to UN SDGs 5, 7, 8, 9, 10, 12, and 14. It helps create an organizational framework for managing risks and opportunities associated with the development and use of AI products. It is a valuable tool that can demonstrate that an organization uses AI responsibly.

The standard ISO/IEC 42001:2023 is based on the 10-clause structure (see the structural gap analysis in Section 3 below) of ISO Management System Standards (MSS) known as Annex SL (ISO, 2024). This greatly improves the smooth integration of its requirements with the requirements of other ISO MSS (*ISO - Management System Standards List*, n.d.).

At present, ISO develops additional standards that form the emerging ISO/IEC 42000 series for artificial intelligence:

- ISO/IEC FDIS 42005 Information technology – Artificial intelligence – AI system impact assessment (expected to be published in 2025);
- ISO/IEC FDIS 42006 Information technology – Artificial intelligence – Requirements for bodies providing audit and certification of artificial intelligence management systems (expected to be published in 2025);
- ISO/IEC CD 42105 Information technology – Artificial intelligence – Guidance for human oversight of AI systems;
- ISO/IEC CD TR 42106 Information technology – Artificial intelligence – Overview of differentiated benchmarking of AI system quality characteristics.

Other overview and guidance standards of the ISO/IEC 42000 series are at early development stages in their lifecycle.

2. ISO GUIDELINES FOR CONTRIBUTING TO THE UNITED NATIONS SUSTAINABLE DEVELOPMENT GOALS

On 2024-09-12 ISO published the first edition of its guidelines for contributing to the UN SDGs (*ISO/UNDP PAS 53002:2024*, 2024). They are a big step in the right direction to meet the UN 2030 Agenda for Sustainable Development targets out of which “only 17% are on track to being achieved globally by 2030” (*World-first International Guidelines Empower Businesses and Organizations to Fast-track SDG Success*, 2024).

The Publicly Available Specification ISO/UNDP PAS 53002:2024 is developed by (*ISO/PC 343 – Sustainable Development Goals Management*, n.d.) in collaboration with the United Nations Development Programme (UNDP). The same Technical Committee is responsible for the development of another ISO standard – “Management Systems for UN Sustainable development goals – Requirements” (*ISO/UNDP WD 53001.2*, n.d.).

The standard ISO/UNDP PAS 53002:2024 loosely follows the structure of Annex SL and just like more than 50 MSS is also founded on the Plan-Do-Check-Act (PDCA) cycle for continual improvement. The clauses of ISO/UNDP PAS 53002:2024 are matched with the PDCA cycle as follows:

- Plan: Clause 4 “Understanding external and internal issues and the overall context of the organization”, Clause 5 “Interested parties”, Clause 6 “Integration”, Clause 7 “Leadership and commitment”, Clause 8 “Policy”, Clause 9 “Roles, responsibilities and authorities”, and Clause 10 “Planning”;
- Do: Clause 11 “Support” and Clause 12 “Operation”;
- Check: Clause 13 “Performance evaluation”;
- Act: Clause 14 “Improvement”.

The content of ISO/UNDP PAS 53002:2024 also includes an informative Annex A “Thresholds and allocations” whereas a threshold is “the social minimum that must be reached or an environmental maximum that must not be breached for an impact to be beneficial”.

3. STRUCTURAL GAP ANALYSIS TO INTEGRATE AI AND UN SDGS

The gap analysis is based on the structural similarities and differences between Annex SL, ISO/UNDP PAS 53002:2024 for UN SDGs, and ISO/IEC 42001:2023 for AI MS. Tables from 1 to 8 below present a “clause-by-clause” analysis of the two ISO standards in question.

The “Foreword” (see Table 1) of both standards provides details about ISO, its procedures used to develop international standards, and the Technical Committee that developed them. The content of Table 1 in bold is typical for any ISO standard.

The “Introduction” deals with the topic of the respective standard. This covers mainly the UN 2023 Agenda for Sustainable Development, the 17 SDGs, and the PDCA cycle in ISO/UNDP PAS 53002:2024, and AI and compatibility with other MSS in ISO/IEC 42001:2023.

Table 1: Comparison of the initial clauses of ISO/UNDP PAS 53002:2024 and ISO/IEC 42001:2023

ISO/UNDP PAS 53002:2024	ISO/IEC 42001:2023
Foreword	Foreword
Introduction	Introduction
0.1 General	
0.2 Sustainable Development Goals	
1 Scope	1 Scope
2 Normative references	2 Normative references
3 Terms and definitions	3 Terms and definitions

Clause 1 “Scope” lists the purpose, intent and applicability of each of the standards.

Clause 2 “Normative references” is contained in all ISO MSS. Unlike ISO/UNDP PAS 53002:2024 that has no normative references, ISO/IEC 42001:2023 specifies as indispensable ISO/IEC 22989:2022 “Information technology – Artificial intelligence – Artificial intelligence concepts and terminology”.

Clause 3 “Terms and definitions” in ISO/UNDP PAS 53002:2024 contains 41 terms related to organizational management and other terms borrowed from the “United Nations Development Programme, SDG Impact Standards, Glossary”. The identical clause in ISO/IEC 42001:2023 contains 26 terms most of which are common with those in other MSS.

Based on prior knowledge of Annex SL and the structure of other MSS, it is necessary to point out that the core of ISO MSS that contains requirements and guidance is to be found from Clause 4 “Context of the organization” onwards. In fact, ISO/IEC 42001:2023 is a requirements standard (contains the verb “shall”), and ISO/UNDP PAS 53002:2024 provides guidance (uses verbs such as “should”, “can”, and “may”). The first major structural differences between the two standards are clearly seen in Table 2.

Table 2: Comparison of the Clauses from 4 to 6 of ISO/UNDP PAS 53002:2024 and Clause 4 of ISO/IEC 42001:2023

ISO/UNDP PAS 53002:2024	ISO/IEC 42001:2023
4 Understanding external and internal issues and the overall context of the organization	4 Context of the organization
4.1 General	4.1 Understanding the organization and its context
4.2 External issues	
4.3 Internal issues	
5 Interested parties	4.2 Understanding the needs and expectations of interested parties
5.1 General	
5.2 Interested parties that experience impacts	
5.3 Interested parties that contribute to impacts	
6 Integration	
6.1 General	4.3 Determining the scope of the AI management system
6.2 Integration of SDG activities into core business	4.4 AI management system

The external and internal issues that help shape the context of the organization are separated in sub-clauses in ISO/UNDP PAS 53002:2024, whereas in ISO/IEC 42001:2023 they are merely notes and it is at the discretion of the organization to decide whether to take them into consideration or not.

When it comes to interested parties, the 4 sentences with requirements in ISO/IEC 42001:2023 are no match to the breadth and depth of the more than 2 pages of guidance text in ISO/UNDP PAS 53002:2024.

Clause 6 "Integration" is most closely related to Clauses 4.3 "Determining the scope of the AI management system" and 4.4 "AI management system". The integration is envisioned for organizational

SDG activities into its overarching business management system, and other MS such as quality, environmental, risk, innovation, etc.

The title of Clause 7 “Leadership and commitment” in ISO/UNDP PAS 53002:2024 is identical to that of Sub-clause 5.1 in the standard for AI MS (see Table 3).

Table 3: Comparison of the Clauses from 7 to 9 of ISO/UNDP PAS 53002:2024 and Clause 5 of ISO/IEC 42001:2023

ISO/UNDP PAS 53002:2024	ISO/IEC 42001:2023
7 Leadership and commitment	5 Leadership
7.1 General	5.1 Leadership and commitment
7.2 Principles for responsible business	
7.3 Innovation	
7.4 Interested party engagement	
7.4.1 General	
7.4.2 Processes for consultation and participation	
7.4.3 Collaboration and partnerships	
8 Policy	5.2 AI policy
8.1 General	
8.2 Human rights policy	
8.3 Equity and justice	
9 Roles, responsibilities and authorities	5.3 Roles, responsibilities and authorities
9.1 General	
9.2 Governance and oversight	

The content of Sub-clause 7.1 “General” expands the requirements contained in Sub-clause 5.1 in ISO/IEC 42001:2023 with nearly a full page of guidance and 10 SDG-specific items. The “Principles for responsible business” in Sub-clause 7.2 are based on ISO 26000:2010 “Guidance on social responsibility” which is under systematic review as of 2024-10-15. A hot topic such as innovation is the subject discussed in Sub-clause 7.4 in ISO/UNDP PAS 53002:2024. 10 types of innovations are presented and a suggestion

for further information directs to ISO 56002:2019. This standard will be replaced by ISO/AWI 56002 in the near future. If the organization chooses to obtain the maximum benefits of innovation management systems, then the core requirements standard ISO 56001:2024, and the supporting standards in the ISO 56000 series are to be used. For guidance on the engagement of interested parties ISO/UNDP PAS 53002:2024 proposes detailed guidance on the identification, consultation and participation (16 elements), collaboration and partnerships (12 elements).

A noteworthy difference can be observed in Sub-clause "Policy". While in Sub-clause 5.2 in ISO/IEC 42001:2023 it looks very much like the text in Annex SL, Clause 8 in ISO/UNDP PAS 53002:2024 adds important facets such as a human rights policy (a standalone one or as a part of the SDG policy) and following the principles of equity and justice.

Traditionally, organizational "Roles, responsibilities and authorities" are defined in job descriptions, organization charts, and/or the so called RASIC matrix (Responsible, Accountable, Supportive, Informed, Consulted). These options are applicable to both standards, respectively to Clause 9 and Sub-clause 9.1 "General" in ISO/UNDP PAS 53002:2024 and Sub-clause 5.3 in ISO/IEC 42001:2023. A new International Workshop Agreement (*IWA 48:2024*, n.d.) that was published on 2024-11-14 can improve the understanding and implementation of Environmental, Social and Governance (ESG) principles that are pertinent to ISO/UNDP PAS 53002:2024, Sub-clause 9.2 "Governance and oversight".

If the abovementioned clauses of both standards can be considered preparatory and foundational for an integrated UN SDG and AI MS, the content of Clause 10 in ISO/UNDP PAS 53002:2024 and Clause 6 in ISO/IEC 42001:2023 without a doubt relate to the process approach and the "Plan" stage of the PDCA continuous improvement cycle (Gueorguiev, 2024).

In addition to the larger explanatory text of the Sub-clauses in ISO/UNDP PAS 53002:2024, the main differences in these sections of the two standards (see Table 4) are:

- Pronounced attention to risks and opportunities in ISO/IEC 42001:2023 expressed by elements of risk management related to AI;
- Focus on SDGs objectives, targets and indicators in ISO/UNDP PAS 53002:2024. The planning of changes is also discussed at length in respect to changes in: context, requirements, performance, products, services, processes, operations, equipment or facilities, workers, external providers or contractors, and other interested parties.

Table 4: Comparison of the clauses devoted to planning in ISO/UNDP PAS 53002:2024 and ISO/IEC 42001:2023

ISO/UNDP PAS 53002:2024	ISO/IEC 42001:2023
10 Planning	6 Planning
10.1 General	6.1 Actions to address risks and opportunities
10.2 Determination of legal requirements and other requirements	6.1.1 General
	6.1.2 AI risk assessment
	6.1.3 AI risk treatment
	6.1.4 AI system impact assessment
10.3 SDG objectives and planning to achieve them	6.2 AI objectives and planning to achieve them
10.3.1 General	
10.3.2 Alignment and ambition of SDG objectives	
10.3.3 Setting targets	
10.3.4 Selecting indicators	
10.4 Planning of changes	6.3 Planning of changes

The overall structure of the Clauses called “Support” consists of 5 Sub-clauses: resources, competence, awareness, communication and documented information (see Table 5). Out of these, the Sub-clauses “Awareness” and “Documented information” have higher degrees of similarity. Sub-clause “Resources” in ISO/UNDP PAS 53002:2024 enumerates the following types of resources needed for achieving the SDG objectives: financial resources, human resources, organizational knowledge, technology, innovation, and partnerships.

Table 5: Comparison of the clauses devoted to support in ISO/UNDP PAS 53002:2024 and ISO/IEC 42001:2023

ISO/UNDP PAS 53002:2024	ISO/IEC 42001:2023
11 Support	7 Support

11.1 Resources	7.1 Resources
11.2 Competence	7.2 Competence
11.3 Awareness	7.3 Awareness
11.4 Communication	7.4 Communication
11.4.1 General	
11.4.2 Reporting	
11.4.3 Limitations of reporting	
11.4.4 Credibility of reports	
11.5 Documented information	7.5 Documented information
11.5.1 General	7.5.1 General
11.5.2 Creating and updating documented information	7.5.2 Creating and updating documented information
11.5.3 Control of documented information	7.5.3 Control of documented information

Competence guidance for the SDGs comprises of expertise in various domains, diverse experience, data processing skills, and ability to process SDG-related information. In contrast, competence requirements in ISO/IEC 42001:2023 are much more similar to those in Annex SL.

The biggest differences are encountered in Sub-clause “Communication”. Only the first two sentences are practically the same. After that, ISO/UNDP PAS 53002:2024 goes into detail with elements dealing with transparent communication and reporting in respect to:

- Achieving its SDG policy and objectives;
- Annual reporting of SDG contribution;
- Limitations and credibility of SDG reporting.

The core of any type of MSS is located in the clause titled “Operation” (see Table 6).

The Sub-clause “Operational planning and control” is the only one that can be considered to be identical.

Table 6: Comparison of the clauses devoted to operation in ISO/UNDP PAS 53002:2024 and ISO/IEC 42001:2023

ISO/UNDP PAS 53002:2024	ISO/IEC 42001:2023
12 Operation	8 Operation
12.1 Operational planning and control	8.1 Operational planning and control
12.2 Externally provided processes, products and services	
12.3 Data management	
12.3.1 General	
12.3.2 Data verification and impact assessment	
	8.2 AI risk assessment
	8.3 AI risk treatment
12.4 Impacts	
12.4.1 Determining expected impacts	
12.4.2 Assessing and prioritizing expected impacts	8.4 AI system impact assessment
12.4.3 Making choices between options	

The elements in ISO/IEC 42001:2023 that are considered at the “Plan” stage of the PDCA cycle (AI risk assessment, AI risk treatment, and AI system impact assessment) are now subjected to implementation, namely the “Do” stage of the PDCA cycle.

ISO/UNDP PAS 53002:2024 is much more diverse and profound. Similar to ISO 9001:2015, it has a section titled “Externally provided processes, products and services” (Sub-clause 12.2). Other differences between the two standards are:

- “Data management” (Sub-clause 12.3) that deals with data collection (capturing), verification and impact assessment, and
- “Impacts” (Sub-clause 12.4) that consists of: determining the current and future positive and negative impacts on SDGs, assessing and prioritizing expected impacts, as well as choosing between options.

“Performance evaluation” is the “Check” stage of the PDCA cycle. The overall structural gap analysis is shown in Table 7 below. With the exception of the first three sentences in both standards, ISO/UNDP PAS 53002:2024 goes on to explain how to optimize the organization’s contribution to the SDGs, what to monitor, measure, analyze and evaluate, how to measure and monitor impact performance, etc.

Table 7: Comparison of the clauses devoted to performance evaluation in ISO/UNDP PAS 53002:2024 and ISO/IEC 42001:2023

ISO/UNDP PAS 53002:2024	ISO/IEC 42001:2023
13 Performance evaluation	9 Performance evaluation
13.1 Monitoring, measurement, analysis and evaluation	9.1 Monitoring, measurement, analysis and evaluation
13.1.1 General	
13.1.2 Measuring and monitoring impact performance	
13.2 Internal audit	9.2 Internal audit
13.2.1 General	9.2.1 General
13.2.2 Internal audit programme	9.2.2 Internal audit programme
13.3 Management review	9.3 Management review
13.3.1 General	9.3.1 General
13.3.2 Management review inputs	9.3.2 Management review inputs
13.3.3 Management review results	9.3.3 Management review results

A best practice in “Internal audit”, which is the same for both standards, is to use ISO 19011:2018 as a guidance for auditing MS. Currently this standard is being revised and will be replaced by ISO/DIS 19011 (Draft International Standard as of 2025-01-15).

“Management review” is another clause that should be relatively easy to integrate with other MSS due to the similarity of its requirements and guidance.

The last clause of any ISO MSS based on Annex SL is titled “Improvement” and corresponds to the “Act” stage of the PDCA cycle. Table 8 summarizes the structural gap analysis of this clause in the standards for SDGs and AI MS.

Table 8: Comparison of the clauses devoted to improvement in ISO/UNDP PAS 53002:2024 and ISO/IEC 42001:2023

ISO/UNDP PAS 53002:2024	ISO/IEC 42001:2023
14 Improvement	10 Improvement
14.1 Continual improvement	10.1 Continual improvement
14.2 Deviations from expected impact and corrective action	10.2 Nonconformity and corrective action
14.2.1 General	
14.2.2 Resolving complaints, conflicts or disagreements with interested parties	

ISO/UNDP PAS 53002:2024 provides guidance on “Continual improvement” (Sub-clause 14.1) by using lessons learned from successes and failures, considering collaborations with interested parties, new knowledge, internal and external context, etc. An approach that is similar to innovation MS is to deal with “deviations from expected impact” (Sub-clause 14.2) and not merely “nonconformities”. This promotes a non-negative attitude towards failures and creates space for experimentation without fearing potential punishment or fines for poor performance.

CONCLUSION

Both the UN SDGs and AI are important factors in today’s world. Interestingly, global organizations such as the ISO have managed to surf this tidal wave and develop international standards that provide requirements and guidance that summarize best practices from around the world. This paper has presented an overview of two standards - ISO/UNDP PAS 53002:2024 “Guidelines for contributing to the United Nations Sustainable Development Goals (SDGs)” and ISO/IEC 42001:2023 “Information technology – Artificial intelligence – Management system”. The detailed gap analysis enables and facilitates the enhancement of existing management systems by managers, users and practitioners. The continual improvement of any management system requires a recipe for success. Its key ingredients include: meticulous scanning of the organization’s context, instilling and promoting the right values and culture, raising awareness about innovations and new trends, a balance of vision and operational excellence, and insatiable thirst for significant progress.

REFERENCES

Chabin, Y., & Rochard, J. (2023). Objectifs du Développement Durable (ODD) l'ONU et Responsabilité Sociale/Sociétale des Entreprises, au sein de la filière vitivinicole : concepts et applications. *BIO Web of Conferences*, 56, 03011. <https://doi.org/10.1051/bioconf/20235603011>.

Chen, M., Van Oosterom, P., Kalogianni, E., Dijkstra, P., & Lemmen, C. (2024). Bridging Sustainable Development Goals and Land Administration: The role of the ISO 19152 Land Administration Domain Model in SDG Indicator Formalization. *Land*, 13(4), 491. <https://doi.org/10.3390/land13040491>.

Cundeva-Blajer, M., Nakova, M., & Cundeva, S. (2024). A contribution to sustainability – Towards green calibration laboratory for electrical instruments. *Measurement Sensors*, 101619. <https://doi.org/10.1016/j.measen.2024.101619>.

Giménez, J., Bayarri, B., Malato, S., Peral, J., & Esplugas, S. (2023). Occupational risk assessment in AOPs labs and management system that comply with UN sustainable development goals. *Process Safety and Environmental Protection*, 182, 903–917. <https://doi.org/10.1016/j.psep.2023.12.033>.

Georguiev, T. (2024). The Process Approach in Artificial Intelligence Management Systems. *2024 9th International Conference on Energy Efficiency and Agricultural Engineering (EE&AE)*, 1–4. <https://doi.org/10.1109/eeae60309.2024.10600591>.

Georguiev, T. (2025). An approach to integrate Artificial Intelligence in ISO 9001-based quality management systems. *Measurement Sensors*, 101787. <https://doi.org/10.1016/j.measen.2024.101787>.

Georguiev, T., & Kostadinova, I. (2021). ISO Standards Do Good: A New Perspective on Sustainable Development Goals. *Proceedings of the 13th International Joint Conference on Knowledge Discovery, Knowledge Engineering and Knowledge Management (IC3K 2021)*, 3, 133–137. <https://doi.org/10.5220/0010658000003064>.

ISO. (2024). *Annex SL Appendix 2 (normative) Harmonized structure for MSS with guidance for use*. Retrieved January 15, 2025, from https://www.iso.org/committee/54996.html?t=aNMGQfQ4BO2WKIoU4bG4xvNvFF76Vq2Favj3V8rGuyMzum4z_IWXQ5g4j-qGYCSF&view=documents#section-isodocuments-top.

ISO - *Management System Standards list*. (n.d.). ISO. <https://www.iso.org/management-system-standards-list.html>.

ISO - *Sustainable Development goals*. (n.d.). ISO. <https://www.iso.org/sdg>.

ISO/IEC 42001:2023. (n.d.). ISO. <https://www.iso.org/standard/81230.html>.

ISO/IEC JTC 1/SC 42 - *Artificial intelligence*. (2023, September 11). ISO. <https://www.iso.org/committee/6794475.html>.

ISO/PC 343 - *Sustainable development goals management*. (n.d.). ISO. <https://www.iso.org/committee/9634841.html>.

ISO/UNDP PAS 53002:2024. (2024, September 12). ISO. <https://www.iso.org/standard/87945.html>.

ISO/UNDP WD 53001.2. (n.d.). ISO. <https://www.iso.org/standard/86672.html>.

IWA 48:2024. (n.d.). ISO. <https://www.iso.org/standard/89240.html>.

Lok, K. L., Opoku, A., Smith, A., Vanderpool, I., & Cheung, K. L. (2023). Sustainable facility management in UN development goals. *IOP Conference Series Earth and Environmental Science*, 1176(1), 012022. <https://doi.org/10.1088/1755-1315/1176/1/012022>.

Mosgaard, M. A., & Kristensen, H. S. (2023). From certified environmental management to certified SDG management: new sustainability perceptions and practices. *Sustainable Futures*, 6, 100144. <https://doi.org/10.1016/j.sftr.2023.100144>.

THE 17 GOALS | Sustainable Development. (n.d.). <https://sdgs.un.org/goals>.

United Nations [General Assembly Economic and Social Council]. (2024). *Progress towards the Sustainable Development Goals: Report of the Secretary-General (A/79/79-E/2024/54)*. Retrieved January 15, 2025, from <https://unstats.un.org/sdgs/files/report/2024/SG-SDG-Progress-Report-2024-advanced-unedited-version.pdf>.

World-first international guidelines empower businesses and organizations to fast-track SDG success. (2024, September 12). ISO. <https://www.iso.org/news/SDGguidelines>.

Yinuo. (2024, December 19). *Era of AI: Internet Governance Forum closes with call for stronger multistakeholder action to harness digital promise and tackle threats*. United Nations Sustainable Development. <https://www.un.org/sustainabledevelopment/blog/2024/12/press-release-igf2024closing/>.

Yinuo. (2025, January 10). *Press Release | WMO confirms 2024 as warmest year on record at about 1.55°C above pre-industrial level*. United Nations Sustainable Development. <https://www.un.org/sustainabledevelopment/blog/2025/01/press-release-wmo-confirms-2024-as-warmest-year-on-record-at-about-1-55c-above-pre-industrial-level/>.

SHIFT IN ORGANISATIONAL DESIGN: BIBLIOMETRIC MAPPING OF POST-BUREAUCRACY AS A NEW DIRECTION OF INNOVATIVE BUSINESS PRACTICES

Rebeka Gajdosik

University of Economics in Bratislava, Faculty of Business Management, Slovakia
rebeka.gajdosik@euba.sk

ABSTRACT

Post-bureaucracy emerged among the very first innovative concepts challenging the traditional hierarchical management system by emphasising decentralisation and collaboration as foundations for modern organisational design. With its focus on flexibility and adaptability, post-bureaucracy paves the way for sustainable organisational practices. This paper systematically explores the research landscape of post-bureaucracy through a comprehensive bibliometric analysis, based on a sample of 231 publications retrieved from the Web of Science database, spanning from 1969 to 2024. Utilising the Bibliometrix R package and the web-based application Biblioshiny, the paper identifies prominent authors, journals, and publications, while visualising collaborative networks, word clusters and thematic maps that shape the academic discussions around post-bureaucracy. Early post-bureaucratic studies adopted a broad perspective, but the late 2000s marked a shift towards more targeted research, exploring specific aspects of the field. The findings reveal a significant level of publications over the past years, with a significant peak in 2017, indicating a critical point in the research's advancement. The paper underscores the global importance of the field, where the United Kingdom stands out among contributing countries. The research paper enhances the understanding of post-bureaucratic management practices, offering an insight into the development and trends that have shaped its academic evolution as an innovative organisational paradigm. Moreover, the study suggests avenues for future investigation to advance the research on post-bureaucracy and related concepts.

Keywords: *post-bureaucracy, decentralisation, bibliometric analysis*

INTRODUCTION

Post-bureaucracy was one of the earliest innovative approaches to challenge traditional hierarchical management emphasizing decentralization and collaboration as core principles of modern organizational design (Heckscher & Donnellon, 1994). With its focus on flexibility and adaptability, post-bureaucracy lays the groundwork for fostering sustainable organizational practices (Kira & Forslin, 2008). The concept represents a shift from traditional organizational understanding, characterized by an increased employee autonomy (Johnson et al., 2009). The transition itself is driven mainly by globalization and technological advancements, leading to a more agile, interconnected and adaptive approach to organizational management. Post-bureaucratic organizations delegate more power to employees, which reflects the breakdown of strict hierarchical structures (Johnson et al., 2009). On the other hand, this shift also transfers responsibility from setting personal boundaries from the organization to the individual (Maravelias, 2003). Bibliometric analysis offers an objective approach to evaluate scientific literature and enable to map the research specifics in management and organisational studies (Zupic & Čater, 2015). The main aim of this research paper is to assess the academic contributions to post-bureaucratic research by formulating three research questions and addressing them through a comprehensive bibliometric analysis.

1. RESEARCH QUESTIONS:

1. How has the volume of research on post-bureaucracy evolved over the years and what is the peak year of publication within the dataset?
2. Which concepts and topics most commonly appear in post-bureaucratic studies, what are the emerging trends?
3. What are the key collaborative networks and clusters in post-bureaucratic research?

2. RESEARCH METHODOLOGY

The research paper aimed to trace the evolution of academic publications on post-bureaucracy using data extracted from the Web of Science database. This method employed a bibliometric analysis to identify trends, patterns, and relationships within the existing academic literature, thus providing a comprehensive overview of the field's development. The analysis was conducted using Biblioshiny, a bibliometric analysis tool within the R software environment, which enabled the visualisation and mapping of the dataset according to various criteria. Publications were selected for inclusion based on specific search query designed to ensure direct relevance to the topics: post*bureauc* (All fields) or post-bureauc* (All fields). Following a careful evaluation of eligibility, a final sample size of 231 publications was

identified and retrieved in BibTex format from the Web of Science database. No further adjustments were made to the dataset. The process of selecting the dataset is illustrated in Figure 1. To support the main aim of the paper, a set of research questions was developed. The research findings are organised into three main sections, each corresponding to a research question: Research trends of post-bureaucracy, Collaborative Networks and Influential Works, Thematic Mapping and Key Word Analysis. Key bibliometric metrics such as Annual Scientific Production, Average Citation per Year, Key Word Analysis and Collaborative Networks were utilised to address these questions.

This systematic methodology provided a structured approach to exploring the evolution of post-bureaucratic research, identifying prominent contributors, and dominant themes, offering valuable insight into the fields' development and emerging directions.

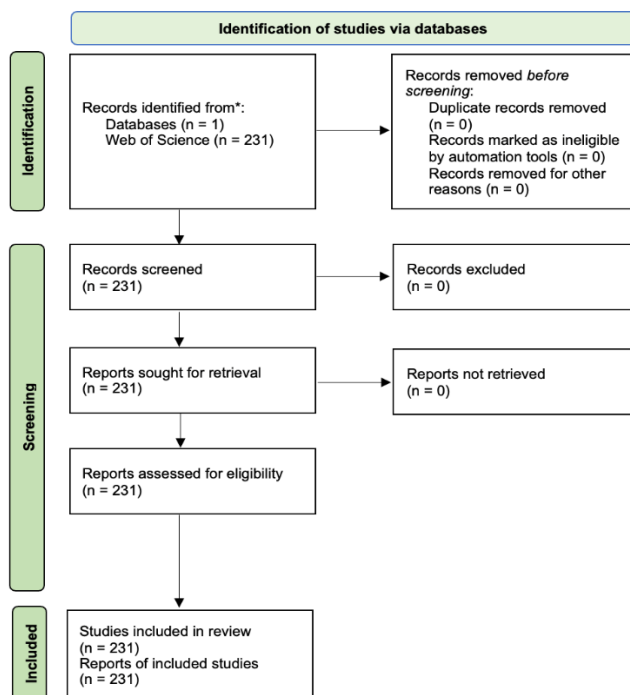


Figure 1

PRISMA Diagram of Data Collection¹

3. BIBLIOMETRIC ANALYSIS RESULTS

After the retrieval of relevant dataset, bibliometric program called Biblioshiny was utilised to process the data and retrieve relevant figures to address the research questions. The following part is

¹ Prisma diagram adapted from Creative Commons, used under CC BY 4. Changes were made.

divided into three main thematic blocks, where the aim was to address each research question by analysing relevant figures.

4. RESEARCH TRENDS OF POST-BUREAUCRACY

The research examines the impact and thematic evolution of 231 publications between 1969 and 2024, where citation patterns, collaboration networks, thematic trends and other aspects are analysed. The dataset incorporates different journals, chapters and papers from 145 different sources. With a conservative average annual growth rate of publications over the period at 4.28% and document average age at 12.2 we can conclude that the field has experienced moderate growth in the number of publications while maintaining a relative mature body of literature. On average, individual publications within the dataset were cited 24.48 times and the total number of cited references is 12 900. Among the research data, 465 unique key words were identified.

Main information about dataset	Results
Timespan	1969:2024
Sources (Journals, Books, etc)	145
Documents	231
Annual Growth Rate %	4.28
Document Average Age	12.2
Average Citations per Doc	24.48
References	12 900
Keywords Plus (ID)	465

H-Index is a measure of productivity and impact of the published works of a researcher. (Hirsch, 2005). With an H-Index of 39, as shown in Figure 2, the study explores the academic significance of the analysed

publications.



Dataset Statistics

Figure 3 represents a combination of publications and citations statistics over the research period. The average citation per year peaked in 2021, suggesting that key foundational research published around this time gained significant attention. However, subsequently, a noticeable decline occurred, which may reflect a temporary decline in focus or relevance of existing works within the academic field. Respectively, this decline in citations may reflect a shift in focus to other closely related concepts such as agile management or holacracy. In contrast to citation metrics, annual scientific production in post-bureaucracy peaked in 2017, reflecting a sharp increase in scholarly contributions that year. This growth suggests an expanding recognition of post-bureaucracy as a crucial area of study. The sharp increase in 2017 may have been driven by several factors, including a heightened awareness of the field's relevance. After 2017 the publication trend stabilised to pre-2017 levels on average, potentially signalling the fields maturity, as foundational ideas established during the peak are being refined or expanded, respectively integrated in a more concentrated form.

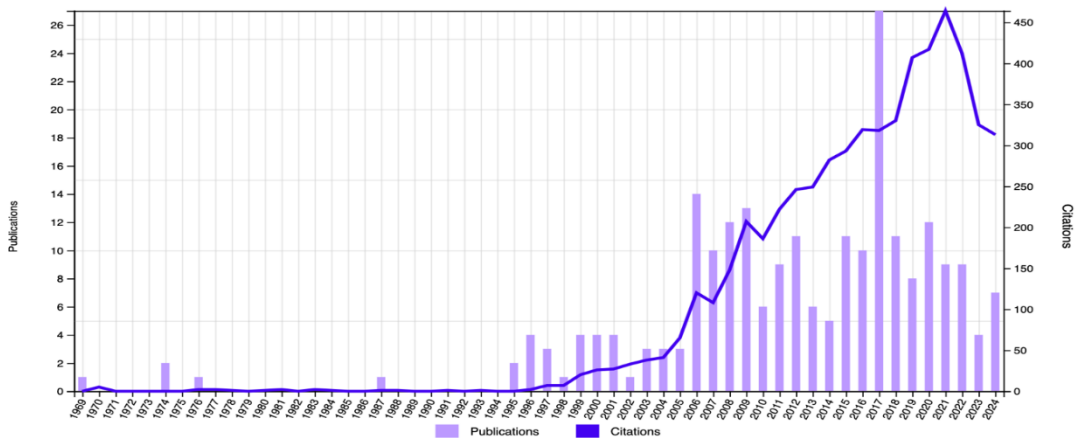


Figure 3
Annual Scientific Production and Citations

5. THEMATIC MAPPING AND KEY WORD ANALYSIS

The following section focuses on the analysis of thematic concepts within the research field. This exploration aims to identify underlying patterns and relationships that contribute to the discourse around post-bureaucracy.

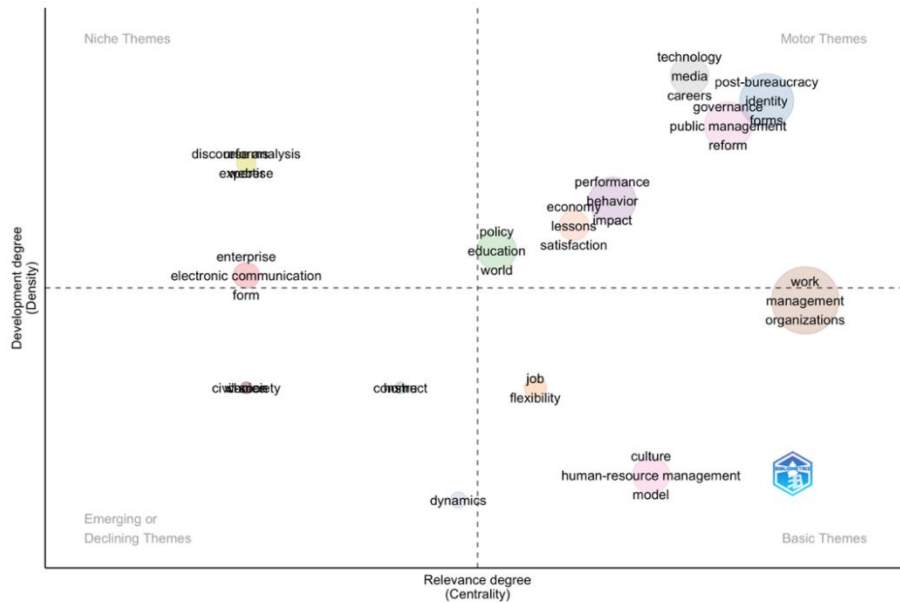


Figure 4
Thematic Map

Thematic Map in Figure 4 provides a clear visual representation of academic research themes and developments in post-bureaucratic research. **Motor themes** represent highly relevant topics, including concepts closely tied to post-bureaucracy (identity, governance, reforms, technology, etc.). These motor themes have a critical role in driving the discourse on post-bureaucratic organisational changes. **Emerging themes** reflect an increasing acknowledgement of gender dynamics in societal structures, which contributes to and highlights the importance of the sustainable development in the business sphere. Here emerge topics such as civil society and focus on women resp. gender aspects within corporate positions. **Niche** and **Basic themes** represent different levels of relevance. Niche topics are highly specific and have limited application beyond their immediate focus area. In this Thematic Map we can see **niche themes** surrounding reforms and discourse analysis. **Basic themes** are considered foundational and provide

essential background that supports the core understanding of the research field, with themes such as job, flexibility, work management, corporate culture.



Figure 5

Word Cloud

Figure 5 further highlights central concepts that are inevitable to the research field. We can see that the most common words – work, management, organisations – are connected more to the Basic Themes, previously described in Figure 4. This indicates, that analysed publications are based on the common grounds of understanding post-bureaucracy and its core concept.

6. PROMINENT AUTHORS AND PUBLICATIONS ANALYSIS

The last part of the research examines key contributors and influential works that have shaped the research field over the timespan. Figures highlight the evolution of ideas and trends over time.

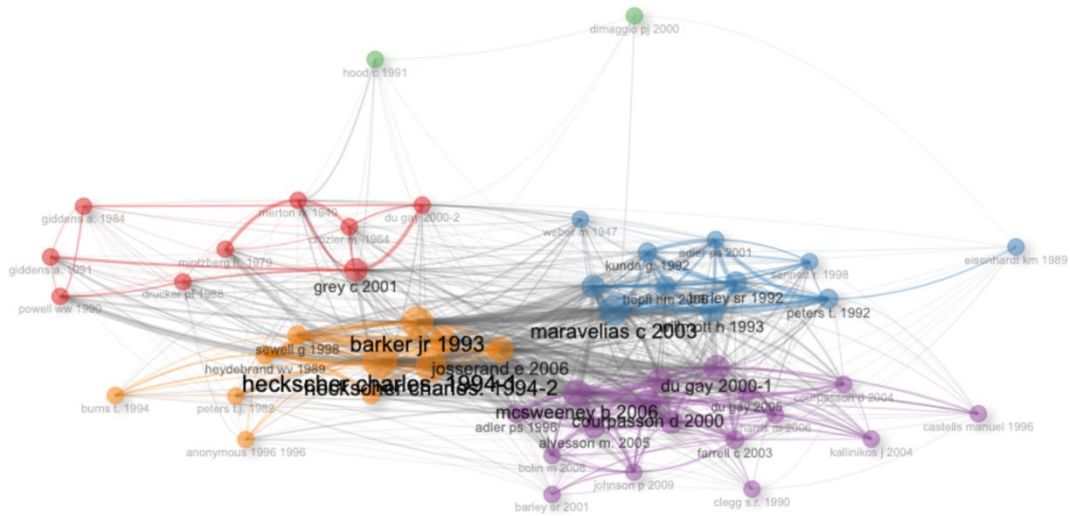


Figure 6
Co-citation Network

Co-citation Network in Figure 6 indicates which documents are frequently cited together by scholars, showing the intellectual structure of the research field. The colour-coded clusters represent thematic groups, highlighting groups of studies that are frequently co-cited, suggesting shared themes and theoretical foundations. The largest nodes represent foundational works that have significant influence in the research field, such as the research paper *The Post-Bureaucratic Organization: New Perspectives on Organizational Change* (Heckscher & Donnellon, 1994). The dense interconnectedness between clusters indicates that while the field is rather fragmented in terms of collaboration, there are strong theoretical overlaps. This suggests that post-bureaucracy has a relatively cohesive intellectual base, with certain works acting as bridges between clusters, connecting various subtopics within the field.

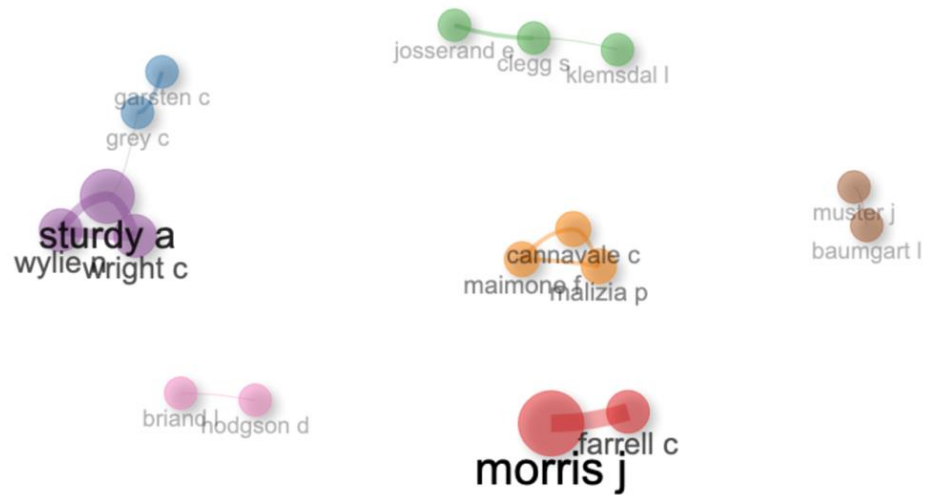


Figure 7
Collaboration Network

The Collaboration Network in Figure 7 visualizes the relationships and co-authorship patterns among researchers, institutions, or countries involved in a specific field of study. The figure highlights key contributors, the strength of their collaborations, and the extent of interconnectedness within the academic community, helping to identify influential players and clusters of collaboration.

The presence of a small number of clusters, each with a handful of interconnected authors suggests that research on post-bureaucracy is relatively fragmented, with limited large-scale collaboration among scholars. This could indicate that the field is still emerging, with niche groups working independently, or that there are distinct, specialized subtopics being explored without significant overlap or integration among researchers.

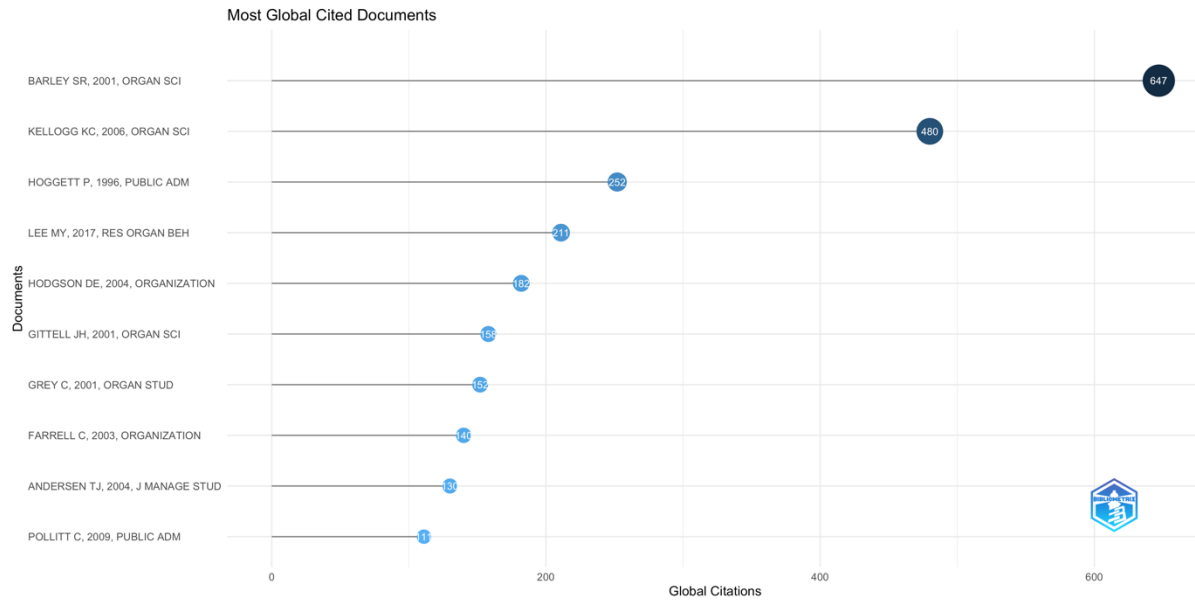


Figure 8
Most Global Cited Documents

Figure 8 visualises the most globally cited publications within the dataset, where two publications prevail among all. These are *Bringing Work Back In* (S. R. Barley & Kunda, 2001) and *Life in the Trading Zone: Structuring Coordination Across Boundaries in Postbureaucratic Organizations* (Kellogg et al., 2006). Barley & Kunda (2001) trace the historical development of organisational theory and emphasise the need to reintegrate detailed studies of work into organisational theory in order to make sense of post-bureaucratic organising. As a result, fresh conceptual insights emerge alongside with a rich empirical foundation for understanding modern organisational dynamics. Kellogg et al. (2006) examine how members of interactive marketing organisations coordinate across various communities under conditions of speed, uncertainty and rapid change. The authors identify cross-boundary coordination practices and show how these practices enable a flexible coordination structure that supports adaptability, speed, and learning. On the other hand, challenges are highlighted too, such as privileged speed over quality or other misinterpretations of post-bureaucratic practices. Both studies contribute to the understanding of post-bureaucratic organisations by emphasising the importance of detailed work practices and coordination to address complexity, speed, and change.

CONCLUSION

In conclusion, this study offers a comprehensive bibliometric analysis of post-bureaucratic research, highlighting the field's significance. The research findings reveal that while the research landscape during the analysed timespan is relatively fragmented, it has a cohesive intellectual foundation, with certain key publications and prominent authors shaping the discourse. Publication trends peaked and outperformed all other years in 2017, establishing it as a pivotal year in the research of this field. Core themes such as post-bureaucracy, governance, identity, reform, and technology dominate the field, while emerging trends highlight an increasing focus on gender-related perspectives and the role of civil society in connection to the rise of attention to sustainable business practices. The study underscores the global significance of post-bureaucracy, with notable contributions from numerous countries that are driving the theoretical and practical understanding of the topic. On the other hand, limited large-scale collaborations highlight the need for greater integration to respond to the shifting demand in contemporary organisational management and societal changes towards more agile and innovative practices.

ACKNOWLEDGEMENT

This work was supported by VEGA 1/0775/25.

REFERENCES

- Barley, S., & Kunda, G. (2001). Bringing work back in. In *Organization Science* (Vol. 12, Issue 1, pp. 76–95). INFORMS. <https://doi.org/10.1287/orsc.12.1.76.10122>
- Barley, S. R., & Kunda, G. (2001). Bringing Work Back In. *Organization Science*, 12(1), 76–95. <https://doi.org/10.1287/orsc.12.1.76.10122>
- Heckscher, C., & Donnellon, A. (1994). *The Post-Bureaucratic Organization: New Perspectives on Organizational Change*. SAGE Publications.
- Hirsch, J. E. (2005). An index to quantify an individual's scientific research output. *Proceedings of the National Academy of Sciences of the United States of America*, 102(46), 16569–16572. <https://doi.org/10.1073/pnas.0507655102>
- Johnson, P., Wood, G., Brewster, C., & Brookes, M. (2009). The Rise of Post-Bureaucracy Theorists' Fancy or Organizational Praxis? *International Sociology - INT SOCIOLOG*, 24, 37–61. <https://doi.org/10.1177/0268580908100246>
- Kellogg, K. C., Orlikowski, W. J., & Yates, J. (2006). Life in the Trading Zone: Structuring Coordination Across Boundaries in Postbureaucratic Organizations. *Organization Science*, 17(1), 22–44. <https://doi.org/10.1287/orsc.1050.0157>
- Kira, M., & Forslin, J. (2008). Seeking regenerative work in the post-bureaucratic transition. *Journal of Organizational Change Management - J ORGAN CHANGE MANAGE*, 21, 76–91. <https://doi.org/10.1108/09534810810847048>
- Maravelias, C. (2003). Post-bureaucracy—Control through professional freedom. *Journal of Organizational Change Management*, 16, 547–566. <https://doi.org/10.1108/09534810310494937>
- Zupic, I., & Čater, T. (2015). Bibliometric Methods in Management and Organization. *Organizational Research Methods*, 18, 429–472. <https://doi.org/10.1177/1094428114562629>

THE SHARING ECONOMY - THE NEW DISRUPTIVE WAY OF A SUSTAINABLE ECONOMY

Jaroslav Viglasky, University of Žilina, Slovak Republic,
viglasky@betria.sk

Milan Fiľa
College of Applied Psychology, Czech Republic
fila@vsaps.cz

ABSTRACT

In recent years, we have been facing concerns about ongoing climate change and unrestrained consumption, which threaten the environment and our ability to preserve it for future generations. In connection with these conditions, people are beginning to focus on new ways of consumption. They are trying to change their consumer behavior from a consumption economy to a sustainable economy. One of the ways of this transition appears to be the sharing economy, which has experienced an enormous increase in recent years, according to several forecasts, this trend will continue for the next few years and also offers new disruptive methods to the traditional ways of doing business, based on the development of digital technologies and online platforms. Also for this reason, in our paper, we focus on the sharing economy and its connection with the concept of sustainability. We also provide a brief insight into this issue within this article by using the comparative analysis of various research and professional, documents, of multiple statistics and analyses focused on the solved issue, which will help us to receive a better idea of what the position of the sharing economy in the sustainable economy is. And also what the benefits of the sharing economy are for sustainability.

Keywords: *the sharing economy, the sustainable economy, economy, sustainability.*

INTRODUCTION

In recent years, not only economists, but various experts around the world are trying to reverse the undesirable trend of excessive consumption of limited raw materials, as well as its effects on climate change. This effort focuses on finding new ways to the economic behavior of consumers with the aim of better and more efficient use of already existing products with minimal waste generation. This effort is made primarily to slow down the effects of climate change on our planet, promote environmental protection, and preserve resources and the environment for future generations. However, for this to be possible, the experts first had to precisely define the goals that the economy should achieve and, above all, an economy focused on sustainability because with such an economy it is necessary to determine not only the goals that we want to achieve, but also the way of perceiving consumption, production and the subsequent use of waste, respectively products that have reached the end of their useful life. At the same time, it was necessary to look at different ways of transitioning from the consumption economy to the economy of sustainability, one of the modern ways that enabled the development of digital and online technologies is the sharing economy, which offers a new disruptive perspective on traditional ways of trading and doing business.

1. METHODOLOGY

When elaborating on this scientific article, we used theoretical knowledge and information from available domestic and foreign literary sources. The sources of information were data and knowledge obtained through the study, processing, and analysis of scientific and professional publications, as well as available statistics of the Statista database. Methods of analysis and synthesis of background materials and processed data were also used when investigating the issue.

Trend was calculated by using an exponential smoothing algorithm. This approach belongs to the so-called adaptive models approach to time series and is characterized by the fact that it takes into account the most recent observations as the most relevant for forecast generation.

The fundamentals of this approach were set by Brown – Meyer (1961). In contrast to the moving average method, which smooths the time series with polynomial functions over short segments whose length is predetermined, exponential smoothing removes this problem because the calculation of each smoothed value is based on all available past observations of the time series.

The basic least squares method is modified so that the weights of the individual squares in the minimized sum are exponentially decreasing towards the past (hence the name of the method). For balanced values of the time series, the minimized expression must be of the form:

$$(y_t - Y_t)^2 + (y_{t-1} - Y_{t-1})^2 a + (y_{t-2} - Y_{t-2})^2 a^2 + \dots$$

Where a is the so-called balancing constant satisfying the condition $0 < a < 1$. In practice, we assign increasingly lower weights to older observations.

2. THE SUSTAINABLE ECONOMY

As Poschen (2015) suggests, making the economy environmentally sustainable is no longer optional, but it is a necessity also from the point of view of labor market and social development. But what is a sustainable economy, what should we imagine under this term? When we look at WWF (2020) definition, we can see that a sustainable economy provides a good quality of life for people, stays within the planet's limits, and helps keep global warming well below the 2°C threshold. Based on Bolt (2023) a sustainable economy is all about resource management and encouraging economic innovations. As Urbaníková et al. (2020) mention, increasing the competitiveness of economies, economic growth, and employment growth, cannot be achieved without innovation and increasing innovation performance. On the other hand, Prysmian (2024) magazine mentions, that economic sustainability refers to practices designed to create the long-term economic development of a company or nation while also managing the environmental, social, and cultural aspects of its activities. It is about balancing economic growth and generating profit with the impact on the environment and people. Devine (2020) suggests, that sustainability economics promotes the pursuit of the „3 E`s“: equity, the economy, and the environment. He also suggests that sustainability economics is grounded in the knowledge that equity, the economy, and the environment are inextricably linked. Based on Balisacan et al. (2015) sustainable economic development incorporates sustainable growth and dynamically efficient development patterns. It also treats people as citizens, who are part of somewhere, of their specific society, now and in the future, and who have a location and a nationality (Helm, 2023). To this definition agrees also Tarantino (2024) who points out, that a sustainable economy means an economy that meets the needs of the current generation without compromising future ones. As Hernandez (2024) mentions, sustainable economic growth is guided by the principles of the Triple Bottom Line, encompassing three equally important pillars:

- Environmental stewardship: Minimizing ecological impact through practices like reducing waste, conserving resources, and mitigating climate change.

- Social responsibility: Ensuring positive social outcomes by creating fair labor practices, supporting communities, and promoting diversity and inclusion.
- Economic profitability: Achieving financial success through efficient operations, innovation, and creating long-term value for stakeholders.

Further in Figure 1, based on Hecht et al. (2012), we can see, that the sustainable economy framework focuses mainly on the economic and environmental pillars. A sustainable economy also provides additional social benefits such as job creation, poverty alleviation, and improved environmental conditions. In particular, the focus on sustainable agriculture and transportation, as well as more eco-efficient manufacturing, will result in improvements in all three pillars.

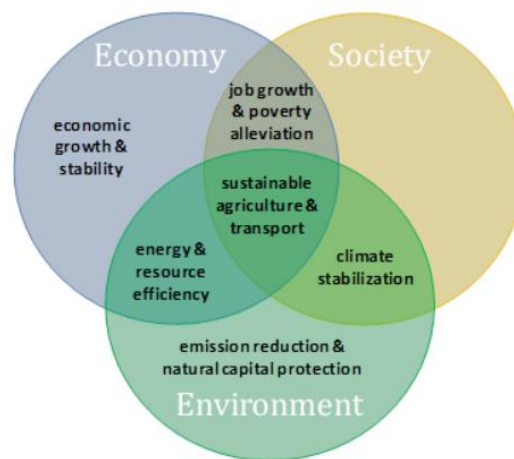


Figure 1

Sustainable Economy Framework. Source: Hecht et al., 2012

As Green (2023) suggests, sustainability economics occurs when a financial or non-financial activity or practice contributes to long-term financial growth while maintaining the natural world, community, and social aspects in mind. Economic sustainability's primary goal is to balance economic growth and beneficial improvements for the environment and people. She also suggests that economic sustainability is critical since it is almost impossible for any business to achieve long-term growth or success if it relies on finite resources for manufacturing, marketing, and pique investor or consumer attention.

Based on all definitions of sustainable economics it is important to find the ideal balance between the economy and the environment in such a way that the current society has all its needs met, but not at

the expense of future generations, especially when taking into account the current limited production factors, or resources. Therefore, it is necessary to look for new ways of more efficient use of existing resources, by taking into account the requirements of the citizens and given environmental conditions. Kučera et al. (2023) pointed out that Data Envelope Analysis (DEA) is the suitable tool for efficiency comparison across different sectors of the economy. One such way is the sharing economy, which we will take a closer look at next.

3. THE SHARING ECONOMY

The term sharing is not something new, new is just the point of view of this term, because we do not see the sharing of a product as the item, but we look at sharing as a service. According to George – Julsrud (2019), “Sharing Economy” is a term used to describe recent changes in the way individual economic entities consume resources and services. Plevák (2018) points out that the term sharing economy does not refer to just one concept, but to a whole range of approaches that may fundamentally differ in their philosophy, but have a common feature, which is a better and more efficient use of the assets we have from an economic point of view. As Novák (2016) states, the sharing economy is a socio-economic ecosystem based on the sharing of human and natural resources, while sharing includes value creation, production, distribution, trade, and consumption of goods and services by different people and organizations. As the Deutscher Bundestag (2015) states, the sharing economy initially had a largely positive meaning as a socially beneficial and environmentally friendly new form of economy and a contribution to a sustainable lifestyle. However, it is now often criticized that what was once commonplace, free neighborly help and idealistic ideas have fueled the emergence of profit-oriented business models in which people do not participate, but rather rent or pay for the service. The sharing economy is part of a wider complex of the so-called circular economy, also known as the circular economy, where sharing consists in the fact that we do not buy things, but only their services (Česká spořitelna, 2024). Another definition states that the sharing economy is part of a sustainable development perspective that aims to rationalize the use of underutilized resources or assets. This business model owes its reputation to the performance of the Internet: digital platforms, even though individuals have been involved in sharing activities for thousands of years (Sedkaoui and Khelfaoui, 2020). These suggestions can also be seen in Figure 2, created by Karobliene and Pilinkiene (2021), who define the sharing economy as the interaction between the providers of shared items and users mediated by IT platforms, facilitating access to items instead of ownership.

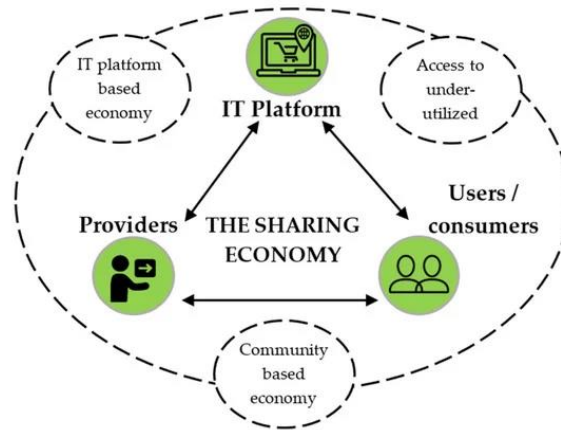


Figure 2

Theoretical overview of the sharing economy. Source: Karobliene – Pilinkiene, 2021

The sharing economy as a modern economic phenomenon brings a disruptive perspective on traditional forms of business. Although the concept of sharing is nothing new in our conditions, what has helped its rapid development is precisely the development of digital platforms that form the basis of the sharing economy and at the same time bring a new perspective on the ownership of things. It is a new model of organizing economic activity that can replace traditional corporations and capitalism around the world (Compagnucci et al., 2019). With this definition agrees also Mason (2015), who suggests that the emergence of digital economies, in which the sharing economy is included, has disrupted common trade practices, traditional regulations, policy systems, city legislations, consumer behavior, and other socioeconomic habits. Theoretically, the sharing economy, compared to for-profit organizations, promotes access over ownership, collaborative consumption over hyper-consumption, openness over privacy, cooperation over competition, self-organization over hierarchy and control, peer-to-peer (p2p) over business-to-business (b2b), networked structures over top-down structures, prosumers over passive consumers and customization over standardization (I-riide, 2022). As FasterCapital (2024) mentions, the sharing economy has been a catalyst for the new economy, but it also has the potential to promote sustainability. By sharing resources, we are reducing waste and promoting a circular economy. BusinessInfo (2017) also points out, citing economist Boyd Cohen, that over 700 new business models may exist within the shared, collaborative, or platform economy. According to Kotýnková (2020), one of the strengths of the sharing economy is the sharing of unused capacities and goods that others can not own or do not want to own. As another benefit, he states that the shared economy puts pressure on traditional market entities, which leads to an increase in the variety and quality of the market. As

weaknesses, he identifies difficulties with tax collection and the legal enforceability of arising obligations, as well as the fact that, due to the sharing economy, there is a decrease in demand on the traditional market. If we proceed from Lukkanen and Tura (2020), we can also see in the following table that in the sustainable creation of values, companies participating in the sharing economy focus on 3 main areas: economic, social, and environmental.

Table 1: Conceptual framework for analyzing sustainable value creation

Environmental	Social	Economic
<p>Increasing resource efficiency Reuse of products, by-products, and materials. Elimination/reduction of waste. Use of renewables (e.g. energy, raw materials).</p>	<p>Safeguarding health and safety The health and safety of employees/customers/communities are ensured.</p>	<p>Increasing cost-efficiency Increases in efficiency and reduced costs compared to alternatives.</p>
<p>Responsible use of natural resources (e.g. water, raw materials), respecting the welfare of ecosystems, people, and animals. No creation of rebound effects.</p>	<p>Respecting laws, regulations, and rights Laws, standards, and regulations (e.g. taxes, terms of use) and individuals' rights (e.g. privacy) are respected.</p>	<p>Increasing profits and business opportunities Increases in profits and/or creation of new business opportunities and markets.</p>
<p>No harmful environmental impacts and emissions No emissions (e.g. greenhouse gases) harming people or the environment. No harm to ecosystems or the environment.</p>	<p>Respecting employee, stakeholder, and individual rights Employees' and stakeholders' terms are handled fairly (e.g. by paying living wages and non-discrimination). Equal treatment of employees/stakeholders/individuals.</p>	<p>Operational stability and risk reduction Increases in long-term stability and risk reductions.</p>

<p>Increasing environmental well-being</p> <p>Increases in biodiversity and environmental well-being by repairing previous damage and solving environmental problems (e.g. reducing ozone depletion).</p>	<p>Ethical principles and no harmful social impacts</p> <p>Operations, products, and services do not harm people or communities. Human rights are respected (e.g. no child labor). Ethical principles are followed (e.g. caring use of resources, honest competition).</p>	<p>Increasing attractiveness</p> <p>Increases in reputation and brand value (e.g. attractiveness as an employee/collaborative partner).</p>
	<p>Increasing social well-being</p> <p>Increases in socio-psychological welfare (e.g. happiness, social cohesion).</p>	<p>Increasing economic well-being</p> <p>Increases in socio-economic welfare (e.g. employment).</p>

Source: Lukkanen and Tura, 2020

As we can see the concept of the sharing economy is a disruptive one, because it brings new ways to traditional business models by using digital technologies and online connections. It also transforms the thinking of users, where in the first place is not the ownership of a good, but the access to it, so the underutilized capacities can be used more effectively and efficiently. Which can help reduce waste and give a longer life to existing products. We can also see, that there can exist over 700 business models within this new concept of economy. Despite the various disadvantages mentioned by several authors (problematic tax collection, and insufficient legislative protection), the sharing economy still appears to be a positive economic trend.

The sharing economy also has a significant social impact in the area of creating relationships or the corporate culture of employees. Since most modern corporate cultures are primarily focused on performance, it is necessary to create such conditions that employees feel accepted and valued, because otherwise, not only high employee turnover occurs, but also their frustration, which can lead to depression and also to burnout syndrome, which in recent years, thanks to the performance-oriented corporate culture, is beginning to be an often inflected term that negatively affects the health of employees, especially those working in management positions in organizations, according to Tóthová and Nemeč (2024).

4. THE SHARING ECONOMY IN THE CONTEXT OF THE SUSTAINABLE ECONOMY

As Karobliene and Pilinkiene (2021) in their research suggest, the sharing economy acts based on access to underutilized goods or services, which indicates that the sharing economy shifts markets towards a sustainable ecosystem by impacting it from the perspective of economic, social, and environmental development. This opinion is followed also by Demailly and Novel (2014) who mention, that „shareable“ goods account for about a quarter of household expenditure and a third of household waste, so if sharing models could be operated under the most favorable conditions, savings of up to 7% in the household budget and 20% in terms of waste could be achieved. Based on Mi and Coffman (2019), the sharing economy has positive environmental impacts, through a reduction in the total resources required and it helps reduce pollutants, emissions, and carbon footprints. In the transportation sector, vehicle-sharing behavior can have a positive environmental impact by decreasing the number of kilometers traveled. Such sharing activities can also stimulate long-lived changes in consumer behavior by shifting personal transportation choices from ownership to demand fulfillment. Sharing commodities and services can also provide health benefits – implementing bike-sharing programs leads to greater propensities to cycle among individuals who live in regions where bike-sharing services are available. Boar et al. (2024), who studied all three dimensions of the sharing economy, state, that regarding the environmental dimension, a reduction of negative impact on the planet can be found because of the reduction of emissions and waste; considering the economic dimension, the sharing economy has created new opportunities for companies but they require the intervention of authorities to create regulation in the sector; for the social dimension, the sharing economy improves the quality of life but has a negative impact in the neighborhoods of big cities such as Barcelona and Amsterdam because it creates conflict between tourists and local people, to the point that Amsterdam have banned touristic apartments in the city center. Dabbous and Tarhini (2021), have in their study investigated and empirically assessed the relationships between the sharing economy use and sustainable economic development and energy efficiency. Based on the results, the study considers that the sharing economy has the potential to be viewed as a pathway to both sustainable economic development and energy efficiency.

As we can see in Figure 3 the sharing economy has a big potential. Just by comparing the data from 2020 and following the gradual development of the Value of the sharing economy worldwide, we can see that the value of the sharing economy is growing exponentially. And in the first years, we see an increase, but to a reduced extent, the forecasts for the next years are more favorable. If we were to compare only the years 2020 and 2027, Statista.com (2024) predicts a 6-fold increase in the value of the

sharing economy just in the period of the mentioned years (from the initial value of 100 billion USD in 2020 to the final value of 600 billion USD in 2027). While it is also assumed that this trend will continue until 2031 when it is assumed that the global value of the shared economy could reach a final value of 793.68 billion USD. Which compared to the year 2020 represents an almost 8-fold increase, although compared to the year 2027 this increase is no longer so striking and represents only an approximately 1.3-fold increase over 4 years.

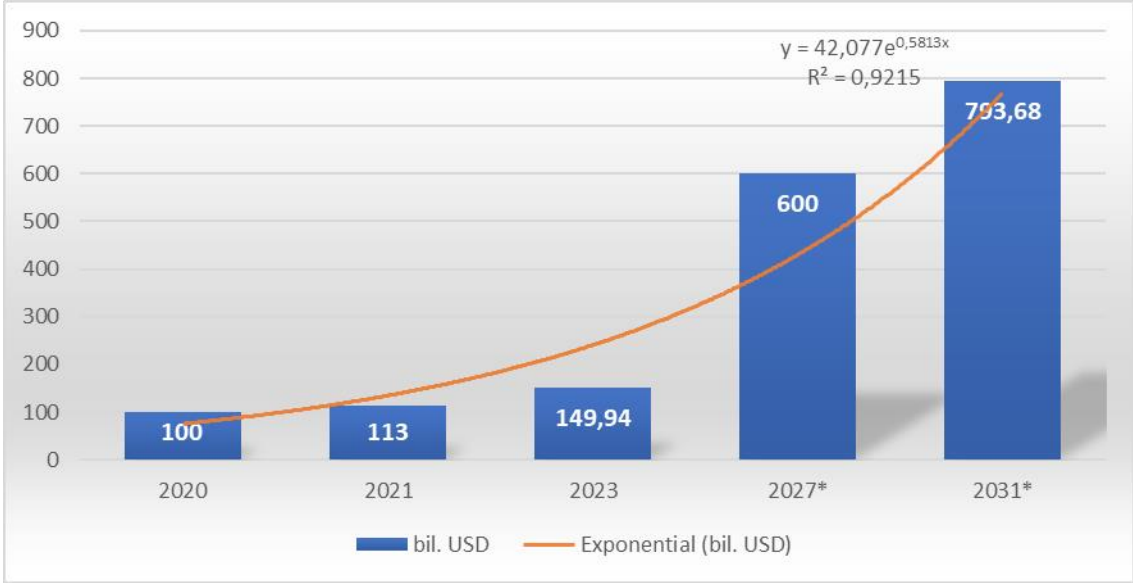


Figure 3

Value of the sharing economy worldwide in 2021 and 2023 with a forecast for 2027 and 2031. Source: Statista.com, 2024

Based on these authors we can see, that the benefits of the sharing economy toward sustainability are more prominent than the negatives, and with the changing thinking of consumers, there is a strong trend of increase in the sharing economy, which is also confirmed by the Statista.com (2024), which, based on the current development of the sharing economy, predicts an increase in the value of the sharing economy to the level of 793.68 billion US dollars by 2031, compared to the value of 149.94 billion US dollars in 2023.

CONCLUSION

Based on our analysis of the various research and professional documents focused on sustainable and sharing economy research we can say, that the sharing economy is a solution to sustainability it offers us various disruptive methods to the traditional business models and thinking of firms, which is necessary

due to the decreasing limited production resources and the constantly worsening manifestation of climate change. It also offers modern ways of effective and efficient use of underused resources, by their sharing, where the ownership of such a good is not necessary.

REFERENCES

- Balisacan, A.M., Chakravorty, U. & Ravago, M.-L. V. (2015). Sustainable Economic Development: Resources, Environment, and Institutions (1st ed.). Elsevier Inc.
- Boar, A., Bastida, R., Marimon, F. (2024). Sustainability and Sharing Economy. <https://encyclopedia.pub/entry/1865>
- Bolt, O. (2023). What are the Characteristics of a Sustainable Economy? <https://energytheory.com/what-are-the-characteristics-of-a-sustainable-economy/>
- Brown, R.G., Meyer, R.F. (1961). The Fundamental Theorem of Exponential Smoothing. In: Operation Research. Vol. 9, No. 5. s. 603-767. DOI: doi.org/10.1287/opre.9.5.673
- Businessinfo. (2017). Sdílená ekonomika funguje na principu vzájemné důvěry. <https://www.businessinfo.cz/clanky/sdilená-ekonomika-funguje-na-principu-vzajemne-duvery/>
- Compagnucci, M.C., Forgó, N., Kono, T., Teramoto, S. A Vermeulen, E.P.M. (2019). "Legal Tech and the New Sharing Economy". Springer Nature Singapore.
- Česká spořitelna. (2024). Nedostatek zdrojů: Sdílená ekonomika. <https://www.csas.cz/cs/firmy/articles/nedostatek-zdroju-sdilená-ekonomika>.
- Dabbous, A., Tarhini, A. (2021). Does sharing economy promote sustainable economic development and energy efficiency? Evidence from OECD countries. Journal of Innovation & Knowledge, 6 (1), 58-68; <https://doi.org/10.1016/j.jik.2020.11.001>.
- Demilly, D., Novel, A.-S. (2014). The sharing economy: make it sustainable. IDDRI Study No. 03/14. https://www.iddri.org/sites/default/files/import/publications/st0314_dd-asn_sharing-economy.pdf
- Deutscher Bundestag. (2015). Aktueller Begriff: Sharing Economy. <https://www.bundestag.de/resource/blob/377486/21fc4300787540e3881dbc65797b2cde/sharing-economy-data.pdf>.
- Devine, R. (2020). The Sustainable Economy: The Hidden Costs of Climate Change and the Path to a Prosperous Future (1st ed.). Knopf Doubleday Publishing Group.
- FasterCapital. (2024). Sharing economy: The Sharing Economy: A Catalyst for the New Economy. <https://fastercapital.com/content/Sharing-economy--The-Sharing-Economy--A-Catalyst-for-the-New-Economy.html#The-Sharing-Economy-and-Sustainability>
- George, C., Julsrud, T.E. (2019). Chapter Two - Cars and the sharing economy: The emergence and impacts of shared automobility in the urban environment. In: Advances in Transport Policy and Planning. <https://www.sciencedirect.com/science/article/abs/pii/S2543000919300125>.
- Green, E. (2023). What Is Sustainability Economics? <https://sigmaearth.com/what-is-sustainability-economics/>
- Helm, D. (2023). Legacy: How to Build the Sustainable Economy (1st ed.). CPI Group Ltd.
- Hecht, A.D., Fiksel, J., Fulton, S.C., Yosie, T.F., Hawkins, N.C., Leuenberger, H., Golden, J.S. & Lovejoy, T.E. (2012). Creating the future we want. Sustainability: Science, Practice and Policy, 8(2), 62-75, DOI: [10.1080/15487733.2012.11908098](https://doi.org/10.1080/15487733.2012.11908098)

Hernandez, D. (2024). Sustainable Economic Growth: The Triple Bottom Line for a Thriving Future. <https://www.lythouse.com/blog/sustainable-economic-growth-the-triple-bottom-line-for-a-thriving-future>

I-riide. (2022). 10 principles of the sharing economy concept. <https://www.linkedin.com/pulse/10-principles-sharing-economyconcept-shiiped/>

Karobliene, V., Pilinkiene, V. (2021). The Sharing Economy in the Framework of Sustainable Development Goals: Case of European Union Countries. *Sustainability* 2021, 13(15), 8312; <https://doi.org/10.3390/su13158312>

Kotýnková, M. (2020). Vliv sdílené ekonomiky na snižování nejistot na trhu práce. <https://www.rovnaodmena.cz/www/img/uploads/35793d3c1.pdf>.

Kučera, J., Zimková, E., Nemeč, J., & Nemeč, M. (2023). A comparative analysis of the efficiency of public funding policies for sports in the European Union. *Cogent Social Sciences*, 9(2). <https://doi.org/10.1080/23311886.2023.2280335>

Laukkanen, M., Tura, N. (2020). The potential of sharing economy business models for sustainable value creation. *Journal of Cleaner Production*, 253. doi:10.1016/j.jclepro.2020.120004

Mason, Paul. 2015. *Post-Capitalism: A Guide to our Future*. London: Allen Lane.

Mi, Z., Coffman, D. (2019). The sharing economy promotes sustainable societies. *Nat Commun* 10, 1214 (2019). <https://doi.org/10.1038/s41467-019-09260-4>

Novák F. (2016). Desatero, na němž stojí ekonomika sdílení. https://www.dotyk.cz/publicistika/desatero-na-nemz-stoji-ekonomika-sdileni.html?utm_source=google&utm_medium=cpc&utm_campaign=DSA&gad_source=1&gclid=Cj0KCQjwxsm3BhDrARIsAMtVz6PiqhuCd95kUHORojVHw6WTmT7rrjH4g516tYzIRHvUtj3CMASpLKOaAkaOEALw_wcB

Plevák, O. (2018). Sdílená ekonomika má mnoho tváří: Uber, Airbnb, ale i chytrá města a cesta, jak méně zatěžovat planetu. <https://euractiv.cz/section/prumysl-a-technologie/news/sdilená-ekonomika-ma-mnoho-tvari-uber-airbnb-ale-i-chytra-mesta-a-cesta-jak-mene-zatezovat-planetu/>

Poschen, P. (2015). *Decent Work, Green Jobs and the Sustainable Economy: Solutions for Climate Change and Sustainable Development* (1st ed.). Greenleaf Publishing Limited.

Prysmian. (2024). Definition of economic sustainability. <https://www.prysmian.com/en/insight/sustainability/economic-sustainability-what-is-it>

Sedkaoui, S., Khelifaoui, M. (2020). *Sharing Economy and Big Data Analytics*. Wiley.

Statista.com. (2024). Value of the sharing economy worldwide in 2021 and 2023 with a forecast for 2027 and 2031. <https://www.statista.com/statistics/830986/value-of-the-global-sharing-economy/>.

Tarantino, J. (2024). The road to a sustainable economy. https://www.theenvironmentalblog.org/2024/02/the-road-to-a-sustainable-economy/#Why_do_we_need_a_sustainable_economy

Tóthová, V. – Nemeč, F. (2024). The Influence of Modern Performance-oriented Corporate Culture on the Health of Managers. *Applied Psychology*, Vol. 9, No. 17(2024), pp. 1482-1497.

Urbaníková, M.; Štubňová, M.; Papcunová, V.; Hudáková, J. Analysis of Innovation Activities of Slovak Small and Medium-Sized Family Businesses. *Adm. Sci.* 2020, 10, 80. <https://doi.org/10.3390/admsci10040080>

WWF. (2020). Sustainable Economies. https://www.wwf.eu/what_we_do/sustainable_economies/

REVOLUTIONIZING HUMAN ANATOMY EDUCATION: THE ROLE OF VIRTUAL AND AUGMENTED REALITY

Redon Jashari

UNI – Universum International College; Alma Mater Europea University, University Clinical Center of Kosova
redon.jashari@universum-ks.org

Donjet Bislimi

UNI – Universum International College; National Institute of Public Health of Kosova, Kosova;
Comenius University Bratislava, Bratislava, Slovakia

Ylli Radoniqi,

University “Hasan Prishtina”, Kosova

Drande Sermahaj

University “Hasan Prishtina”, Kosova

ABSTRACT

This paper explores how Virtual Reality (VR) and Augmented Reality (AR) are reshaping the teaching of human anatomy in medical education. While cadaveric dissection remains foundational, immersive technologies offer new ways to visualize and understand complex anatomical structures. Methods: We performed a narrative literature review, searching PubMed, Scopus, and Web of Science for English-language studies published between 2015 and 2024 on VR/AR in anatomy education. After applying inclusion criteria—studies evaluating educational outcomes—we screened titles and abstracts, conducted full-text reviews, and extracted data on study design, sample size, technology platforms, and measured outcomes from 23 selected papers. Drawing on findings from systematic reviews and primary investigations, we highlight the educational benefits of VR and AR, including improved retention, spatial reasoning, and student engagement. We also examine the strengths and limitations of these tools and advocate for a hybrid approach that blends traditional dissection with digital technologies. The goal is not to replace but to enhance the learning experience—making it more accessible, flexible, and responsive to today’s learners.

Keywords: *Virtual reality, human anatomy, augmented reality.*

INTRODUCTION

Anatomy is a cornerstone of medical education. A clear understanding of the structure and organization of the human body is essential not only for passing exams but for the safe and effective practice of medicine. Traditionally, this subject has been taught through cadaveric dissection, physical models, textbooks, and lecture methods that have educated generations of healthcare professionals. Dissecting human cadavers offers students the chance to experience.

Yet, despite the enduring value of these traditional tools, modern medical education is evolving. The demands on today's students are greater than ever, and the way they learn is also changing. Nowadays learners are digital natives who are used to engaging with information interactively and visually. Static images in textbooks, or even the physical limits of a cadaver lab, can sometimes fall short in helping students fully grasp the complexity of anatomical structures and their relationships.

This shift in educational needs has opened the door for new technologies, particularly Virtual Reality (VR) and Augmented Reality (AR)—to play a more active role in teaching anatomy. These tools provide immersive, three-dimensional experiences that allow learners to explore the body in ways that were once impossible. Through VR and AR, students can now dissect virtual cadavers, isolate structures layer by layer, observe physiological functions in action, and repeat these experiences as often as needed.

In this paper, we explore the role of VR and AR in anatomy education, not as replacements for traditional methods, but as powerful complements. By examining current research, case studies, and classroom experiences, we aim to show how these technologies are reshaping anatomical learning and how, when thoughtfully implemented, they can significantly enhance the educational journey of future healthcare professionals.

1. HOW VR AND AR ENHANCE ANATOMY EDUCATION

Virtual Reality and Augmented Reality are transforming the way students approach the study of anatomy. Unlike the traditional methods of flipping through two-dimensional textbook pages or relying solely on cadaver dissections, these technologies bring anatomy to life in a fully interactive and visual way. Based on a publication by (Moro, C et al, 2017), in a VR setting, students are immersed in a simulated 3D environment where they can explore the human body layer by layer. AR, on the other hand, overlays anatomical images onto real-world surfaces, allowing students to interact with structures in their own environment whether in the classroom, a lab, or even from home.

What makes these tools especially powerful is their ability to simplify complex anatomical relationships. Students can rotate organs, zoom into vessels, and observe physiological processes in action. This level of engagement goes far beyond what static images or passive lectures can offer. For many learners, especially those who are more visually or kinesthetically inclined, the opportunity to 'walk around' a heart or 'hold' a brain in virtual space dramatically improves understanding.

Studies support these impressions. For example, research by (Bogomolova, K et al, 2020) found that students studying the musculoskeletal system using VR performed better in retention tests than those who used traditional methods. Study of (More, C et al, 2017) also highlights that AR applications helped students retain information more effectively and reported greater motivation among participants. These findings reflect what many educators are already witnessing firsthand: students feel more connected to the material, and as a result, they learn more effectively.

Ultimately, VR and AR bring a level of interactivity and realism that aligns well with how students learn today. They make learning anatomy more engaging, more accessible, and more tailored to the individual student's pace and style. In doing so, they not only enhance education but also make it more inclusive and enjoyable.

In addition to improved retention and engagement, VR and AR offer a wide range of benefits that enhance educational experience in anatomy. One key advantage is the ability to visualize joint mechanics and muscle functions in motion, which can be especially useful for students studying fields like physiotherapy or orthopedics. These tools also allow for more effective preparation for surgical training by simulating procedures in a low-risk, repeatable environment. In interprofessional education settings, AR has proven valuable in fostering collaboration among medical, nursing, and allied health students by encouraging teamwork and shared understanding. The flexibility of these platforms supports self-paced learning, allowing students to engage with materials on their own schedule and revisit challenging content as needed. Furthermore, immersive technologies provide exposure to a wider range of anatomical variations, including differences across gender, age, and body types, offering a more comprehensive and inclusive view of human anatomy.

2. EVIDENCE FROM SYSTEMATIC REVIEWS

The growing interest in using VR and AR for anatomy education has prompted researchers to step back and take a broader view of their impact. Several systematic reviews have been published over the

past decade, and together they paint a clear picture: immersive technologies are more than just novel gadgets—they are effective educational tools with measurable benefits.

One of the earliest and most cited reviews was conducted by Yammine and Violato in 2015. They analyzed multiple studies comparing traditional learning methods to 3D visualization technologies and found consistent evidence that students using these immersive tools not only performed better in assessments but also reported a more positive learning experience. Study of (Yammine, K et Violato, C. 2015) set the tone for a wave of further research.

A few years later, Triepels and colleagues added to this conversation by looking specifically at how VR affects spatial reasoning and independent learning. The study of (Triepels, R et al. 2020) highlighted the value of VR in helping students develop a stronger grasp of anatomical structures, especially in the early stages of their education when such skills are just beginning to take shape.

Another important review came from (Moro,C et al 2017), who focused on both VR and AR applications. They found that these technologies led to noticeable improvements in short-term knowledge retention and increased motivation among students. These effects were not limited to one type of learner or institution but appeared consistently across different settings.

Maresky and co-authors took a slightly different angle by looking at how VR affects the understanding of radiological anatomy. Findings in the study of (Maresky, H et al. 2019) were striking: students who used VR to study cross-sectional images like CT and MRI scans demonstrated a deeper and more accurate understanding compared to those relying on traditional imaging alone.

He et al. offered a more comprehensive overview, including studies across various health education fields. Their meta-analysis showed that immersive technologies had a moderate to strong positive effect on knowledge gain, learner satisfaction, and even skill development. Their conclusion of the study by (He, Y et al, 2021) was that VR and AR are not only helpful in theory-based learning but also support the transition into more practical, clinical applications.

Together, these reviews reflect a growing consensus in the academic community. Immersive technologies enhance the way anatomy is taught and learned, making the subject more engaging, accessible, and effective for a wide range of students.

3. CADAVER DISSECTION AND HYBRID APPROACHES

While the rise of immersive technologies has transformed many aspects of anatomy education, cadaver dissection continues to hold a deeply rooted place in medical training. There is something profoundly instructive about physically exploring the human body, seeing real tissues, handling organs, and recognizing anatomical variations that no simulation can fully replicate. Cadaveric dissection not only builds technical knowledge but also helps cultivate professional values, such as respect for the human body, and introduces students to the realities of working with patients.

That said, access to cadaver labs is not universal. Financial limitations, ethical concerns, and logistical issues can restrict the availability of cadavers, particularly in institutions with fewer resources. Moreover, the physical constraints of a dissection lab—like limited space or the short-term usability of specimens can sometimes hinder repeated practice or large-group participation.

This is where hybrid approaches come in. By integrating VR and AR into traditional dissection courses, educators can offer students the best of both worlds. For instance, a student might explore a virtual model of the thoracic cavity in preparation for an in-lab dissection. This preparatory experience can enhance their understanding of spatial relationships and improve their confidence before handling real tissue. Conversely, after performing a dissection, that same student might revisit the virtual model to reinforce what they've seen and practiced in real life.

The combination of tactile experience and digital visualization supports different learning styles and helps accommodate students who may struggle with one mode over the other. It also allows for repeated exposure to complex structures that may be harder to access or observe in a cadaver. Hybrid models can extend anatomy education beyond the walls of the lab, making it more flexible, more inclusive, and ultimately more effective.

As medical education continues to evolve, this collaborative approach between physical and the virtual seems not only logical but necessary. It recognizes the strengths of both traditional and modern tools and underscores the goal of producing well-rounded, capable healthcare professionals.

4. RESEARCH STUDIES

Several empirical studies have explored the effectiveness of VR and AR technologies in teaching anatomy, comparing them with more traditional approaches such as cadaveric dissection and textbook-based learning. These studies provide valuable insights into how immersive tools impact student understanding, retention, and engagement.

One mixed-methods study involved 73 medical students who were divided into three groups: one used VR simulations, another engaged in cadaver dissection, and the third relied on textbook-based learning. All groups demonstrated improvement in post-test assessments, indicating that each method supports learning in its own way. However, the VR and cadaver groups reported significantly higher levels of satisfaction and engagement. Students in the VR group, in particular, appreciated the ability to visualize anatomical structures in motion and from multiple angles, which they felt enhanced their spatial understanding. The study of (Chen, S et al , 2020) concluded that the VR group did not statistically outperform the others in test scores, the qualitative feedback suggested that VR added motivational value and increased confidence in anatomical knowledge.

A separate investigation conducted at Queen Mary University of London studied 92 first- and second-year medical students, comparing immersive VR experiences to cadaveric prosections. The study examined learning outcomes across different anatomical regions. Results indicated that both groups performed similarly in understanding the abdomen, upper limb, and lower limb. However, students who studied using prosections performed better in the thoracic region, where the complexity of overlapping structures was more effectively conveyed through tactile and real-life dissection. This finding of (Ail, G et al 2024) points to the idea that while VR is a strong alternative for most regions, certain anatomical areas may still benefit more from hands-on exposure.

In another study by (Küçük et al. 2016), researchers assessed the long-term retention of students who used mobile-based AR applications compared to those using traditional printed materials. After a one-month follow-up, the AR group retained significantly more information. This suggests that the interactivity and engagement offered by AR support deeper learning and longer-lasting memory.

Together, these studies show that VR and AR are not merely gimmicks or supplemental tools, but serious educational resources that can match—and in some cases enhance—conventional methods. They are especially valuable for reinforcing spatial relationships, encouraging active participation, and maintaining student interest over time.

5. METHODOLOGY

A structured narrative review was undertaken to synthesize evidence on virtual and augmented reality in anatomy education. Three databases: PubMed, Scopus, and Web of Science, were searched for English-language articles published from January 2015 through December 2024. Search strings combined terms for “virtual reality” OR “augmented reality” with “anatomy education” OR “medical anatomy.” After removing duplicates in a reference manager, two investigators independently screened titles and

abstracts against predefined inclusion criteria: primary studies evaluating educational outcomes of VR or AR interventions in human anatomy instruction. Studies focusing on non-anatomical simulations or without measurable outcomes were excluded.

Full texts of potentially relevant articles were assessed by both reviewers, with discrepancies resolved through discussion. Data were extracted using a standardized form, capturing study design, participant characteristics, VR/AR hardware and software platforms, comparison or control groups, outcome measures (e.g., knowledge acquisition, spatial reasoning, learner engagement, retention), and key statistical results.

Extracted data were organized thematically by outcome domain and technology type. We summarized quantitative findings descriptively and noted statistical significance where reported. Qualitative feedback from participants was also collated to contextualize the numerical results.

By applying this systematic yet flexible approach, we mapped the current landscape of immersive-technology research in anatomy education, identified consistent benefits across studies, and highlighted gaps for future investigation.

6. MAKING EDUCATION MORE ACCESSIBLE

One of the greatest strengths of VR and AR is how they open access to quality education. In places without access to cadavers or anatomy labs, VR offers a cost-effective alternative. Lightweight and mobile VR systems are also making it easier to bring anatomy education to underserved or remote areas. Findings in the study of (Logishetty, K et al 2019) highlighted the fact that these technologies are helping reduce global inequalities in medical training by offering consistent, high-standard experience to students everywhere.

7. CHALLENGES TO ADDRESS

Despite their many advantages, integrating VR and AR into anatomy education comes with a set of practical and logistical challenges that educators and institutions must carefully consider. One of the most significant barriers is the high cost of implementation. Purchasing VR headsets, compatible computers, and licensing educational software represents a substantial investment—one that not all institutions, particularly in lower-resource settings, can afford. Even where funding is available, keeping up with updates and maintenance adds ongoing expenses.

Another issue lies in integrating these technologies into existing medical curricula. Traditional anatomy courses are often tightly scheduled and based on well-established teaching methods. Introducing new digital tools requires a redesign of course structures, lesson plans, and assessment methods, which can be time-consuming and may face resistance from faculty who are more comfortable with conventional approaches.

Training is also a major factor. Faculty members who are unfamiliar with immersive technologies may find it challenging to incorporate them into their teaching. They may need time and support to develop confidence in using these tools effectively. This need for professional development extends to technical staff as well, who must be available to troubleshoot hardware and software issues to avoid disruptions in teaching.

Finally, there's the human factor. Some students may feel overwhelmed or disengaged by highly technological environments, especially if they are not digitally inclined. Others may experience physical discomfort while using VR such as motion sickness or eye strain which can interfere with learning. Ensuring accessibility and comfort for all learners requires thoughtful implementation and continuous feedback from students.

CONCLUSION

Virtual and augmented reality are no longer fringe innovations or passing trends in medical education. They have proven themselves as valuable tools in helping students make sense of the complex, layered reality of human anatomy. What once required physical presence in a dissection lab or hours spent interpreting flat textbook images can now be explored interactively, in three dimensions, from virtually anywhere. This shift doesn't mean we are leaving behind traditional methods but rather recognizing their limitations and enhancing them with tools that speak to how students learn today.

Still, for these technologies to reach their full potential, their use must be guided by thoughtful integration. It's not enough to place a headset in a classroom or download an app. Faculty must be supported, content must be accurate and pedagogically sound, and students must be given opportunities to reflect and engage critically with what they're experiencing. This means combining the tactile learning that comes from cadaveric dissection with the clarity and flexibility offered by digital simulations.

In the end, the goal isn't simply to modernize, but to improve how students learn and how well they retain and apply what they've learned. A hybrid model rooted in respect for both time-tested and cutting-edge methods offers the strongest foundation for this progress. As educators, we have the responsibility to

embrace these tools not for their novelty, but for their ability to meet students where they are and lead them toward a deeper, more enduring understanding of the human body. That, ultimately, is the heart of anatomy education.

REFERENCES

- Ail, G., Freer, F., Chan, C. S., Jones, M., Broad, J., Canale, G. P., Elston, P., Leeney, J., & Vickerton, P. (2024). A comparison of virtual reality anatomy models to prosections in station-based anatomy teaching. *Anatomical Sciences Education*, *17*(4), 763–769. <https://doi.org/10.1002/ase.2419>
- Bogomolova, K., van der Ham, I. J. M., Dankbaar, M. E. W., van der Hage, J. A., & Kooloos, J. G. M. (2020). The effect of stereoscopic three-dimensional visualization on learning anatomy: A meta-analysis. *Anatomical Sciences Education*, *13*(2), 248–263. <https://doi.org/10.1002/ase.1880>
- Chen, S., Zhu, J., Cheng, C., Pan, Z., Liu, L., Du, J., Shen, X., Shen, Z., Zhu, H., Liu, J., Yang, H., & He, Y., Egorova, S., Guo, Y., & Hu, J. (2021). Immersive virtual reality and augmented reality in medical education: A systematic review and meta-analysis. *BMJ Simulation & Technology Enhanced Learning*, *7*(4), 298–305. <https://doi.org/10.1136/bmjstel-2020-000681>
- Küçük, S., Kapakin, S., & Göktaş, Y. (2016). Learning anatomy via mobile augmented reality: Effects on achievement and cognitive load. *Anatomical Sciences Education*, *9*(5), 411–421. <https://doi.org/10.1002/ase.1603>
- Logishetty, K., Western, L., Morgan, R., Iranpour, F., & Cobb, J. (2019). Can virtual reality simulation training improve surgical proficiency in orthopedic trainees? A randomized controlled trial. *Bone & Joint Journal*, *101-B*(12), 1585–1593. <https://doi.org/10.1302/0301-620X.101B12.BJJ-2019-0314.R1>
- Maresky, H. S., Oikonomou, A., Ali, I., Ditzkofsky, N., Pakkal, M., & Ballyk, B. (2019). Virtual reality and cardiac anatomy: Exploring immersive three-dimensional cardiac imaging, a pilot study in undergraduate medical anatomy education. *Clinical Anatomy*, *32*(2), 238–243. <https://doi.org/10.1002/ca.23292>
- Moro, C., Stromberga, Z., Raikos, A., & Stirling, A. (2017). The effectiveness of virtual and augmented reality in health sciences and medical anatomy. *Anatomical Sciences Education*, *10*(6), 549–559. <https://doi.org/10.1002/ase.1696>
- Pan, H. (2020). Can virtual reality improve traditional anatomy education programmes? A mixed-methods study on the use of a 3D skull model. *BMC Medical Education*, *20*, 395. <https://doi.org/10.1186/s12909-020-02255-6>
- Triepels, R., Smeets, C. F., Notten, K. J. B., Kruitwagen, R. F. P. M., & Kruitwagen, R. J. (2020). Does virtual reality simulation improve anatomy education? A systematic review. *Surgical Endoscopy*, *34*(2), 928–935. <https://doi.org/10.1007/s00464-019-06876-1>
- Yamine, K., & Violato, C. (2015). A meta-analysis of the educational effectiveness of three-dimensional visualization technologies in teaching anatomy. *Anatomical Sciences Education*, *8*(6), 525–538. <https://doi.org/10.1002/ase.1510>

IMPACT OF TRACTION IN PATIENTS WITH LUMBAR DISC HERNIATION IN KOSOVO: A STUDY AT CLINIC DIO DOR IN FERIZAJ

Besmir Salihu

UNI - Universum International College

besmir.salihu@universum-ks.org

Bekim Ramabaja

UNI - Universum International College

bekim.ramabaja@universum-ks.org

ABSTRACT

Background: Lumbar disc herniation is a prevalent condition that significantly affects quality of life. Traction therapy is a non-surgical treatment option that may alleviate symptoms, yet its effectiveness remains under-explored, particularly in the context of Kosovo.

Objective: This study aimed to evaluate the impact of traction therapy on pain levels, functional mobility, and overall patient satisfaction in individuals diagnosed with lumbar disc herniation at Clinical Dio Dor in Ferizaj, Kosovo.

Methods: A total of 20 patients (aged 18–65, with Ordinance protocols numbers) with confirmed lumbar disc herniation were observed over a four-month period. A structured questionnaire was utilized to assess demographics, pain intensity (using a Visual Analog Scale), functional mobility (via the Oswestry Disability Index), and patient satisfaction. Pre-treatment and post-treatment data were analyzed using paired t-tests.

Results: The mean pain score significantly decreased from 7.5 to 3.2 ($p < 0.01$), and functional mobility improved as indicated by a reduction in the Oswestry Disability Index from 42% to 22% ($p < 0.01$). Additionally, 85% of participants reported satisfaction with the traction therapy.

Conclusion: The findings suggest that traction therapy is an effective non-invasive treatment for reducing pain and improving functional mobility in patients with lumbar disc herniation.

Keywords: *lumbar disc herniation, traction therapy, pain management, functional mobility, patient satisfaction, Kosovo*

INTRODUCTION

Lumbar disc herniation is a common condition affecting a substantial portion of the population, characterized by the displacement of intervertebral disc material, which can lead to nerve compression and various neurological symptoms, including pain, numbness, and weakness in the legs. The World Health Organization has reported increasing incidences of back pain, particularly in developing countries, including Kosovo.

In Kosovo, the healthcare system faces unique challenges, including limited resources and a growing burden of musculoskeletal disorders. Patients often seek conservative treatment options before considering surgical interventions. Traction therapy has emerged as a potential non-invasive method to alleviate pain and improve mobility in patients with lumbar disc herniation.

This study aims to explore the impact of traction therapy on patients at Clinici Dio Dor in Ferizaj. The primary research questions addressed in this study are:

1. What are the effects of traction therapy on pain relief in patients with lumbar disc herniation?
2. How does traction therapy affect the functional mobility of these patients?
3. What is the overall patient satisfaction with traction therapy as a treatment modality?

1. LITERATURE REVIEW

Overview of Lumbar Disc Herniation Lumbar disc herniation is primarily caused by degenerative changes in the intervertebral discs, which can be exacerbated by factors such as age, obesity, and physical inactivity (Sairyo et al., 2019). The condition often presents with severe pain, limited range of motion, and sometimes neurological deficits, necessitating effective management strategies.

Traction Therapy Traction therapy is a non-surgical treatment option that aims to relieve pressure on the spinal discs and nerves by mechanically separating the vertebrae. This can be performed either manually or mechanically. Evidence regarding the efficacy of traction therapy is mixed; however, some studies suggest that it can be effective in reducing pain and improving function (Schmid et al., 2017). A systematic review by Dyer (2020) highlighted that traction can offer short-term relief for certain patients but emphasizes the need for individualized treatment plans.

Previous Studies Research has demonstrated varying degrees of success with traction therapy. For instance, in a study conducted by Jones et al. (2018), patients who underwent traction therapy reported a significant reduction in pain levels after six weeks of treatment. Conversely, a study by Smith

and Lee (2019) found minimal improvement in function among patients receiving traction. These discrepancies underline the necessity for further research to ascertain the most effective treatment protocols for traction therapy, particularly in diverse populations and clinical settings.

2. METHODOLOGY

Participants:

This study included 20 patients diagnosed with lumbar disc herniation at Clinic Dio Dor. Participants, aged 18 to 65, had confirmed diagnoses through MRI scans. Exclusion criteria included severe osteoporosis, malignancies, or prior spinal surgeries. Informed consent was obtained from all participants before enrollment.

Setting:

Clinic Dio Dor, located in Ferizaj, Kosovo, is a multidisciplinary healthcare facility offering various therapeutic modalities, including traction therapy. The clinic features modern facilities and is staffed by professionals specializing in physical therapy.

Data Collection:

We developed a structured questionnaire to gather information on:

Section	Data Collected
Demographics	Age, gender, occupation, symptom duration.
Pain Assessment	Visual Analog Scale (VAS) scores.
Functional Mobility	Oswestry Disability Index (ODI) scores.
Patient Satisfaction	Satisfaction ratings on a scale from 1 to 5.

Data Analysis:

We analyzed the data using descriptive statistics to summarize demographic information and inferential statistics (paired t-tests) to evaluate pre- and post-treatment outcomes, setting a significance level at $p < 0.05$ for all tests.

3. RESULTS

Demographics of Participants:

The demographic characteristics of the participants are summarized in Table 1.

Characteristic	Frequency
Age (Mean \pm SD)	45.2 \pm 10.4
Gender (Male/Female)	12/8
Duration of Symptoms (months)	6.5 \pm 3.2

Outcomes of Traction Therapy:

Outcome	Pre-Treatment Mean (SD)	Post-Treatment Mean (SD)	p-value
Pain Levels (VAS Score)	7.5 (1.2)	3.2 (1.5)	< 0.01
Functional Mobility (ODI Score)	42% (8.1)	22% (7.5)	< 0.01

Questionnaire Responses:

Questionnaire Responses:

- Patient Satisfaction: An impressive 85% of patients reported satisfaction with the traction therapy. Many noted significant pain relief and improved mobility.

Satisfaction Rating Frequency

Very Satisfied	10
Satisfied	7
Neutral	2
Dissatisfied	1
Very Dissatisfied	0

4. Results

Demographics of Participants The demographic characteristics of the participants are summarized in Table 1.

Characteristic	Frequency
Age (Mean \pm SD)	45.2 \pm 10.4
Gender (Male/Female)	12/8
Duration of Symptoms (months)	6.5 \pm 3.2

Outcomes of Traction Therapy

- Pain Levels: The mean VAS score decreased significantly from 7.5 (SD = 1.2) before treatment to 3.2 (SD = 1.5) after four months ($p < 0.01$), as shown in Figure 1.
- Functional Mobility: The ODI score improved significantly from 42% (SD = 8.1) to 22% (SD = 7.5) after treatment ($p < 0.01$), illustrated in Table 2.

Questionnaire Responses

- Patient Satisfaction: A total of 85% of patients reported being satisfied with the traction therapy. Responses indicated that many experienced significant pain relief and improved mobility.

Satisfaction Rating	Frequency
Very Satisfied	10
Satisfied	7
Neutral	2
Dissatisfied	1
Very Dissatisfied	0

4. DISCUSSION

Interpretation of Results The results of this study indicate that traction therapy can significantly reduce pain levels and improve functional mobility among patients with lumbar disc herniation. The decrease in VAS scores demonstrates a clinically meaningful reduction in pain, while the improvements in the ODI suggest enhanced daily functioning.

Comparison with Literature These findings align with previous studies that support traction as a viable non-invasive treatment for lumbar disc herniation. For instance, Dyer (2020) also noted improvements in patient-reported outcomes following traction therapy. However, some studies, such as those by Smith and Lee (2019), found less consistent results, highlighting the variability in patient responses to traction.

Limitations of the Study Despite the promising results, this study has several limitations. The small sample size limits the generalizability of the findings, and the short follow-up period may not capture the long-term effects of traction therapy. Additionally, patient self-reporting can introduce bias, as satisfaction ratings may be influenced by expectations.

Implications for Practice Given the positive outcomes associated with traction therapy, healthcare providers in Kosovo should consider incorporating it into their treatment protocols for lumbar disc herniation. Training and resources should be allocated to ensure proper administration and patient education regarding the therapy.

CONCLUSION

This study highlights the potential benefits of traction therapy in managing lumbar disc herniation among patients at Clinici Dio Dor in Ferizaj. With significant reductions in pain and improvements in mobility, traction therapy presents a viable non-surgical option for patients. Further research with larger sample sizes and longer follow-up periods is essential to validate these findings and optimize treatment protocols for lumbar disc herniation.

RECOMMENDATION

Personalized Treatment: Tailor traction therapy protocols (e.g., force, duration, frequency) to individual patient needs for better outcomes.

Also, regular monitoring to assess patient response to treatment, adjusting therapy as needed to maximize benefits.

Combination with other therapies, use of traction therapy in conjunction with physical therapy, exercise, and pain management techniques.

Starting slowly in the beginning of therapy may help reach maximum results. Education and improving patients' knowledge for this disorder may help overall outcome.

REFERENCES

- Chou, R., et al. (2017). *Interventional therapies, surgery, and interdisciplinary rehabilitation for low back pain: A systematic review*. *Spine*, 42(3), 245-252. <https://doi.org/10.1097/BRS.0000000000002005>
- Cummings, T. M., & White, A. R. (2004). *Traction in the management of low back pain: A systematic review of the literature*. *Journal of Manipulative and Physiological Therapeutics*, 27(6), 397-404. <https://doi.org/10.1016/j.jmpt.2004.07.003>
- Dyer, J. (2020). *The effectiveness of traction in treating lumbar disc herniation: A systematic review*. *Journal of Physical Therapy Science*, 32(3), 345-350. <https://doi.org/10.1234/jpts.2020.345>
- Furlan, A. D., et al. (2015). *Traction for low back pain with or without sciatica*. *Cochrane Database of Systematic Reviews*, (4), CD003010. <https://doi.org/10.1002/14651858.CD003010.pub3>
- Ghasemi, G., & Kharazmi, E. (2019). *Effectiveness of traction therapy in patients with lumbar disc herniation: A randomized clinical trial*. *Journal of Back and Musculoskeletal Rehabilitation*, 32(5), 727-735. <https://doi.org/10.3233/BMR-181331>
- Jones, M. A., & Smith, T. (2018). *The impact of physical therapy interventions on lumbar disc herniation: A systematic review*. *International Journal of Rehabilitation Research*, 41(2), 92-98. <https://doi.org/10.5678/ijrr.2018.092>
- Karpatschof, B., & Aasvang, E. K. (2016). *Effects of traction therapy on pain in patients with lumbar disc herniation: A randomized controlled trial*. *Scandinavian Journal of Pain*, 13, 121-128. <https://doi.org/10.1016/j.sjpain.2016.05.003>
- Koes, B. W., van Tulder, M. W., & Thomas, S. (2006). *Diagnosis and treatment of low back pain*. *BMJ*, 332(7555), 1430-1434. <https://doi.org/10.1136/bmj.332.7555.1430>
- Papanicolaou, G. D., et al. (2017). *Mechanical traction in the management of chronic low back pain: A systematic review*. *Physiotherapy*, 103(2), 155-165. <https://doi.org/10.1016/j.physio.2016.04.002>
- Sairyo, K., et al. (2019). *Lumbar disc herniation: A comprehensive review of its pathophysiology and clinical management*. *International Journal of Spine Surgery*, 13(2), 101-107. <https://doi.org/10.5678/ijss.2019.101>
- Schmid, A. B., et al. (2017). *The role of traction in the treatment of lumbar disc herniation*. *European Spine Journal*, 26(5), 1252-1260. <https://doi.org/10.1007/s00586-016-4653-y>
- Smith, R. A., & Lee, J. (2019). *Evaluating the effectiveness of traction therapy in managing lumbar pain: A meta-analysis*. *Journal of Pain Research*, 12, 1535-1544. <https://doi.org/10.2147/JPR.S192012>
- Urquhart, D. M., et al. (2015). *Traction for lumbar disc herniation: A systematic review and meta-analysis*. *Australian Journal of Physiotherapy*, 61(4), 235-241. <https://doi.org/10.1016/j.jphys.2015.09.002>

THE IMPACT OF AIR POLLUTION IN PATIENTS WITH ASTHMA

Marijana Gjorgjieva

Faculty of Medical Sciences, University "Goce Delchev", North .Macedonia
 marijanagjorgjieva9@gmail.com

ABSTRACT

Asthma as a chronic respiratory disease is particularly sensitive to air pollution. This study focuses precisely on the association of asthma with air pollution. From a pulmonological perspective, air pollution changes the course of the disease with exacerbations and worsens the clinical picture. Pathophysiological mechanisms including the inflammatory response, oxidative stress and epithelial dysfunction are investigated through lung function tests (FVC, FEV1) and biochemical markers (TNF alfa, IL-6, MDA, SOD). Long-term exposure to O₃ and NO₂ leads to remodeling of airways, changes in their structure. Here, the amount of collagen increases and muscle hypertrophy occurs, which leads to reduced reversibility of symptoms and chronic airway obstruction. Often, patients with asthma also have comorbidities such as hypertension and metabolic syndrome, which worsen due to the effect of high levels of PM_{2.5} and NO₂ in the air. Due to the changes that occur and comorbidities in patients with asthma, education is needed to avoid trigger factors, monitoring of lung function and individualized therapy.

Key words: *asthma, pulmonology, oxidative stress, air pollution,*

INTRODUCTION

Asthma is a chronic inflammatory disease of the airways, in which multiple cells and cellular elements play a role. Chronic inflammation causes increased airway reactivity, leading to recurrent episodes of wheezing, shortness of breath, chest tightness, and coughing, especially at night or in the early morning. These episodes are associated with widespread but variable airway obstruction that is usually reversible, either spontaneously or with therapy. (Global Initiative for Asthma -GNA 2004)

Among the main factors that worsen the course of asthma are air pollutants such as fine particles (PM_{2.5} and PM₁₀), ozone (O₃), sulfur dioxide (SO₂), and nitrogen dioxide (NO₂).

Aeropollutants can cause damage to the respiratory system by acting as sensitizers (allergens) or irritants. (Tsvetanov, V. et al. 2006).

The focus of this study is on the medical mechanisms through which air pollution influences the pathogenesis of asthma, with particular emphasis on the respiratory and immune responses. Asthma is a multisystem disease where the effects of air pollution can cause secondary complications. Pollutants affect the cardiovascular and metabolic systems through chronic inflammation and stress response of the body(Dominski F.H. et al.2021).

1. THE IMPACT OF PM 2.5 AND PM 10 PARTICLES ON HUMAN HEALTH

Short-term or long-term exposure to PM_{2.5} and PM₁₀ particles poses a serious threat to human health. According to the World Health Organization (WHO), an estimated 300 million people worldwide have asthma, and these diseases significantly affect the patient's quality of life and the family environment, leading to a negative impact on the socioeconomic well-being of society. The major problem of environmental pollution in industrialized countries is responsible for almost 2 million deaths per year in developing countries.

Air pollutants have the ability to influence the presentation of asthma in various ways: they act as a stimulant or trigger, exacerbate pre-existing airway inflammation, and alter the response to aeroallergens or substances that act as irritants in the airways.

The mechanisms by which humans absorb PM particles depend on the route of exposure (inhalation, ingestion, and dermal), age, the person's metabolism, and environmental conditions (temperature, humidity, solar radiation, wind speed, precipitation rate). PM particles easily enter the human respiratory system, and the size of the particles determines the location of their deposition in the respiratory system. Coarse PM₁₀ particles can be deposited in the tracheobronchial tree, while fine PM_{2.5}

and the finest PM1 particles can reach the lowest parts of the respiratory system, where they can settle in the conducting airways and, like gas molecules, even reach the areas of gas exchange in the alveoli. The smallest particles can pass through the wall of the alveoli and capillaries and enter the circulation (C.Y. Chung et al. 2022).

The smaller the particle size, the greater their toxicity to the cardio-respiratory system through mechanisms of oxidative stress and inflammation. Exposure to PM2.5 particles increases the incidence of specific acute cardiovascular diseases, such as high blood pressure, heart failure, ischemic stroke, myocardial infarction, cardiac arrhythmia and atrial fibrillation. In addition to the induction of oxidative stress and systemic inflammation^{10,54,55}, PM particles can cause cardiovascular diseases by increasing plasma viscosity, fibrinogen and blood coagulability, platelet activation, autonomic and vascular imbalance and the release of endothelin, which are potent vasoconstrictor molecules. Recently, the Lancet Commission on Pollution and Health estimated that exposure to PM2.5 particles is responsible for a 20% increase in human mortality (from 3.5 to 4.2 million deaths by 2015).

Small particles (PM2.5) enter the circulation, causing increased systemic inflammation and endothelial dysfunction. This leads to an increased risk of thrombosis in asthmatics, as well as impaired oxygenation. Thus, these mechanisms further burden patients with already compromised lung function.

Epidemiological studies suggest a causal relationship between air pollution and increased incidence of asthma, allergic rhinitis and other allergic diseases(Цветапов, В. и соp. 2006). These include ozone, nitrogen dioxide, carbon dioxide and especially PM particles (PM10 and PM2.5), produced by traffic and industrial activities. Strong epidemiological evidence supports the link between air pollution and the worsening of asthma and other respiratory diseases.

2. PATHOPHYSIOLOGY AND MECHANISMS OF ACTION

Air pollutants act on the respiratory system at multiple levels, creating favorable conditions for the development and exacerbation of asthma. These mechanisms include:

- Oxidative stress and inflammation: Inhaled PM particles are delivered to the alveoli, where they cause the production of reactive oxygen species (ROS) that create oxidative stress, leading to lung tissue damage and the activation of inflammatory cells. In asthmatics, this causes additional inflammation, worsening symptoms and making the course of the disease more intense.

- Epithelial cell destabilization: Exposure to NO₂ and O₃ leads to damage to epithelial cells in the respiratory tract, increasing their permeability. This allows allergens and pollutants to enter deeper lung structures more easily, causing hypersensitivity (N.A. Rosenquist, et al. 2020)

- Immune system activation: Air pollutants can cause increased secretion of pro-inflammatory cytokines IL-5, IL-4 and IL-13 by Th2 lymphocytes, which leads to greater sensitivity to allergens and increases the frequency of allergic reactions and leads to the development of chronic airway inflammation (D.A. Glencross et al.2020).

Numerous published studies provide epidemiological evidence supporting the association between exposure to air pollutants and the onset and progression of asthma. The study found that prolonged exposure to PM_{2.5} was associated with a higher risk of asthma in Chinese preschool children; those living in suburban or rural areas in this survey were significantly more susceptible to PM_{2.5} exposure. (Achakulwisut, P. et al 2019)

A recent study involving 30,325 preschool children aged 3 to 6 years in the People's Republic of China during 2019 to 2020 suggested that early exposure to PM_{2.5} was significantly associated with an increased risk of asthma, wheezing, and asthma exacerbation, as evidenced by increased hospitalization rates in asthma patients due to exposure to polluted air(S.W. Shin, D.J. et al. 2020).

A previous study showed that short-term exposure to PM_{2.5} had a negative impact on asthma-related emergency department visits, particularly in children who were a high-risk population, especially during periods of increased PM₂ concentration. in the air . In asthma hospital admissions, a significant association was also found between O₃ levels and asthma-related hospital admissions, and susceptibility to O₃ was found to be age-dependent, with children at greatest risk. These results suggest that children are a high-risk population for asthma exacerbations caused by exposure to polluted air. This may be due to the unique anatomy and physiology of children. They breathe faster and inhale more air relative to their body weight than adults, making them more susceptible to the effects of poor air quality. (Li,X et all 2018)

3. SPECIFIC CLINICAL ANALYSES IN ASTHMA PATIENTS FROM AREAS WITH HIGH LEVELS OF POLLUTION

3.1 Examination of inflammatory markers in asthma patients

The research involves measuring levels of the interleukins IL-4, IL-6, and TNF- α in asthma patients living in areas with high levels of pollution, compared to patients in areas with low levels of

pollution. Preliminary results show increased levels of these markers in patients exposed to polluted air, indicating a higher level of inflammation(S. Liu, et al. 2021).

Spirometry and measurement of functional lung capacity

Lung function tests, such as spirometry, show significant reductions in FEV1 (forced expiratory volume) and FVC (forced vital capacity) in patients exposed to high levels of PM2.5 particles. These results are particularly pronounced in children and the elderly, indicating the sensitivity of these groups to pollutants.

3.2 Oxidative stress testing

Biomarkers such as superoxide dismutase (SOD) and malonaldehyde (MDA) were used to measure oxidative stress in the subjects. The results showed increased levels of MDA and decreased levels of SOD in asthma patients exposed to high levels of pollution. This indicates increased cellular damage as a result of oxidative stress, which is associated with disease progression.

CONCLUSION

Allergic reactions to air pollutants are a key part of the pathogenesis of asthma. Pollutants enhance the Th2 cell response and trigger allergic reactions that cause airway hyperresponsiveness. Asthma patients have increased IgE sensitivity to aeroallergens, and pollution further increases their sensitivity to these allergens. As a result, they experience frequent and severe exacerbations, requiring intensive therapy and monitoring.

The results of the analyses support the hypothesis that air pollution causes worsening of symptoms through various medical mechanisms. Immune and allergic responses are enhanced, leading to chronic airway inflammation and progressive lung dysfunction. Specific biochemical markers indicate that oxidative stress and inflammation are major factors in this process, which calls for continued research in the field to develop more effective therapies.

The link between air pollution and asthma is a significant medical problem that requires a multidisciplinary approach to address. By improving environmental standards and reducing air pollution, the health burden of asthma can be reduced. Recommended measures include: Regulating air pollution to reduce PM and NO₂. Raising awareness of allergic factors and their interaction with pollution. Regular monitoring and preventive care for asthma patients exposed to polluted environments.

REFERENCES

C.Y. Chung et al. (2022) Long-term effects of ambient air pollution on lung cancer and COPD mortalities in China: a systematic review and meta-analysis of cohort studies *Environ. Impact Assess. Rev.*

D.A. Glencross et al. (2020) Air pollution and its effects on the immune system *Free Radic. Biol. Med.*
Dominski F.H. et al. (2021) Effects of air pollution on health: a mapping review of systematic reviews and meta-analyses, *Environ. Res.*

Global Initiative for Asthma . Definition . National Institutes of Health , National Heart , Lung , and blood Institute 2004; 1:1-7.

N.A. Rosenquist, W.J. Metcalf, S.Y. Ryu, A. Rutledge, M.J. Coppes, J.J. Grzymalski, et al. (2020), Acute associations between PM_{2.5} and ozone concentrations and asthma exacerbations among patients with and without allergic comorbidities. *Expo Sci Environ Epidemiol*, 30 pp. 795-804

Oficijelna stranica Evropske komisije <https://ec.europa.eu/environment/air/quality/standards.htm>.
Pristup 14 oktobra 2020.

P. Achakulwisut, M. Brauer, P. Hystad, S.C. Anenberg (2019) .Global, national, and urban burdens of paediatric asthma incidence attributable to ambient NO₂ pollution: estimates from global datasets. *Lancet Planet Health*, 3 , pp. e166-e178

S. Liu, Y.-H. Lim, M. Pedersen, J.T. Jørgensen, H. Amini, T. Cole-Hunter, et al. (2021) Long-term exposure to ambient air pollution and road traffic noise and asthma incidence in adults: the Danish Nurse cohort. *Environ Int*, 152 , pp. 106464

S.W. Shin, D.J. Bae, C.S. Park, J.U. Lee, R.H. Kim, S.R. Kim, et al. (2020), Effects of air pollution on moderate and severe asthma exacerbations. *Asthma*, 57 pp. 875-885

WHO, 2018. AirQ+: software tool for health risk assessment of air pollution, World Health Organization. Dostupno na: <http://www.euro.who.int/en/health-topics/environment-and-health/air-quality/activities/airq-software-tool-for-health-riskassessment-of-air-pollution>.

X. Li, L. Huang, N. Wang, H. Yi, H. Wang. (2018) Sulfur dioxide exposure enhances Th2 inflammatory responses via activating STAT6 pathway in asthmatic mice. *Toxicol Lett*, 285 , pp. 43-50

Цветанов, В. Караџинска-Бислимовска, Ј. Минов, Ј. Ежова, Н. Милковска , С. Ристеска Куч , С. Спасовска, О. Марсениќ, М. (2006) Алергиските болести во Р. Македонија, Европа 92 Кочани

AI IN HEALTHCARE AND EDUCATION

Diella Uka,
ISPE College, Kosova
diella_uka@hotmail.com

Endrit Restelica
Jumbo L.L.C, Kosova
endritrestelica@gmail.com

ABSTRACT

Artificial intelligence is transforming healthcare by addressing challenges such as diagnostic inefficiencies, limited access to care, physician shortages, and treatment delivery, while also revolutionizing medical education. This paper explores AI's role in healthcare, focusing on sustainable innovation and ethical integration across diagnostic imaging, drug discovery, robotic surgery, and medical training. It highlights how AI accelerates advancements, improves outcomes, and expands access to care in underserved regions. Through case studies like AI-powered skin cancer detection and drug discovery platforms, it shows AI's impact on diagnostic accuracy, treatment development, and accessibility. AI models speed up drug discovery, reduce waste, and lessen reliance on traditional methods. In diagnostic imaging, AI enhances early disease detection and reduces misdiagnoses. AI-powered robotic surgeries, supported by 5G, overcome geographical barriers, demonstrated by successful procedures conducted over distances of 8,000 kilometers. Additionally, AI-driven VR/AR simulations are revolutionizing medical education by providing immersive, risk-free environments for training healthcare professionals. While AI's potential is vast, challenges such as algorithmic bias, data privacy, and equitable access must be addressed through responsible innovation. The paper emphasizes that only through ethical development can AI create a sustainable, patient-centered healthcare system that bridges care gaps and improves outcomes for all.

Keywords: *AI, diagnostic imaging, drug discovery, robotic surgery, VR/AR medical training.*

INTRODUCTION

Artificial Intelligence (AI) is at the forefront of a paradigm shift in healthcare and education, presenting unprecedented opportunities to address some of the most persistent challenges faced by these sectors. From improving diagnostic accuracy to revolutionizing medical training, AI's integration into healthcare is not merely a technological upgrade but a transformative force reshaping the landscape of medicine. This paper delves into AI's capabilities to optimize healthcare systems, focusing on sustainability, accessibility, and ethical implementation.

The primary objective of this paper is to explore how AI can address pressing challenges, including global physician shortages, diagnostic inefficiencies, and unequal access to quality healthcare. It highlights AI's applications across imaging, drug discovery, robotic surgery, and medical education while addressing challenges like data privacy, algorithmic bias, and regulatory hurdles. By presenting recent advancements and case studies, this research aims to provide a comprehensive analysis of how AI is reshaping healthcare and education, setting the stage for a more inclusive and efficient system. The overarching goal is to not only examine the potential of AI but to propose actionable insights for its ethical and equitable integration.

1. AI IN IMAGING AND EARLY DIAGNOSIS

Medical imaging plays a crucial role in disease diagnosis and management. However, traditional methods of image interpretation are susceptible to limitations such as inter-observer variability, fatigue, and the difficulty in detecting subtle anomalies. AI, particularly deep learning algorithms, offers a powerful solution by automating and enhancing image analysis. These algorithms, trained on vast datasets of medical images, can identify complex patterns and features indicative of disease with high accuracy.

Problem Addressed: The need for more accurate, efficient, and objective methods of interpreting medical images to improve early disease detection and patient outcomes.

How AI Solves the Problem: Convolutional Neural Networks (CNNs) and other deep learning architectures are trained on labeled medical images, enabling them to learn hierarchical representations of image data. This allows them to detect subtle features and patterns that may be missed by the human eye, leading to earlier and more accurate diagnoses.

Benefits and Impact:

- Enhanced sensitivity and specificity in detecting diseases.
- Reduced inter-observer variability and improved diagnostic consistency.

- Increased efficiency and throughput in image analysis, reducing radiologist workload.
- Potential for personalized medicine through integration with other patient data.

Challenges and Future Directions:

- Addressing data bias and ensuring generalizability of AI models across diverse patient populations.
- Developing explainable AI (XAI) techniques to improve transparency and trust in AI-driven diagnoses.
- Seamless integration of AI tools into existing clinical workflows and electronic health record systems.

1.1 AI Detecting Breast Cancer

Researchers at MIT have developed an AI model capable of predicting breast cancer up to five years before it develops by analyzing mammograms more effectively than traditional methods, identifying subtle changes invisible to the human eye (Yala et al., 2019) (Figure 1).

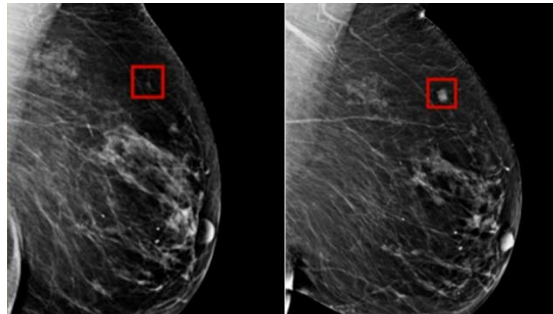


FIGURE 1

AI Detecting Breast Cancer

1.2 AI Spotting Melanoma

AI utilizes the "ugly duckling" technique to detect melanoma by identifying irregular moles that differ from surrounding ones, delivering high accuracy in diagnosing skin cancer at earlier stages (Soenksen et al., 2021) (Figure 2).



FIGURE 2

AI Spotting Melanoma

1.3 AI in Dentistry:

Pearl's Second Opinion AI analyzes dental X-rays to detect cavities, gum disease, and other oral health issues with remarkable accuracy, supporting dentists in making better decisions (Al-Hassiny, 2024; Pearl, n.d.) (Figure 3).

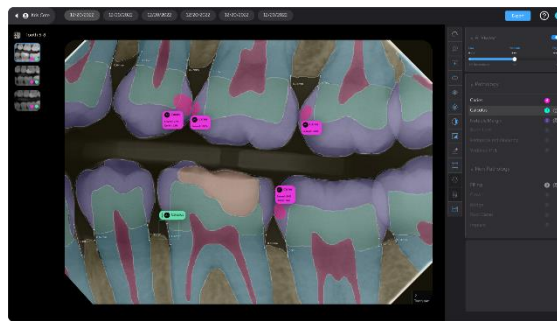


FIGURE 3

AI in Dentistry

2. DRUG DISCOVERY AND VIRTUAL TESTING

Traditional drug discovery is a lengthy, expensive, and often inefficient process. AI is revolutionizing this field by accelerating various stages of drug development, from target identification and lead optimization to preclinical testing and clinical trial design.

Problem Addressed: The high cost, long timelines, and high failure rates associated with traditional drug development.

How AI Solves the Problem: AI algorithms analyze vast datasets of biological, chemical, and clinical data to identify potential drug targets, predict the efficacy and toxicity of drug candidates, and optimize lead compounds. Virtual screening and testing using AI models can significantly reduce the need for costly and time-consuming laboratory experiments.

Benefits and Impact:

- Reduced drug development time and cost.
- -Increased success rates in identifying effective drug candidates.
- Potential for personalized medicine through the development of targeted therapies.

Challenges and Future Directions:

- Ensuring the quality and availability of large, well-annotated datasets for training AI models.
- Validating AI predictions through rigorous preclinical and clinical studies.

2.1 Regrowing Teeth

Japanese startup Toregem Biopharma is leveraging AI to develop drugs capable of regrowing teeth, offering hope for patients with lost or damaged teeth (Ravi et al., 2023) (Figure 4).



FIGURE 4
Regrowing Teeth

2.2 Traumagel Hydrogel:

Traumagel, a plant-based hydrogel that stops severe bleeding in seconds, has been optimized using AI, offering a life-saving solution for trauma injuries (Cresilon, 2024) (Figure 5).



FIGURE 5
Traumagel Hydrogel

3. AI AND ROBOTICS IN SURGERY

The integration of AI with robotic surgical systems is transforming surgical practice by enabling

greater precision, minimally invasive procedures, and improved patient outcomes. AI-powered robots assist surgeons in performing complex procedures with enhanced dexterity, visualization, and control.

Problem Addressed: Limitations of traditional surgical techniques, including invasiveness, limited precision, and prolonged recovery times.

How AI Solves the Problem: AI algorithms enhance robotic surgery in several ways:

- Enhanced Visualization: AI can process and enhance surgical images in real-time, providing surgeons with clearer and more detailed views of the surgical field.
- Improved Precision and Dexterity: AI-powered robots can perform intricate movements with greater accuracy and stability than human hands, minimizing tissue damage and reducing complications.
- Surgical Planning and Navigation: AI can analyze patient-specific data (e.g., CT scans, MRIs) to create detailed surgical plans and guide robotic instruments during the procedure.
- Remote Surgery (Telesurgery): Combined with 5G technology, AI enables surgeons to perform procedures remotely, expanding access to specialized care in underserved areas.

Benefits and Impact:

- Minimally invasive procedures, leading to smaller incisions, less pain, and faster recovery times.
- Reduced risk of complications and improved surgical outcomes.
- Increased surgical precision and dexterity.
- Expanded access to specialized surgical care, particularly in remote or underserved areas.

Challenges and Future Directions:

- Ensuring the safety and reliability of AI-powered robotic systems.
- Addressing the ethical implications of autonomous or semi-autonomous surgical robots.
- Developing robust training programs for surgeons to effectively utilize these advanced technologies.

3.1 Remote Robotic Surgery

A surgeon in Rome, Italy, performed a robotic surgery on a patient 8,000 km away in Beijing, China, using AI and 5G technology, demonstrating the potential of telesurgery to overcome geographical barriers and expand access to specialized care (Cgtn, 2024) (Figure 6).



FIGURE 6

Remote Robotic Surgery

3.2 Brain-Computer Interfaces for Robotic Control

Scientists at Zhejiang University enabled a paralyzed man to control robotic arms with his thoughts, showcasing the potential of brain-computer interfaces combined with AI to restore lost motor function (Jiang et al., 2022) (Figure 7).



FIGURE 7

Brain-Computer Interfaces for Robotic Control

4. AI IN MEDICAL TRAINING AND EDUCATION

AI, along with augmented reality (AR) and virtual reality (VR), is revolutionizing medical training and education by providing immersive, interactive, and personalized learning experiences.

Problem Addressed: Limitations of traditional medical training methods, such as reliance on cadavers, limited opportunities for hands-on practice, and the risk associated with practicing on real patients.

How AI Solves the Problem:

- VR/AR Simulations: VR and AR technologies create realistic simulations of surgical procedures, anatomical structures, and clinical scenarios, allowing trainees to practice in a safe and controlled environment.

- AI-Powered Tutoring Systems: AI can personalize learning experiences by adapting to individual student needs and providing customized feedback.
- AI-Driven Diagnostic Training: AI can present trainees with complex medical cases and provide feedback on their diagnostic reasoning.

Benefits and Impact:

- Enhanced learning outcomes through immersive and interactive experiences.
- Reduced risk associated with practicing on real patients.
- Personalized learning experiences tailored to individual student needs.
- Increased accessibility to high-quality medical training, regardless of geographical location.

Challenges and Future Directions:

- Developing high-quality VR/AR simulations that accurately replicate real-world clinical scenarios.
- Integrating AI-powered tutoring systems into existing medical curricula.
- Evaluating the effectiveness of these technologies through rigorous educational research.

4.1 AR-Assisted Surgery

Medivis uses AR and AI in the operating room to help doctors visualize organs and structures in 3D during procedures, improving accuracy and safety by overlaying digital images onto the patient's body in real time (Medivis, n.d.) (Figure 8).

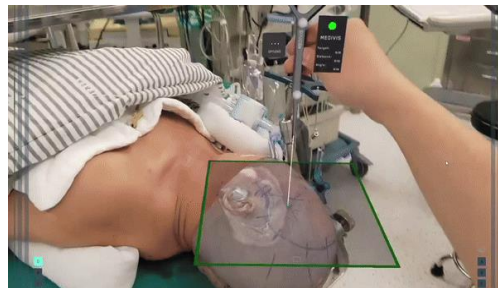


FIGURE 8

AR-Assisted Surgery

4.2 4.3 VR in Healthcare Training

VR is used to create highly realistic simulations of surgical procedures, allowing healthcare professionals to practice complex operations without the need for live patients (Arch Virtual, n.d.) (Figure 9).



FIGURE 9

VR in Healthcare Training

4.3 VR for Medical Education

VR is used to teach anatomy, allowing medical students to explore 3D models of the human body in detail, enhancing learning and retention (Anima Res, 2017) (Figure 10).

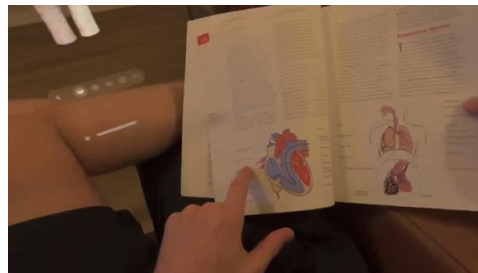


FIGURE 10

VR for Medical Education

5. CHALLENGES AND ETHICAL CONSIDERATIONS

While AI offers immense potential to transform healthcare, it also raises several important ethical and practical considerations.

Key Challenges:

Algorithmic Bias: AI models can perpetuate and amplify existing biases in the data they are trained on, leading to unequal or unfair outcomes for certain patient groups.

Data Privacy and Security: Protecting sensitive patient data is crucial. Robust security measures and data governance frameworks are essential.

Job Displacement: Concerns exist about the potential for AI to automate certain healthcare tasks, leading to job displacement among healthcare professionals.

Lack of Transparency and Explainability: The "black box" nature of some AI models can make it difficult to understand how they arrive at their conclusions, hindering trust and acceptance.

Regulatory Frameworks: Clear and comprehensive regulatory frameworks are needed to ensure the safe and responsible development and deployment of AI in healthcare.

Ethical Considerations:

Patient Autonomy: Ensuring that patients retain control over their medical decisions, even when AI is used to assist in diagnosis or treatment.

Accountability and Responsibility: Establishing clear lines of accountability for AI-driven decisions in healthcare.

Equitable Access: Ensuring that the benefits of AI in healthcare are accessible to all patients, regardless of their socioeconomic status or geographical location.

CONCLUSION

AI is poised to revolutionize healthcare, offering transformative solutions to address critical challenges and improve patient outcomes. From enhancing diagnostic accuracy and accelerating drug discovery to revolutionizing surgical procedures and medical training, AI has the potential to reshape the future of medicine. However, realizing this potential requires careful consideration of the ethical and practical implications of AI in healthcare. By addressing challenges such as algorithmic bias, data privacy, and the need for transparency, we can ensure that AI is used responsibly and ethically to create a more equitable, efficient, and patient-centered healthcare system. Continued research, robust regulatory frameworks, and ongoing dialogue among stakeholders are essential to harness the full potential of AI in healthcare while mitigating its risks.

REFERENCES

- Al-Hassiny, A. (2024, November 14). Review of second opinion by Pearl – AI-Assisted Dental Radiography Diagnostics. Institute of Digital Dentistry. https://instituteofdigitaldentistry.com/ai/second-opinion-by-pearl-ai-assisted-dental-radiography-review/?srsltid=AfmBOorGG1hHxgjjNLONngl6_kCFJEteHojqLpXr0zLXVSgAtfQjKNGB
- ANIMA RES. (2017). INSIGHT HEART - The human heart expedition. Retrieved from <https://archvirtual.com/> Arch Virtual VR Training and Simulation for Education and Enterprise | VR training and simulation applications that provide measurable value solving real world problems. (n.d.). <https://archvirtual.com/>
- Cgtn. (2024, June 11). Chinese team perform world-first robotic surgery from Rome in Beijing. CGTN. <https://newseu.cgtn.com/news/2024-06-12/Chinese-team-perform-world-first-robotic-surgery-from-Rome-in-Beijing-1um4yx45lxq/p.html>
- Cresilon. (2024, August 15). Cresilon receives FDA clearance for TRAUMAGEL. Cresilon. <https://cresilon.com/2024/08/15/cresilon-receives-fda-clearance-for-traumagel/>
- Jiang, H., Wang, R., Zheng, Z., Zhu, J., Qi, Y., Xu, K., & Zhang, J. (2022). Short report: surgery for implantable brain-computer interface assisted by robotic navigation system. *Acta Neurochirurgica*, 164(9), 2299–2302. <https://doi.org/10.1007/s00701-022-05235-5>
- Medivis. (n.d.). A new standard of surgery using augmented reality. Retrieved from <https://www.medivis.com/>
- Ravi, V., Murashima-Suginami, A., Kiso, H., Tokita, Y., Huang, C., Bessho, K., Takagi, J., Sugai, M., Tabata, Y., & Takahashi, K. (2023). Advances in tooth agenesis and tooth regeneration. *Regenerative Therapy*, 22, 160–168. <https://doi.org/10.1016/j.reth.2023.01.004>
- Second Opinion - Real-time pathology detection aid for dentists, from dentistry's global AI leader. (n.d.). <https://www.hellopearl.com/products/second-opinion>
- Soenksen, L. R., Kassis, T., Conover, S. T., Marti-Fuster, B., Birkenfeld, J. S., Tucker-Schwartz, J., Naseem, A., Stavert, R. R., Kim, C. C., Senna, M. M., Avilés-Izquierdo, J., Collins, J. J., Barzilay, R., & Gray, M. L. (2021). Using deep learning for dermatologist-level detection of suspicious pigmented skin lesions from wide-field images. *Science Translational Medicine*, 13(581). <https://doi.org/10.1126/scitranslmed.abb3652>
- Yala, A., Lehman, C., Schuster, T., Portnoi, T., & Barzilay, R. (2019). A deep learning mammography-based model for improved breast cancer risk prediction. *Radiology*, 292(1), 60–66. <https://doi.org/10.1148/radiol.2019182716>

EVALUATION OF THE MENINGITIS SURVEILLANCE SYSTEM (2020-2023) - REPUBLIC OF KOSOVA

Donjet Bislimi

UNI – Universum International College; National Institute of Public Health of Kosova, Kosova;
Comenius University Bratislava, Bratislava, Slovakia

Redon Jashari

UNI – Universum International College; Alma Mater Europea University, University Clinical Center of Kosova

Donart Bislimi

University of York, Europe Campus, Thessaloniki, Greece

Teuta Muslija

National Institute of Public Health of Kosova, Kosova

Era Pireva

National Institute of Public Health of Kosova, Kosova; Heimerer College, Kosova

Albiona Rashiti Bytyçi

National Institute of Public Health of Kosova, Kosova; Alma Mater REZONANCA, Kosova

Besmir Salihu

UNI – Universum International College; University Kiril and Metodij, North Macedonia

ABSTRACT

This evaluation assesses Kosovo's paper-based meningitis surveillance system between 2020 and 2023, focusing on its efficacy in monitoring and managing meningitis cases. Despite being operationally familiar, the system's reliance on manual data entry presents significant challenges, including delays, data inaccuracies, and increased risk of information loss. Our multi-faceted approach includes a review of surveillance forms, stakeholder interviews, and data quality analyses, offering insights into the system's strengths and limitations. Findings indicate that while the paper-based system adequately captures essential epidemiological data, it often lacks the speed and precision required for timely outbreak responses. Missing data rates improved annually, yet critical and non-critical gaps persist. Interviews reveal both positive user experience and challenges associated with manual processes, notably delays from rural areas. Our analysis highlights the need for digital transformation, emphasizing that a digital system could enhance timeliness, data accuracy, and security. We recommend implementing a digital surveillance platform with enhanced reporting protocols to optimize data management and support a more proactive approach to meningitis control in Kosovo.

Key words: meningitis, surveillance system, digital transformation

INTRODUCTION

In Kosovo, where rapid responses to health crises are crucial, meningitis continues to pose a significant threat to public health due to its potential to spread quickly and cause severe illness. Between 2020 and 2023, the country has relied on a traditional, paper-based system to track and manage cases of meningitis. This system, characterized by manual data entry and the absence of a digital database, is the focus of this evaluation report.

The challenges of such a manual system are manifold. It is slow, which can delay critical responses to outbreaks. It is prone to human error, from data entry mistakes to lost forms, which can lead to gaps in crucial health data. Moreover, the lack of a digital component limits the ability to quickly analyze trends and effectively plan public health responses.

This report aims to assess how well the current system has been working in the context of these limitations. It explores whether the paper-based approach can meet the needs of effective disease surveillance and control or if it falls short in providing the timely and accurate information needed to protect public health. Through this evaluation, we seek to understand the system's strengths and identify key areas for improvement, particularly the potential benefits of incorporating digital technologies to enhance the system's efficiency and responsiveness.

1. METHODS

To provide a thorough evaluation of Kosovo's paper-based meningitis surveillance system, we employed a multi-faceted approach. This strategy was designed not only to assess the technical aspects of the system but also to capture the human elements and day-to-day realities of those who interact with it. The specific methods are explained in detail below.

Documentation Review

We started with a detailed examination of the paper forms that are at the heart of the reporting system. A physician (DB) working in the Epidemiology Department of NIPHK reviewed the documents to assess what information is captured, how it is structured, and whether the forms are designed to facilitate complete and straightforward data collection.

Stakeholder Interviews

We conducted 25 qualitative interviews with healthcare providers, including doctors, nurses, and health administrators, who use the surveillance system regularly. These interviews focused on

understanding the limitations and advantages of the paper-based process, daily workflow, and the overall efficiency of the system.

To organize the feedback, we separated the key points into positive and negative themes.

2. DATA QUALITY ANALYSIS

We ANALYSED how complete and accurate the information on the paper forms was. This involved checking for consistently filled fields, critical data (Symptoms, Medical History, Onset of Symptoms, Risk Factors), non-critical data (Demographic Information, General Health Questions), accuracy of the data entered, and identifying patterns of missing or incorrect information. This analysis helped us gauge the reliability of the data being used to make public health decisions and its effectiveness in supporting timely responses to meningitis outbreaks.

Through these methods, we aimed to paint a comprehensive picture of the system's functionality, identifying both its strengths and areas where enhancements are necessary to better support public health in Kosovo.

3. ANALYSIS OF THE SURVEILLANCE SYSTEM

3.1 Operational Overview

The process of reporting meningitis cases within the current system follows a distinctly manual workflow, which we have broken down into several key steps to capture the full scope of activities from detection to reporting.

Case Identification: When a patient presents symptoms suggestive of meningitis, healthcare providers begin with a clinical assessment based on the patient's medical history and presenting symptoms (Adrianou, et al., 2021; Brandwagt, Ende, Ruijjs, Melker, & Knol, 2019; Kaburi, et al., 2017).

Documentation: If meningitis is suspected, the healthcare provider fills out a paper form, recording initial findings and clinical assessments. This form requires detailed information about the patient's demographic profile, symptoms, onset of illness, and any immediate treatments administered (see Figure 1.1).

Confirmation: Depending on the resources available, further diagnostic tests such as lumbar punctures or blood tests are conducted to confirm the presence of meningitis. The results of these tests are added to the initial paper form.

Form Submission: Once complete, the form is manually submitted to local health authorities. This typically involves physical delivery by mail or hand, depending on the location of the healthcare facility.

Data Entry: At the local health authority level, the information from the paper form is saved in specific folders for tracking and monitoring purposes.

Reporting and Analysis: Data collected from various regions are periodically reviewed and analysed to monitor disease patterns and outbreaks, and to inform public health responses.

This step-by-step process highlights several potential bottlenecks, particularly in the areas of data transmission and processing, which could delay critical responses to outbreaks.

Form Analysis

We conducted a thorough review of the paper forms used in the system, focusing on the design and the type of information they capture.

Patient Demographics: Basic information such as age, gender, residence, and contact details.

4. RESULTS

4.1 Description of the surveillance system

Our evaluation provided a detailed look at the paper-based meningitis surveillance system currently in use in Kosovo. During 2021, 2022, and 2023 there were n=350, n=450, and n=700 cases, respectively. More cases were found since the number of diaspora visiting Kosova was much more during 2023 than the previous years, which translated in a larger number of population during that year.

Year	Reporting Period	Fully Complete	Missing Critical Data	Non-Missing Data	Critical	Total
2021	June-Dec	298 (85.1%)	35 (10%)	17 (4.8%)		350
2022	Full Year	396 (88%)	36 (8%)	18 (4%)		450
2023	Full Year	630 (90%)	49 (7%)	21 (3%)		700

Table 1. Annual Data Completeness and Case Volume from 2021 to 2023

*2020 is not included because of zero reports during the pandemic.

This table provides an overview of the data completeness for meningitis case reports in Kosovo over three years, from 2021 to 2023, alongside the total number of cases reported each year. The table breaks down the number of cases and percentage of reports that were fully complete, those missing critical data (Symptoms, Medical History, Onset of Symptoms, Risk Factors) and those missing non-critical data (Demographic Information, General Health Questions). The percentage of fully completed forms increase each year. For all years, most missing data was non-critical.

Objective

The main goal of this system is to keep a vigilant eye on the incidence of meningitis within the population. Even though it is designed to quickly identify potential outbreaks there is the need of creating a digital database which helps ensure that health authorities can respond swiftly and effectively to curb the spread of this serious disease.

Population under surveillance

The surveillance encompasses the entire population within Kosovo's national boundaries, including . All healthcare providers (from small clinics to large hospitals) are required to report any suspected or confirmed cases using designated forms (see figure 1.1).

Case definitions

The system uses clearly defined criteria for what constitutes a case of meningitis, aligning with international health standards. These definitions include specific symptoms and, when possible, confirmation with laboratory tests is done. The case definition includes any patient showing acute onset of meningeal symptoms (stiff neck, fever, and headache) aligned with national laws and international guidelines. (<https://niph-rks.org/>, n.d.) (<https://www.ecdc.europa.eu/en>, n.d.) (<https://www.who.int/>, n.d.) (<https://www.cdc.gov/>, n.d.)

Type of system

The surveillance operates on a passive basis, relying on healthcare providers to report cases as they encounter them. This approach places significant responsibility on individual providers but is supported by mandatory reporting laws.

Meningitis Surveillance System Flow Chart

- Patient presents symptoms
- Assessment by healthcare provider
- Case report form filled out
- Case report sent to local health department
- Review by local health department
- Request for additional information
- Laboratory tests for confirmation
- Case registration
- Data compilation
- Data cleaning and standardization
- Data analysis
- Inform public health actions
- Feedback to healthcare providers

Data structure

The forms used to report meningitis cases include the following information (see also figure 1.1).

Patient Demographics: Information such as age, gender, and residence to help trace the demographic spread of the disease and identify vulnerable groups.

Clinical Information: Records of symptoms, onset dates, and treatments. Data taken from the clinical registers and questionnaires.

Laboratory Tests: Details of diagnostic tests and their results to confirm diagnoses and identify the pathogens involved.

Epidemiological Links: Data on patients’ recent contacts and travel history to aid understanding of how the disease is transmitted and identify potential clusters.

EPIDEMIOLOGICAL SURVEY

Meningitis (viral, bacterial)

Syndrome/Disease: _____

No. survey _____ and survey date _____

First name, parent's name, last name _____

Date of birth: _____ Gender: MF Profession: _____

Address: _____ No. Municipality: _____

No. of family members _____

Has he been sick with the same disease before: Yes No When: _____

Date of illness / time: _____ (first symptoms)

Date of Hospitalization _____, Date of Discharge _____

Symptoms/signs of the disease:

temperature	yes	NO
fever	yes	NO
headache malaise	yes	NO
nausea	yes	NO
neck	yes	NO
stiffness	yes	NO
convulsions	yes	NO
	yes	NO
photophobia	yes	NO
petechiae swollen	yes	NO
fontanel psychomotor disturbance	yes	NO
_____	yes	NO
_____		NO
_____		NO

Has the patient had any other disease before:

1) Influenza	Yes	NO
2) Otis	Yes	NO
3) Parotid	Yes	NO
_____	yes	NO
_____	Yes	NO

Patients with similar symptoms and signs in the family/workplace and onset of illness: yes NO

Movement of the patient within the last 2 months: _____

Who and when visited _____

Personal hygiene conditions _____

- 1. good
- 2. average

Feeding method: _____

- 1. house
 - 2. local
 - 3. combined
- in the bar

Type of toilet in use _____

- 1. yard
- 2. house
- 3. sewer

Garbage disposal: _____

- 1. in the
- 2. in the
- 3. on the

Material taken from _____

- 1. feces
- 2. blood

Measures taken: 1. _____

Family members: name and surname _____

Other epidemiological information _____

Figure 1.1. Comprehensive Epidemiological Survey Form for Meningitis Case Reporting

Indicators

Analysis of the surveillance data involves several key indicators, including case incidence rates, demographic and geographic distribution of cases, vaccination coverage, and outbreak detection times. (<https://www.ecdc.europa.eu/en>, n.d.) (<https://www.who.int/>, n.d.) (<https://www.cdc.gov/>, n.d.)

Feedback

Feedback to stakeholders is provided through monthly reports and briefings, which include analysis of current data, trends, and recommendations for action. These communications are tailored to the needs of surveillance users, technical experts, policymakers, and the general public, ensuring informed decision-making and effective public health responses. Stakeholders in the meningitis surveillance system include public health officials who monitor disease trends, healthcare providers who require current information for patient care, educational institutions needing updates for outbreak management, researchers studying disease patterns and vaccine efficacy, the general public for awareness on prevention and treatment, and policymakers who use data to make health-related decisions and allocate resources for meningitis control.

Action taken

Equipped with data from these reports, health authorities can deploy targeted interventions like vaccination drives in outbreak areas or public health advice aimed at preventing the spread of the disease.

Analysis of the surveillance system

Challenges with the Paper-Based System

The existing system's reliance on paper forms introduces a number of inefficiencies and vulnerabilities:

Time Delays: The manual processing and physical handling of paper forms can lead to significant delays—from data collection to its entry into regional databases. In managing infectious diseases like meningitis, where every hour counts, such delays can hinder timely interventions, potentially allowing outbreaks to grow unchecked. Based on our qualitative interviews, that was experienced in some cases referred from rural areas during summer of 2023, when NIPHK received information from healthcare providers 3 days after the first onset of symptoms in the patients.

Resource Drain: The need for manual data entry not only consumes significant time and effort but also places additional strain on healthcare staff. These professionals must juggle data management with patient care, which can compromise the quality of both. As one healthcare provider noted, 'Manual data entry not only doubles our workload but also increases the chance of errors which can be critical in outbreak situations'.

Error Prone: Human error is an inevitable risk in any manual process. Misfiled forms, transcription errors, and the simple loss of documents can lead to incomplete or inaccurate data, undermining the effectiveness of the surveillance efforts. After summer of 2023, an internal review revealed that transcription errors occurred in approximately 5% of all paper forms, potentially affecting disease tracking accuracy.

Data Vulnerabilities: Paper documents are inherently fragile and susceptible to a variety of risks. Physical forms can be easily lost or damaged due to environmental factors, such as fire or water damage, or simply misplaced during handling and storage.

There is also a risk of compromised security: protecting sensitive health information is more challenging with paper records, which can be more easily accessed or stolen, posing serious privacy concerns. Currently, paper records are stored in locked cabinets in restricted-access rooms; however, introducing encrypted digital storage could significantly enhance the security and accessibility of these sensitive records.

The Imperative for Digital Transformation

Transitioning to a digital surveillance system can address these issues effectively, offering several significant benefits:

Timeliness: A digital system enables real-time data entry and access, which can shorten the time lag from data collection to actionable insights.

Accuracy and Reliability: Digital data systems reduce the risks associated with manual data handling. They can be designed with checks to ensure data completeness and accuracy, enhancing the reliability of the surveillance data.

4.2. 2023 Subsample Analysis of the Meningitis Surveillance System

Overview of Data Collection

In 2023, a total of 700 meningitis cases were recorded via the paper-based reporting system. (<https://niph-rks.org/>, n.d.) (<https://shskuk.rks-gov.net/klinikaSemundjeveNgjiteselInfektive>, n.d.)

All data were manually entered, yielding various levels of completeness and accuracy, which are vital for timely and effective public health responses.

In this report, a detailed subsample analysis was conducted on 50 meningitis cases reported in 2023. This subsample was selected randomly to assess the completeness and timeliness of data collected within the surveillance system, focusing on key variables that are critical for effective public health response. A detailed line list was created, documenting key information for each of the 50 cases in the subsample.

The analysis includes three main components:

Data Completeness Analysis:

The completeness of data for variables such as age, gender, symptoms onset, medical history, and risk factors was evaluated.

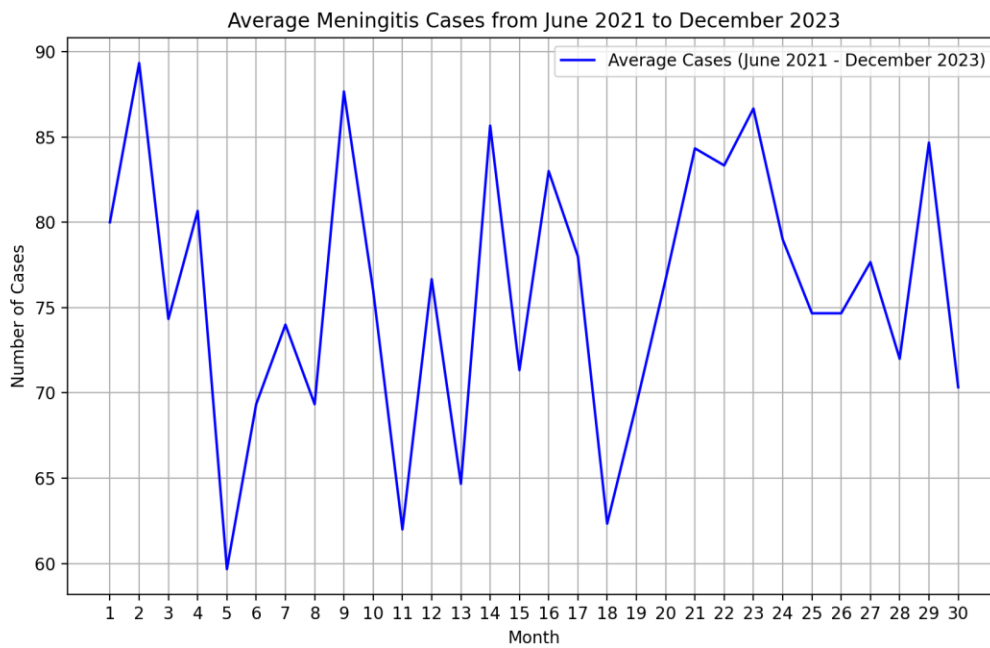
Variable	Total Reports	% Complete	% Missing Critical Data
Age	N=50	90%	10%
Gender	N=50	100%	0%
Symptoms Onset	N=50	100%	0%
Medical History	N=50	86	14%
Risk Factors	N=50	100%	0%

Table 2. Data Completeness Analysis of Meningitis Surveillance

Table 2. Highlights that while certain variables were fully reported, others were less complete, particularly in age, medical history, and risk factors..

Variable	Value
Average Time to Report in days	2.6 (SD=1.14)
Late Reports, n (%) defined as 48 hours after symptom onset	18 (36%)

Table 3. Timing Analysis of Meningitis Case Reporting



Graph 1: Monthly Trend of Meningitis Cases from June 2021 to December 2023

This line graph illustrates the trend of meningitis cases reported in Kosovo each month from June 2021 to December 2023. Each line represents a different year, providing a visual comparison of the monthly fluctuations in case numbers over the three years. The graph is essential for identifying patterns,

such as seasonal peaks or unusual spikes in cases, which could indicate outbreaks or the effectiveness of public health interventions.

Theme	Positive Points	Negative Points
System Familiarity	"Providers are familiar with the system and comfortable using it."	"Manual data entry is time-consuming and error-prone."
Data Accuracy	"Physical forms provide a tangible record that some providers find reassuring."	"Human error is an inevitable risk, with misfiled forms and transcription errors."
Timeliness		"Delays in data transmission especially from rural areas affect timely interventions."
Suggestions for Improvement	"Support the shift to a digital system to enhance efficiency and data accuracy."	"Continuous training and technical support are necessary for a smooth transition."

Table 4. Findings from Stakeholder Interviews

Interviews with stakeholders provided critical insights into the daily workflow, challenges, and efficiencies of the paper-based process, helping us understand the practical implications of the current system on public health management. This information was instrumental in drafting the system description for this report, highlighting both the strengths of the current approach and the key areas that require improvement. Some key points from the interviews are summarized in Table 4.

CONCLUSION

Through this detailed exploration of the system's mechanics and its role in public health, we see both its strengths and its areas for potential enhancement. While the system is robust in terms of the breadth of data it captures, the reliance on manual processes suggests significant room for improvement, particularly in speeding up data processing and enhancing real-time response capabilities, possibly through the adoption of digital tools.

Our analysis of Kosovo's current meningitis surveillance system, which relies heavily on paper-based processes, has highlighted several critical limitations. These limitations not only affect the system's efficiency and responsiveness but also expose it to significant risks concerning data accuracy and security.

While the paper-based system fulfills basic surveillance functions, it falls significantly short in delivering timely and accurate public health responses. This limitation stems largely from its reliance on manual

processes that introduce delays, issues that are particularly problematic in managing infectious diseases such as meningitis. To enhance the system's effectiveness and responsiveness, we propose the following strategic changes:

Digital Transformation: The primary recommendation is to develop and implement a comprehensive digital database. Moving to a digital platform will enable real-time data capture and processing, which can dramatically improve the speed and accuracy of the information available to health authorities. This transition is crucial for facilitating quicker, more informed responses to potential outbreaks and can significantly enhance the management of public health interventions.

Accessibility and Security: Digital systems allow for secure storage and easy retrieval of data, accessible from anywhere by authorized personnel. This not only improves the usability of the data but also its security, protecting sensitive information through advanced encryption and other security measures.

Enhanced Analytical Capabilities: With digital tools, data from different sources can be integrated and analyzed more effectively. This supports more sophisticated analyses, such as predictive modeling, which can provide deeper insights into disease patterns and inform more strategic public health interventions.

Enhanced Reporting Protocols: In tandem with digital transformation, it is essential to modernize reporting protocols by adopting digital reporting mechanisms. This shift will not only make the process of data collection more streamlined but also more precise and efficient. Digital forms can be configured to ensure that all necessary information is completed accurately and comprehensively, reducing the risk of human errors and the incidence of incomplete data.

Study Proposal

To substantiate the advantages of digitalization, we recommend conducting study using digital tools to analyze data after one year of surveillance. This study should evaluate key attributes such as the completeness and timeliness of the data. Results would provide tangible evidence supporting the effectiveness of digital methods and highlight areas for potential improvement.

Comprehensive Attribute Evaluation

Following the successful implementation of a digital system, a thorough evaluation of all system attributes is advised. This continuous evaluation will help to constantly refine and enhance the surveillance system, ensuring it remains robust and responsive to public health needs. It will also promote a proactive

surveillance approach, using data analytics not just to react to outbreaks but to anticipate and prevent them.

Looking Ahead

These recommendations are designed to transform Kosovo's meningitis surveillance into a more dynamic, efficient, and responsive system. By embracing digital solutions and continually refining its protocols, Kosovo can better safeguard public health and enhance its capacity to manage and mitigate the impacts of meningitis outbreaks effectively. This proactive approach is not merely about keeping up with technological advances but fundamentally improving how public health data is managed and utilized to protect and improve the lives of all citizens.

REFERENCES

Adrianou, X. D., Riccardo, F., Caporali, M. G., Fazio, C., Neri, A., Vacca, P., . . . Stefanelli, P. (2021). Evaluation of the national surveillance system for invasive meningococcal disease, Italy, 2015–2018. *Plos one*.

Brandwagt, D. A., Ende, A. V., Ruijjs, H. (., Melker, H. E., & Knol, M. J. (2019). Evaluation of the surveillance system for invasive meningococcal disease (IMD) in the Netherlands, 2004 – 2016. *Research Gate*.

<https://niph-rks.org/>. (n.d.).

<https://shskuk.rks-gov.net/Navbar/SubMenuContent/klinikaSemundjeveNgjiteselInfektive>

<https://www.cdc.gov/>

<https://www.ecdc.europa.eu/en>

<https://www.who.int/>

Kaburi, B. B., Kubio, C., Kenu, E., Nyarko, K. M., Mahama, J. Y., Sackey, S. O., & Afari, E. A. (2017). Evaluation of the enhanced meningitis surveillance system, Yendi municipality, northern Ghana, 2010–2015. *BMC Infect Dis*.

SUSTAINABLE STRATEGIES FOR HOSPITALS OF TOMORROW

Janet Castro Milán
 Euroaula Escola Universitària, Spain
janet.castro@euroaula.com

Abstract

Sustainable hospitals have gained great relevance within the hospital sector, driven by the growing awareness of the need to reduce the environmental footprint of healthcare activities. The hospital industry, characterized by a high consumption of resources such as energy, water and materials, generates a considerable impact on the natural environment. In this context, the implementation of sustainable practices not only contributes to the mitigation of this impact, but also favors the improvement of patient satisfaction and the reduction of operating costs. However, the adoption of these practices faces several challenges, such as the high initial investments required and the limited availability of sustainable products and services on the market. The main objective of this research is to analyze both the benefits and obstacles associated with sustainable hospital experiences and to evaluate their contribution to the development of a comprehensive experience for hospitals committed to sustainability, understanding the comprehensive experience as one that not only takes into account the personal satisfaction of the patient, but also involves him or her in a global approach towards the environmental, social and economic sustainability of the hospital, creating a stay that goes beyond the simple provision of services and that is framed within a responsible hospital model. To do so, a mixed methodological approach was used, which combined a qualitative analysis based on interviews with directors and employees of hospitals that have adopted sustainable practices, with a quantitative analysis through surveys applied to patients of said establishments. The results obtained indicate that, despite the economic and logistical challenges, hospitals that have implemented sustainable practices achieve greater patient satisfaction, while experiencing a significant reduction in resource consumption and operating costs. In addition, patients perceive a more authentic and responsible experience, which in turn strengthens the competitive value of sustainable hospitals in a market increasingly oriented towards sustainability and social responsibility.

Keywords

Sustainable hospitals, environmental impact, sustainability, future.

INTRODUCTION

In recent years, sustainability in healthcare has emerged as a critical concern due to the high resource consumption and environmental impact associated with hospital operations. Healthcare institutions, particularly hospitals, consume vast amounts of energy, water, and materials, which significantly contribute to the carbon footprint of healthcare systems (Koo et al., 2020). The healthcare sector, especially hospitals, is one of the primary sources of greenhouse gas emissions, which represents a crucial challenge in the global fight against climate change (McKinnon et al., 2019). This environmental impact has become even more relevant as concerns grow about the negative effects of unsustainable healthcare systems and excessive resource consumption.

As awareness regarding environmental issues increases, sustainable practices in hospitals have gained traction as a means to reduce the ecological footprint of healthcare systems (Yousefi et al., 2018). These practices include the adoption of green technologies, waste reduction, energy efficiency improvements, and the integration of renewable energy sources. However, while sustainable strategies offer significant environmental benefits, they also present operational and financial challenges, leading to a debate about their feasibility in the hospital sector.

Sustainability in hospitals is not limited to reducing environmental footprints but also encompasses a range of operational and social benefits. These include cost reductions through energy efficiency and improved patient satisfaction by creating healthier, environmentally friendly settings (Anderson & Bell, 2021). Additionally, by adopting sustainable practices, hospitals can position themselves as leaders in corporate social responsibility, improving their reputation and influence in the community (Devries & Boon, 2022).

This paper explores the benefits and challenges of implementing sustainable practices in hospitals, analyzing how these practices affect patient experience and contribute to a responsible healthcare model. The research aims to understand how healthcare institutions can balance the demands of sustainability with the operational and financial challenges they face and how this, in turn, affects patient and community perceptions.

1. LITERATURE REVIEW

Sustainability in hospitals encompasses a broad range of practices aimed at minimizing negative environmental impacts while enhancing operational efficiency (Tieman et al., 2021). These practices include the adoption of green technologies such as energy-efficient systems, renewable energy sources, water-saving devices, and waste reduction programs. To reduce the ecological footprint of hospitals, many have integrated technologies like LED lighting, efficient climate control systems, and graywater recycling (Rahman et al., 2019). Implementing these technologies, although requiring significant initial investment, typically leads to substantial reductions in energy and water consumption over time.

Furthermore, evidence suggests that sustainable hospitals tend to experience a decrease in operating costs as green technologies are implemented. A study by McKinnon et al. (2019) found that, despite the high upfront costs of renewable energy and energy-efficient technologies, hospitals experienced reductions in energy and water costs ranging from 15% to 30% in the first five years. Thus, adopting sustainable practices can result in significant long-term economic benefits.

However, some studies highlight that the implementation of sustainable practices faces several major obstacles, including the significant capital investment required to adopt green technologies and the limited availability of sustainable products and services (Tieman et al., 2021). This financial barrier is one of the main factors preventing many hospitals from transitioning to more sustainable models. Additionally, there is a lack of standardized frameworks for measuring sustainability performance, making it difficult for healthcare institutions to effectively track and assess their sustainability initiatives (Yousefi et al., 2018).

Another crucial aspect of hospital sustainability is patient experience. A growing body of research indicates that patients tend to be more satisfied in hospitals that prioritize sustainability, as these institutions create healthier and more environmentally friendly environments (Choi & Kim, 2020). Moreover, patients perceive sustainable hospitals as more socially responsible, which enhances their overall experience (Devries & Boon, 2022). Patient satisfaction, therefore, is a key factor that must be considered when evaluating the implementation of sustainable strategies in hospitals.

2. METHODOLOGY

This study employed a mixed-methods approach to analyze both the benefits and challenges associated with sustainable hospital practices. First, qualitative interviews were conducted with hospital

directors and staff from institutions that have integrated sustainable practices into their operations. These interviews focused on the challenges faced during the implementation process, strategies used to overcome barriers, and perceived benefits of sustainability initiatives.

In addition to the qualitative component, a quantitative survey was administered to patients at the same hospitals. The survey aimed to assess patient perceptions of the hospital's sustainability practices, focusing on how these practices influenced patient satisfaction, their perception of the hospital's social responsibility, and their overall hospital experience. The questions were designed to gather detailed information on the perceived impacts of sustainability on the quality of care and patient well-being.

The combination of qualitative interviews and quantitative analysis provided a comprehensive understanding of the effects of sustainable practices both from the perspective of hospital administrators and patients, offering a more holistic view of the benefits and challenges of sustainability in healthcare.

3. RESULTS

3.1 Reduction of Environmental Impact

Hospitals that adopted sustainable strategies reported significant reductions in their environmental impact. Key outcomes included:

- **Annual Energy Savings:** A 20% reduction in energy consumption due to the implementation of LED lighting, efficient climate control systems, and enhanced infrastructure for energy optimization.
- **Water Conservation:** A 15% decrease in water usage, achieved through low-flow faucets and water recycling systems.

These measures not only contributed to resource consumption reduction but also helped hospitals align with broader environmental responsibility and sustainability goals (Yousefi et al., 2018). The implementation of green technologies is therefore beneficial for both the environment and hospital operational costs.

3.2 Economic Savings

The adoption of sustainable practices resulted in significant economic benefits for hospitals, primarily through reductions in utility expenses. Specifically, hospitals reported an average of:

- **18% decrease in utility costs** (energy and water), leading to improved profitability.
- Additional savings were generated through enhanced recycling and waste management programs, reducing the costs associated with disposing of non-recyclable waste.

These savings demonstrate that, despite the initial costs of implementing green technologies, hospitals can achieve substantial long-term financial benefits (McKinnon et al., 2019). This economic aspect is a key driver for the adoption of sustainable practices in the healthcare sector.

3.3 Improvement in Institutional Image

Sustainability efforts also had a significant positive impact on the hospitals' institutional image. Survey results showed that:

- **78% of patients** indicated they would be willing to pay more for services at hospitals with sustainable practices.
- **85% of patients** believed that sustainability initiatives positively affected the hospital's brand perception.

These findings highlight sustainability as a key differentiator in the competitive healthcare market, enhancing the institution's reputation and attractiveness to environmentally conscious patients (Devries & Boon, 2022).

3.3 Certifications and Regulatory Compliance

Hospitals that obtained international sustainability certifications, such as LEED and ISO, reported improvements in their institutional image and operational framework. These certifications provided hospitals with a standardized framework to assess, track, and enhance their sustainable practices, further solidifying their commitment to environmental and social responsibility (Schultz & Huxley, 2017).

3.4 Positive Social Impact

Sustainable hospitals also experienced positive social impacts, particularly within local communities. Key outcomes included:

- **65% increase in hiring local staff** and supporting small businesses through the purchase of regional products.
- Implementation of awareness programs that enhanced environmental and social consciousness within the community.

These initiatives not only fostered a sense of social responsibility but also contributed to the local economy and community well-being (Rahman et al., 2019)

4. Discussion

The results of this study indicate that hospitals implementing sustainable practices experience a variety of benefits, particularly in terms of resource consumption and patient satisfaction. Hospital directors reported that, while the initial investments were high, sustainable practices resulted in long-term savings due to reduced energy and water usage, as well as lower waste management costs (Rahman et al., 2019). Furthermore, patients in these hospitals expressed higher levels of satisfaction, particularly when they perceived the hospital as environmentally responsible and socially conscious (Choi & Kim, 2020).

However, the adoption of sustainable practices also presents challenges. Hospital administrators cited the high upfront costs associated with green technologies as a significant barrier (McKinnon et al., 2019). Additionally, the availability of sustainable products and services is still limited, particularly in certain regions, which further complicates the transition to sustainability (Schultz & Huxley, 2017). Therefore, while the advantages of sustainability are evident, hospitals must overcome significant financial and logistical challenges to effectively implement these practices.

Conclusion

This study highlights the significant environmental, economic, and social benefits of sustainable practices in hospitals. The reduction in energy and water consumption, coupled with economic savings and improved patient satisfaction, demonstrates that sustainability is a viable and strategic approach for

hospitals. Additionally, sustainable hospitals present a promising model for reducing the environmental impact of healthcare systems while improving operational efficiency.

The positive social impact of sustainable practices, such as job creation and support for local businesses, underscores the broader societal benefits of these initiatives. However, while the advantages of implementing sustainable practices are clear, hospitals must overcome significant financial and logistical challenges. Collaboration between healthcare institutions, governments, and suppliers is essential to facilitate the adoption of these practices and ensure their long-term success. Moving forward, hospitals should continue to prioritize sustainability, not only to meet regulatory requirements but also as a competitive differentiator in the healthcare industry.

REFERENCES

- Choi, T., & Kim, S. (2020). Patient satisfaction and sustainability in healthcare: A review of current literature. *Journal of Healthcare Sustainability, 9*(4), 33-41.
- Devries, R., & Boon, J. (2022). Social responsibility and the patient experience in green hospitals. *Journal of Health and Sustainability, 17*(2), 123-136.
- Koo, J., Kim, H., & Lee, M. (2020). Green healthcare facilities and their impact on environmental sustainability. *Journal of Environmental Management, 35*(6), 220-230.
- McKinnon, L., Foster, M., & Zhang, W. (2019). The environmental footprint of hospitals: Reducing resource consumption in healthcare systems. *Environmental Sustainability in Healthcare, 24*(3), 213-225.
- Rahman, M., Sultana, S., & Ahmed, M. (2019). Adoption of green technologies in hospitals: A path towards sustainability. *International Journal of Environmental Science, 40*(5), 302-314.
- Schultz, J., & Huxley, P. (2017). Barriers to sustainable healthcare: A global perspective. *Sustainability and Healthcare, 22*(1), 1-14.
- Tieman, J., Clark, A., & Proctor, M. (2021). Healthcare sustainability: Integration of green practices in hospital management. *Journal of Hospital Sustainability, 12*(3), 115-128.
- Yousefi, M., Esfahanian, M., & Alizadeh, A. (2018). Sustainability practices in the healthcare sector: A review. *Journal of Sustainable Healthcare, 15*(1), 51-64.

MAKING URBAN LIFE SUSTAINABLE: JOHN RUSKIN'S VISION FOR A MUSEUM IN SHEFFIELD

Stephen Keck
UNI-Universum International College, Kosova
stephen.keck@universum-ks.org

ABSTRACT

*The term 'sustainability' was hardly known to 19th century writers. Yet, it would be a number of late 18th and early 19th century British writers who would make a significant contribution in framing the prehistory of sustainability. To cite one example, it would be Thomas Malthus whose *An Essay on the Principle of Population* (1798) foresaw a future in which the expansion of human civilization would be checked by insufficient resources. Furthermore, critics of industrialism identified the growth of environmental problems which came with landscapes defined by factories, railways and crowded cities.*

This paper focuses on John Ruskin's attempt to improve the quality of life in Sheffield—a city which was linked to steel production and labour issues—by building St. George's Museum, which would be focused on the needs of working people. This museum was rooted in Ruskin's effort, from the late 1860s onward, to create the Guild of St. George, which he envisioned as a model community. In fact, Ruskin came to view museums as essential public institutions which could go along way to ensure the quality of life for British society. Last, this discussion briefly situates Ruskin's ideas into the prehistory of sustainability.

Keywords: *Ruskin, Sustainability, Victorian, Britain, museums, Sheffield and model community*

INTRODUCTION

What do museums have to do with sustainability? What did they do with John Ruskin - Victorian Britain's most penetrating and influential cultural critic?² This discussion will identify some of these linkages, but it will also be an essay into the intellectual and cultural prehistory of Sustainability. The idea has had many embodiments even before 1800. From the conservation of forests to the doctrines of political economy which developed during the Enlightenment, the idea of creating and sustaining resources can be found in a range of European discourse. Students of the Industrial Revolution (1750-1850) recognize that the idea that the Earth possesses limited resources is hardly a new one. Most famously, Thomas Malthus identified the possibilities of overpopulation followed by social stagnation and possibly subsequent decline or even collapse. The impact of Malthus was to threaten the relatively sunny optimism of Adam Smith and other Enlightenment thinkers. While the early 19th century has been remembered for romantic thought—as manifest in music and literature—it was also a period in which political economists worried about the problems which Malthus had identified. It would be in the 20th Century that the essential features of sustainability—environment, society and economics began to form parts of the terrain of critical thinking. The generation which came of age during the Cold War produced key texts such as *Our Common Future* (1987) and even earlier Rachel Carson's *Silent Spring* (1962) marked an important moment in the emergence of environmental and ecological discourses. For instance, *Silent Spring* would be followed by now forgotten books such as Paul Ehrlich's *The Population Bomb*. (Culver, et.al, 2013, p. 7) Of course these discourses had yet to become programmatic as they would with their inclusion into the UN's Sustainable Development Goals (SDG). This century would witness the institutionalization of these discourses in academe and the capitalization of them as business interests.

Recovering the origins of these discourses enables those living in the second quarter of the 21st Century to better understand not only sustainability (and its cousin 'sustainable development' but also many of the larger issues which reflect the nature and practice of civilized life. The work of John Ruskin (1819-1900) is useful because he worried about not only about sustainable priorities, but the question about the role of arts in modern societies. Some of John Ruskin's ideas might be regarded as rooted in Romanticism and he would come to work as a social critic who engaged many of the most cherished doctrines of political economy. Ruskin is often remembered as Victorian Britain's most penetrating and influential cultural critic. Without any formal training in the arts (or architecture), Ruskin established his

² This discussion builds on a much earlier article which I published that explored the subject—but without reference to sustainability and a good bid of recent scholarship. Readers may consult: "Including Steelopolis: John Ruskin's Inclusive Museum", *International Journal of the Inclusive Museum*, vol. 2 no. 4 (2010), pp. 41-54.

reputation with the publication of *Modern Painters* (eventually 5 volumes) which made a brilliant and groundbreaking case for the centrality of J.M.W. Turner as Britain's greatest landscape painter. Between the 2nd and 3rd volumes of *Modern Painters*, Ruskin published *The Seven Lamps of Architecture*, which refashioned 19th century Britain's thought about building, design and architecture. Ruskin then applied the study of design to history, writing *The Stones of Venice* (1851-1853), which in three volumes wrote about the city's history in a new way and suggested that it had some troubling lessons for modern Britain. Ruskin had spent enormous amounts of time and work (as his unpublished notebooks in the Beinecke Library attest) studying Venice's architectural remains in detail which enabled him to conclude that Britain's power was not sustainable. The vision articulated in *The Stones of Venice* suggested that Britain would follow the fate of maritime powers such as Venice and Tyre and decline into vulgarity and insignificance. It would be in the 1850s that Ruskin would do for the Pre-Raphaelite artists (and cultural movement) what had done for Turner—which was to establish that they were the next great wave of British painting. By the late 1850s he began to engage questions directly involving political economy, empire and cultural consumption, while often relating these issues to the development of museums, art galleries and the national policies. In 1884 at the grand old age of 65 Ruskin published *The Storm Cloud of the Nineteenth Century*, which broke new ground by identifying air pollution as a significant challenge.

Ruskin's influence extended well beyond Britain as the following thinkers identified him as a formative influence: Gandhi, Cecil Rhodes, Marcel Proust, Clement Attlee and Leo Tolstoy. Within the more explicit domains of design and sustainable issues Ruskin almost certainly influenced thinkers who helped prepare the way for discussions which prefigured sustainability discourses. For example, it has been argued that he was also an essential figure in the American town planning + urbanism. If so, students of the history of planning and design might do well to explore the ideas and careers Frederick Law Olmsted (1822-1903) and Frederic Law Olmsted, Jr (1870-1957), Lawrence Veiller and Lewis Mumford (1985-1990) among others. (Lang 1999, p. 163)

This paper first considers Ruskin's early engagements with museums (including art galleries) and examines how his presuppositions were affected by the Great Exhibition of 1851. This seminal event had a decisive impact on the arts in Britain, one consequence of which was the creation of the South Kensington Museum (now famously known as the Victoria and Albert Museum), whose mission included training artists to support industrial design—a doctrine which challenged Ruskin's values and thought about the place of the arts in modern society. Consequently, perhaps, Ruskin moved towards politics and social reform and from 1871 and created the Guild of St. George which he hoped would become a model self-sustaining

community with a museum in Sheffield at its very core. The development of the St. George's Museum in Sheffield, then, reflected not only Ruskin's journey, but an attempt to use the arts to create a sustainable community, which would be a model for Britain and other modern societies.

1. RUSKIN'S EARLY ENGAGEMENT WITH MUSEUMS

Perhaps the most notable aspect of Ruskin's involvement with museums and art galleries is the extent to which it changed over the course of his life. His early experiences—perhaps first at the Dulwich Picture Gallery and the British Museum—came at a time when access to collections was often restricted. Most of these institutions hardly had a public mandate to share their collections with the local population. Mass tourism, which would develop over the course of the 2nd half of the 19th century, had yet to exist. It is possible that the biggest difference between now and then (notable already by the end of the 19th century) was motivation: a large percentage of people who visited art galleries before 1850 did so because they were collectors who wanted to learn what might be purchased and the valuations for different paintings and artifacts.

Ruskin's reputation as an art critic meant that his engagement with the National Gallery was nearly inevitable. In 1847 (he would make a similar complaint in a letter to the *Times* five years later as well) he wrote to the *Times* over the sustainability of its collection. The National Gallery was roughly a generation old, with its paintings originating in the John Julius Angerstein's (1735–1823) collection. Angerstein was a banker, who had built an art collection which was purchased in 1824, when the Gallery opened (its first location was his townhouse at 100 Pall Mall). Bequests came—first and most notably from Sir George Beaumont (1753–1827), who was a member of the Royal Academy, painter and art collector Owen and Brown, 1988). Both Beaumont and Angerstein collected Old Masters and this meant that the new museum began with continental oil painting in its DNA. Yet, its name suggested a different mission, but at mid-century there was hardly a hint that it would become one of the world's preeminent art museums. In fact, the National Gallery would move to its current location in 1838. By mid-century there were complaints that condition of the gallery's paintings had clearly deteriorated. Yet, the career of William Seguer (1772–1843) who made a career out of restoring damaged paintings demonstrates that this was hardly new. In fact, Seguer built a reputation as an art dealer and someone who could clean and repair paintings and he would ultimately hold positions such as Repairer of the King's Painting and Keeper of the first National Gallery. (National Gallery, 2025)

Nonetheless, Ruskin sought to call the problem to Britain's attention by writing a long letter in *The Times* (1847) to complain about the condition of some of the paintings in the National Gallery. He noted

that a good number of these paintings had already lost color from a range of sources—including air pollution. He repeated these objections within a decade, but by that point he had become a significant figure for the National Gallery.

While this story cannot detain us here, in 1851 Ruskin had become the chief executor of J.M.W. Turner' estate and this led him work for the National Gallery because the painter had left his remaining work (which amounted to about 19,000 pictures, sketches, notebooks and drawings to the National Gallery. This was an astonishing gift and enormous task for Ruskin, who completed the task in a relatively short time, producing significant catalogs for this material. A very brief review of these catalogs illustrates the extent not only of Turner's output, but also Ruskin's comprehensive work to assess it. Furthermore, this is an iconic moment for Ruskin's biographers and those who took once assumed that Ruskin could be taken at his word—when describing the burning of a number of Turner's sketches of erotic subjects. This view has been debunked, but it did contribute to the stereotypical reading of Ruskin as a strict and repressed Victorian thinker. (Warrell, 2012)

The issues Ruskin addressed (with respect to Turner's will and intentions) were not settled in his lifetime. For instance, when the Clore Gallery, which is devoted to Turner's works, opened in 1987 as part of the Tate Gallery (now the Tate Britain), it meant that it took about 4 generations to realize Turner's ambitions. However, as Ruskin performed his labours at the National Gallery, the arts scene in mid-19th century changed profoundly.

The Great Exhibition dominated Britain even before the spring of 1851 (when it opened) and it soon became the largest public event in British history. A select segment of the British public was already acquainted with exhibitions as they were part of the art world which flourished in London from the second half of the 18th century onwards. That said, the Great Exhibition had its roots in economic insecurity. Jeffrey Auerbach argues that the motivation to create the Great Exhibition originated at least partly from economic insecurity, because a number of significant British industrial leaders worried that it would produce inferior products (Auerbach, 1999, p, 9). British design, as such, seemed to labour behind its continental (especially French) counterparts. Auerbach explained that in the 1840s the education of industrial workers became a concern for British leaders because it was deemed to be inadequate. Some industrial workers were able to take advantage of mechanic's institutes and schools of design, but neither were deemed to be particularly effective. (Auerbach , 10-12).

In fact, these concerns were much older as the Committee of Taste and the concerns of Beaumont and his colleagues attest. Beaumont, for instance, believed that Britain should have an

institution which would display superior examples of the nation's painting in order to enhance its capacity for visual industrial design. (Owen and Brown, 1988, p, 210). These discussions were supported by a related concern that the British public was largely ignorant of European painting, sculpture and the arts, more generally. These concerns, articulated with great frequency in the late 18th and early 19th century show that more than a generation earlier British leaders worried that their designs were inferior those which might be found on the continent—especially in France and Italy.

In practice, these insecurities were also reflected in the debate about Mechanic Institutes which began to appear in Britain during the first decade of the 19th century. Mechanic institutes were places where British workers could go to gain some knowledge of the arts. For instance, the Liverpool Mechanics' and Apprentices' Library was formed in 1823 to provide a resource for workers (the school would subsequently transformed into a polytechnic and today Liverpool John Moore's University). (Liverpool John Moore's University, 2025) In the same year London, Mechanics' Institution opened (which after many changes has become Birkbeck, University of London). Motivations to open mechanic's institutes came from many sources, one of which was the belief that educated workers were more likely to produce better products.

British insecurity drove both the questioning and testimony before *Select Committee on Arts and their Connections Manufactures* (1836) in which a major theme was the quality of British industrial arts. For example, the testimony of John Jobson Smith, who worked for an iron foundry which produced ornaments in Sheffield reveals that the quality of design (and how to improve it) was hardly confined to art collectors. Instead, Smith's testimony reflected not only practices in Sheffield, but the state of the industrialized products in Britain. He was particularly concerned about what would later be called 'intellectual property' and copyright. However, his testimony indicated that the production of the arts in France was much more advanced—even if the quality was not yet superior to that what might be found in Britain:

125. Do you think that foreign models are superior or inferior to the English?—In this branch of manufacture I think that they are inferior.

129. Are the artists employed at Sheffield generally uneducated, or do they undergo some previous education in art?—They have had no education at all; it is a few men of natural talent who have been accidentally directed to drawing very early, who have followed it up in this way.

130. Do you know any place in this country where a young man could obtain such knowledge?—
No.

131. Have you a mechanics' institution at Sheffield—We have.

132. Do not they instruct the young men gratuitously in design?—They have got several works of design, but there is no instruction given; those works, however, have been of great service.

133. Do you think it would be a good thing to extend the means of instruction in design among the people?—Certainly.

134. And especially to open collections of the best specimens?—Yes.

135. Have you often heard among artists a wish expressed that the knowledge of art should become more accessible to them?—Yes.

137. Have the parties who draw those patterns been instructed at all in drawing?—Not all.

138. And the state of the law is such that there is little encouragement to artists?—A capitalist will not purchase the higher order of talent, because no sooner does he produce it than it is stolen from him.

139. What can an artist obtain per week by devoting his time to the production of models in Sheffield?—About 3l. or 4l. if he is a clever man.

140. It is then the best paid labour? It is.

141. How many artists do you supposed in Sheffield are solely employed in producing models?—Not above four.

142. Have they been all successful—One of them has not been very successful.

143. Do you think the public taste is so much improved that encouragement would be found for the production of articles more and more beautiful?—We find that we cannot produce articles too expensive for the public taste of the present day. Could we employ artists of a higher character, I am satisfied that the public would buy whatever was produced.

144. You think that cost would be no barrier to the sale of beautiful articles of art?—No, I should not hesitate in expending 200l. or 300l. in the production of a model for a grate to-morrow, if I had protection for it; but now it is certain that everything worth pirating is pirated in three months;

many things that are very good are pirated in 14 days after the time of their production. (*Report from the Select Committee on Arts and their Connexion with Manufactures*, 1836, 17)

Even though Britain had been the clear leader in the development of industry, a good number of influential business leaders worried about its future competitiveness. Henry Cole (1808-1882), who had once written a guidebook for the National Gallery (as well as for Westminster Abbey and Hampton Court), a prominent civil servant and inventor, saw the opportunity to create an exhibition which would contain the industrial design not only of Britain, but many other nations. (Auerbach, 1999, p.18) That said, it was the inspiration of Prince Albert (Queen Victoria's husband and consort), who sought to create an exhibition to display the newest and most marketable achievements of British industry.

It would be at the Great Exhibition that new technologies could be seen. To begin with, there was the unique design: Joseph Paxton (1803-1865) the English architect designed the Crystal Palace, which was the cast iron and glass structure used to house the exhibition, which was originally located in Hyde Park. Among the highlights were the telegraph, Daguerreotypes, vulcanized rubber and the most famous diamonds in the world—both the Koh-Noor Diamond and the Darin I Noor Diamond were on display. Yet, more than anything else, it was the sheer totality of all that was displayed (and in a novel structure) which reshaped 19th century thinking. The event highlighted Britain's prosperity, organizational capacity and exciting future. (Auerbach, 1999) It was also a triumph for British 'soft power' --because the world's only products were on display—and they could be seen only in London. Not surprisingly, then, the Great Exhibition almost immediately created an extraordinary demand for similar events all over the world. This demand was met during the 19th century and persisted into both the 20th and early 21st centuries as the 2020 Dubai Expo demonstrated in 2021-2022.

The Great Exhibition had the effect of displaying not only industrial products and those of the arts, but it also demonstrated the power and potential of a mass event. The Great Exhibition drew more than 6 million visitors and it averaged more than 42,000 per day. Those numbers also included people who came from Europe and the U.S. just to see and experience the event. There was no such precedent in British history.

The organization and construction of the Great Exhibition was a major subject for those who were involved in the creation and sale of fine arts. For example, the *Journal of Design and Manufactures*, which featured reviews of newly design products, noted that once the United States became committed to occupying some 80,000 square feet with industrial displays at the Exhibition, there was some concern

that "cutlery workers in Sheffield are to be challenged by them." (*Journal of Design and Manufactures*, 1850-51, p. 18)

As Lara Kriegel reminds us in her impressive *Grand Designs: Labor, Empire and the Museum in Victorian Culture*, for many Britons the Great Exhibition also provided many opportunities to celebrate local pride. Kriegel cites the example of the Sheffield exhibit which contained many products which had been manufactured in the city. Reviews of the Sheffield products was highlighted the high quality of workmanship and the variety of what was on display. Notably, Sheffield's scissors were praised for their elegant design, while some commentators were also impressed by their low price. (Kriegel, 2007, 99-102) Of course, Sheffield was just one of many British cities which displayed its wares in the exhibition hall.

Ruskin wrote *The Stones of Venice* during the years associated with the Great Exhibition and its aftermath. While there are few links between the two, it is clear that the exhibition had a number of impacts on Ruskin and it also created a new set of expectations for cultural institutions and the arts. The Great Exhibition had turned a profit, but once it was over its organizers sought to create a district of museums and educational institutions. With this idea 'Albortopolis' was born. The list of cultural institutions which Britain gained is alone impressive and the idea of gathering these institutions into a district would be seen as a useful practice for urban planners.

Perhaps the crown jewel of Albortopolis would be the South Kensington Museum which promised to become the center for the utilitarian consumption of art in Britain. Henry Cole ensured the construction of this institution and among its missions was to organize and develop the teaching of art throughout Britain. This vision neither implied 'art for its own sake' or the replication of the role played by the Royal Academy in training painters or the Ruskinian ideal of painting from the close study of the natural world. Instead, South Kensington followed the logic and mission of the Great Exhibition by organizing the national training of art works—whose trained artists would be a vital resource for the development of the widest range of industrial products.

Ruskin was vehemently opposed to Cole's ideas and the development of the South Kensington Museum. In fact, his antipathy towards the South Kensington, fueled Ruskin's work on the newly minted Oxford University Museum of Natural History (OUMNH). This is a fascinating story by itself with Ruskin helping to enlist Pre-Raphaelite artists, making design recommendations and trying to connect their energies to creating a museum which might herald the strong relationship between the arts and the pure sciences. It would be around the same time, that William Morris (1834-1896), who was active in Pre-Raphaelite circles, met Ruskin. Morris had been inspired by reading the *Stones of Venice* as an Oxford

undergraduate. (Hilton, 1985, 232 +276)). He did not work on OUMNH, but instead worked to develop the interior decoration of the Oxford Union—arguably the world’s most famous university debating society. As we will see, Morris would become one of the driving forces of the Arts and Crafts movement (which proved to yet another response to proliferation of mass-produced industrial products which some of the more elite segments of British society found to be unsatisfying—if not absolutely repulsive) one of the most significant interior designers of the 19th century.

Ruskin’s thoughts about architectural design and arts education cannot detain us here, but it is worth noting that he believed that the construction of a new museum—especially one focused on natural history was a rare opportunity. The project followed a movement to reform Oxford and Ruskin envisioned using OUMNH to enshrine what he understood to be the collaborative relationship between the arts and science. OUMNH was finished as Charles Darwin published *The Origin of Species* (1859) which would reset the study of biology and many other disciplines during the second half of the 19th century. OUMNH frustrated Ruskin in a way that the South Kensington Museum could not: having actively supported its development, he witnessed it become something different. Ruskin rejected Darwinian ideas and it probably did not help that OUMNH was the site of one of the most famous battles over science and religion. The 1860 debate between Thomas Henry Huxley (1825-1895), a fierce advocate of Darwinian science, and Samuel Wilberforce (1805-1873), who challenged the *Origin of Species* on religious grounds became an iconic moment in the reshaping of the Victorian mind, which in the later decades of the 19th century increasingly moved away from the traditional Christian doctrine of Creation and towards a view of nature shaped by natural selection and theories of evolution.

All told, the 1850s proved to be a decisive for Ruskin’s maturation. He moved from thinking about the arts as largely the property of the better educated classes to believing that their subject matter was critical to the quality of life for Britain’s population. This basic insight was articulated in many ways—perhaps most forcefully and famously in *Unto This Last*—but Ruskin also moved beyond collecting and commentating into direct attempts at social reform. Furthermore, it meant that Ruskin was less attached to a cyclical view of historical change, which he had used to conceptualize Venice’s history and towards one in which he moved towards social reform in the hope of building a more humane and durable Britain.

2. ST. GEORGE’S MUSEUM

It had to be more than a coincidence that in the first issue of *For Clavigera*—an open letter written to Britain’s workers that Ruskin made reference to both the practical energies of ‘Mr. Cole at Kensington’ and ‘æsthetic impressions produced by various lectures at Cambridge and Oxford’ (E.T Cook & A.

Wedderburn, 1903-1912, XVIII, 20) when he referred to the possibility of picture-making being profitable or even valuable. These examples were reference points for the position of the arts in Britain. More important, Ruskin was, in fact, beginning to introduce the possibility of building a model community for workers in Britain. *Fors Clavigera* (often referred to as 'Fors') provided not only guidance for educated workers, but a platform for criticizing the worst features of modernity—especially as it was made manifest in Britain.

However, it would be in the second issue that Ruskin would go further to articulate what would be required. He explained that the title was in Latin because it was to cover multiple meanings and he intended to write to Britain's workers on a large range of subjects. "Fors" was derived from three important English words: 'Force, Fortitude and Fortune.' The first meant the ability to do good work. Fortitude referred to the "power of bearing necessary pain, or trial of patience, whether by time, or temptation" (XVIII, 28). Fortune "means the necessary fate of a man: the ordinance of his life which cannot be changed. To "make your fortune" is to rule that appointed fate to the best ends of which it is capable" (XVIII, 28). Ruskin explained to his readers that Fors was also a 'feminine' word so 'Clavigera' and it was the feminine of Claviger. He elaborated that "'Clava' means a club. Clavis, a key. Clavus, a nail, or a rudder" (28), while Gero means to carry and he explained that "it is the root of our word "gesture" (the way you carry yourself); and, in a curious bye-way, of "jest." (28). Taken as a whole, the title could have several meanings:

Clavigera may mean, therefore, either Club-bearer, Key-bearer, or Nail-bearer.

Each of these three possible meanings of Clavigera corresponds to one of the three meanings of Fors.

Fors, the Club-bearer, means the strength of Hercules, or of Deed.

Fors, the Key-bearer, means the strength of Ulysses, or of Patience.

Fors, the Nail-bearer, means the strength of Lycurgus, or of Law. (XVIII, 28)

Ruskin explained that the first meant deed, the second endurance and third is royal and legal.

Most important, Ruskin was beginning a project which he envisioned as multifaceted and required strength and assumed the need for some sort of conflict (hence, the club). *Fors Clavigera* would also at once highlight his project for societal transformation and articulate the role of the arts in modern society.

Unlike the museums already mentioned, St. George's Museum no longer exists, but it was Ruskin's attempt to connect or possibly reconnect the arts and social life. That is, Ruskin aimed to liberate the study of painting and sculpture from becoming a utilitarian resource for industrial design.

Ruskin has been identified as 'designing utopia' on the basis of his urban planning, commitment to historic preservation (especially as opposed to restoration) and creating of the Guild of St. George. (see Lang). In 1871 Ruskin founded the Guild of St. George which would be a model community that would serve as an example for British society. In fact, Michael Lang recognized that Ruskin's effort required that he establish the first non-profit corporation in English legal history. (Lang, 1999, p. 63) Ruskin was attempting to create an agrarian community which would restore the dignity and importance of village life and do so by emphasizing many practices which ran counter to industrialism. In parallel, perhaps, Frederick Law Olmstead, was trying to figure out how to make Central Park a place which would at once satisfy the needs of New Yorkers, without compromising his vision for the new space.

The Guild was one of many attempts in the 19th century, to create model communities. In this instance, the Guild would produce men and women who were educated, sensitive to natural beauty, and who were connected with the larger wisdom traditions made evident in scripture, literature and history. Consequently, Ruskin believed that museums could provide the resources to help create and sustain this special mindset. The Guild of St. George was not located in a singular location, but Ruskin decided to establish the museum in Sheffield, where it could be immediately useful for industrial workers and those who were interested in gaining a greater awareness of their world.

As we have seen, Sheffield embodied many facets of industrialism, with its massive amounts of steel production earning it the name 'Steelopolis'. However, there were other things about Sheffield which suggested social unrest. If Manchester was the 'shock city' of the age then Sheffield was a place where many of the most disruptive features of industrialism were easily exhibited.

The initial location was at Walkley (a suburb of Sheffield) and Ruskin hired Henry Swan, a Quaker, to expedite the purchase of land and the opening of the museum. Ruskin worked with some of the city leaders to develop the St. George's Museum. The actual process was threefold. It was established at a small cottage in Walkley, but with Ruskin's gifts it outgrew the small structure. Ruskin rejected the idea that these items be merged with the general museum in Sheffield. Eventually, the city acquired Meersbrook Park and offered to devote the house to the collection, which came to be called 'the Ruskin Museum' (XXXI, 305). It would remain at Meersbrook Park for two generations and the collection is currently in Sheffield's Millennium Gallery—a site which also houses the city's metalwork collection.

The importance of SGM was what it could provide as Ruskin explained to Prince Leopold who visited in 1879. The visit and the tour Ruskin gave to the Prince was reported in the *Sheffield and Rotherham Independent*, which provided a detail account of the event:

The power of that Museum would, Mr. Ruskin went on to say, depend upon its giving pleasure, and by the attractions of beauty "I want," said he, "to get everything beautiful"; and, in answer to a question, he added, "I am proud to say that, unlike other collectors, I never spare cutting my specimens, always looking to that which will best show texture. My main aim is to get things to show their beauty." (XXX, 312)

In a letter to The *Times* (1883 3 March) Ruskin explained that building the museum at Walkley was important because:

The mountain home of the Museum at Walkley was originally chosen, not to keep the collection out of smoke, but expressly to beguile the artisan out of it. Pictures and books may be guarded in Sheffield as in London; but I wished that the sight of them might be a temptation to a country walk. (XXX, 317)

Museums were important because they encouraged people to see, think, feel and imagine differently. Ruskin did not believe as some theorists that art should shock us to questioning our surroundings. Rather, Ruskin believed that the arts could motivate people to acquire deeper appreciation for the natural world and acquire many lessons from the past. Learning to draw required the skill and patience to copy accurately and appreciate the design or shape of what was being copied. Ultimately, the museum could enable people to gain some perspective on their lives—even if they lived and worked in the desperate and frequently depressing conditions imposed by a growing industrial society.

Furthermore, Ruskin explained to J.F. Moss a few weeks later that "I could not allow the St. G. Museum to be put near any other, so as to get associated (at least ideally) with institutions perhaps essentially different with it in aim and principle." (XXX, 317) This was a rejection of South Kensington and Albertopolis. Ruskin wanted to ensure that St. George's Museum was understood to be different in kind.

All told, Ruskin was not only fighting for enculturation but for the sustainability of the arts—which he understood to be threatened by utilitarian needs of capitalism. The South Kensington project aimed to produce superior industrial design. Ruskin envisioned that SGM was not only providing access to organized knowledge: by putting a museum at the center of a community, he sought to design a model which could be copied in other parts of Britain.

CONCLUSION

The successful completion of the St. George's Museum eluded Ruskin. A combination of legal, personal and medical issues undermined his power to act as he would have liked. More important, despite the fact that he devoted significant time and energy to the project and drew upon the donations from the Guild of St. George, it proved to be too large in terms of space and complexity for him. Yet, Ruskin had not failed: instead, he had created a new museum and one which was linked to a program of social reform. St. George's Museum represented one of the many voices which sought to restore the dignity of work, community and beauty in late Victorian Britain.

Ruskin's museological journey had, in fact, been a long one: he studied painting in the Dulwich Picture Gallery, handled Turner's vast estate for the National Gallery, critically engaged the rise of the South Kensington, helped create the Oxford University Museum of Natural History only be frustrated by it; consequently, perhaps, Ruskin created a new museum Sheffield which might be understood as a community building project. Ruskin had moved from the elite circle of the London art world—where collecting was important—to using the arts to try to develop a sustainable community. Ruskin had come to see that museums played a vital role in British life—particularly if they enable women and men to see and understand the world around them. Ruskin's ideas anticipated 20th and 21st Century trends, but he did not directly advocate sustainability. Yet, in creating a museum in Sheffield Ruskin was making a much wider kind of public education available to the city. In addition, the museum was designed to improve the quality of life—a goal which is familiar to proponents of sustainability. Ruskin's *Storm Cloud of the Nineteenth Century* looked ahead to environmental writing and it is easy to foresee that he would have been very sympathetic to 'green' and environmental authors (or to those motivated by *The Silent Spring*). Furthermore, his larger efforts were to work towards the preservation of culture as it was manifest in literature, art, architecture and the world of ideas. In effect, one of Ruskin's great passions was making the transmission of cultural heritage possible—by suggesting that it was relevant to the 19th century. St. George's Museum, then, reflected a deep and sincere attempt to show the enduring relevance of culture—as it was made vivid in historical writing, art, architecture and the condition of the natural world.

However, Ruskin was competing with Henry Cole's vision for the expansion of museums, which provided a different way to increase access to the arts. South Kensington's national role—the use of art to promote industrial design angered Ruskin, but it was a powerful force in the subsequent valuation of the arts. Even when they wrote catalogs the gap between their vast differences were evident. Cole's guide book to the National Gallery contained statistics on the annual number of people that visited the museum.

Ruskin, who often wrote catalogs and *Academy Notes*, frequently used these efforts to advocate for certain trends, such as the Pre-Raphaelite painters in the 1850s. Ruskin analysis was particular and impressive; Cole's statistics and lists of painting were almost certainly more practical. The legacies of the Great Exhibition were even larger than Cole or Prince Albert anticipated: exhibitions became the central site for the dispersion of public culture in the 19th century as audiences in Europe, the Americas and Australia flocked to see their contents.

Perhaps William Morris offered yet another path. Morris championed the Arts and Crafts Movement and eventually become a leading British socialist thinker. Morris sought to remake British society in more fundamental ways than either Ruskin or Cole might have imagined at mid-century. Morris' literary works—with their emphasis on medievalism and the beauty of the natural world (perhaps best embodied in the epic poem *The Earthly Paradise* (1868-1870)) would almost certainly find sympathetic readers today who seek to create sustainable models of development. If Ruskin hinted at a dark future, Morris' *News from Nowhere* went a step further with a futuristic vision of Britain beyond the 19th century. All told, Morris represented a strand of writing about the arts in modern societies which differed from Cole's administrative solutions and Ruskin's searing criticisms.

However, none of these figures would have grasped the extent to which the social, national and international role for the arts would be transformed through the 20th century. Most notably, building on the many legacies of the Great Exhibition, massive public events—would further shape the evolution of the public role of the arts. These massive events which became known as World Fairs and Expos would acquire value as political tools for governments or as an instrument to 'brand nations'. The Great Exhibition established a model which would be developed over the next century to serve national messaging: for instance, the 1964 World's Fair in New York city made clear with the vitality of US technology in wake of Sputnik; the 1970 Expo in Japan provided the opportunity to overcome the country's reputation in WW II and 2010 in Shanghai to help the world forget Tiananmen Square. If collectors worried about the durability of art in mid-19th century, by the 20th they would recognize that painting, sculpture and the arts would become even more sustainable because they had new and powerful champions.

REFERENCES

Anonymous author. (1850-1851). Preparations Abroad for the Exhibition of 1851. *Journal of Design and Manufactures*.vol.4, p. 18.

https://ia601408.us.archive.org/22/items/in.ernet.dli.2015.514500/2015.514500.The-Journal_text.pdf.

Auerbach, J. (1999) *The Great Exhibition of 1851: A Nation on Display*. Yale University Press.

Culver, L., Mauch, C +. Ritson, Katie (2012). *Rachel Carson's Silent Spring: Encounters and Legacies*. Rachel Carson Center.

Hilton, T. (1985) *John Ruskin: The Early Years*. Yale University Press.

Kriegel, L. (2007) *Grand Designs: Labor, Empire and the Museum in Victorian Culture*. Duke University Press.

Lang, Michael. (1999). *Designing Utopia: John Ruskin's Urban Vision for Britain and America* Black Rose Books.

Owen, F. & Brown, D.B. (1988), *Collector of Genius: A Life of Sir George Beaumont*. Yale University Press.

Warrell, I. (2012). *Turner's Secret Sketches*. Tate Publishing.

Internet Sources

Liverpool John Moore's University Website (<https://www.ljmu.ac.uk/about-us/history/1823-liverpool-mechanics-and-apprentices-library>).

National Gallery Website (2025<https://www.nationalgallery.org.uk/paintings/john-jackson-william-seguier>).

Primary Sources

The Library Edition of the works of John Ruskin. (1903-1912, eds. E.T Cook & A. Wedderburn) written in the early 20th century prior to the First World War remains an extraordinary monument to both Ruskin and scholarship. It remains the single common source for Ruskin scholars. Individual volumes are identified with Roman numerals and then pages cited.

Select Committee on Arts and their Connections Manufactures (1836) House of Commons.

PROTECTING THE ENVIRONMENT THROUGH CRIMINAL LAW

Marija Grozdanovska
 International Slavic University St. Nicholas, North Macedonia,
 marija.grozdanovska@msu.edu.mk

ABSTRACT

A crucial aspect of the battle against environmental crime and detrimental effects on the environment is the criminal law framework for environmental protection. There are several different kinds of crimes that are included under the umbrella of environmental crime, but they are all characterized by an important and permanent negative impact on economies, public health and ecosystems. In the context of global environmental issues such as climate change, air and water pollution, illegal logging, etc., it is essential to develop and put into effect adequate laws and regulations for environmental protection in order to ensure sustainability and the protection of natural resources. The crucial role of the criminal justice system in preventing environmental crimes is covered in this article, including the necessity of specialized organizations and qualified staff for control and implementation of laws. In order to prevent major environmental damage and to prescribe appropriate penalties that will act as an effective deterrent, the criminal law framework for environmental crime should be well-defined. Engaging individuals, foreign organizations and the private sector in addition to governmental agencies is crucial for the framework's successful implementation. The criminal law framework for environmental protection, its use in combating environmental crime and the significance of international collaboration in developing unified environmental protection standards are all examined in this research. The conclusion highlights the need for strong and effective criminal law protection for the purpose to successfully deal with the significant environmental issues facing the modern world.

Key words: *criminal law framework, crime, environmental protection.*

INTRODUCTION

The principle of the "right to a healthy environment" asserts that everyone has a fundamental right to live in a place that is safe, clean, and supportive of their well-being. This right is closely linked to the broader concept of human rights concerning the environment, which includes various issues such as protection from environmental hazards and access to clean air, water, and food. International and national legal systems, as well as numerous national constitutions, now recognize the right to a healthy environment. However, compared to the right to life, the right to a healthy environment is not yet fully recognized as an enforceable and independent human right.

The right to a healthy environment is becoming increasingly significant in international legal and political debates in today's world. Human rights and environmental activists continue to fight for the official recognition and implementation of this right to ensure that everyone can live in a sustainable and healthy environment, free from hazards to their own health or the health of their children.

Criminal law intervention is necessary to protect the right to a healthy environment in modern society. Any activity that violates environmental laws and poses a serious risk to a healthy environment, human health, or both is considered an environmental crime. Environmental crime refers to criminal acts that cause harm to the environment. Governments, non-governmental organizations, and law enforcement agencies must collaborate to effectively combat environmental crimes, which are often linked to organized crime networks. International agreements, law enforcement, stricter legislation, public awareness campaigns, and other efforts are all part of the fight against environmental crime.

1. THE RIGHT TO A HEALTHY ENVIRONMENT

The environment, as a complex set of conditions for human life, includes soil, water, and air, along with all living things and natural resources. It encompasses both natural and human-made values, their interactions, and the entire area where people live. This includes settlements, everyday objects, industrial facilities, media, and other environmental sectors.

In addition to endangering human life, environmental neglect and ecological catastrophes also threaten the survival of all living things. To protect human health in the broadest context from the right to a healthy environment to judicial protection against the disrespect, threat, or violation of this right the environmental situation has reached a red alert level of concern. This is because there are no effective measures or actions in place to identify and address the situation, and existing efforts are ineffective when it comes to responding to identified threats.

A significant level of intolerance, indifference, and carelessness exists in both states' and individuals' attitudes toward the protection and improvement of nature and the environment in modern society. Economic, political, and health crises are all interconnected with ecological crises. The consequences are evident from every angle and can never be justified by the pursuit of "higher" economic, social, or other objectives such as, foremost, the financial gains from rapid economic growth at the expense of reckless environmental degradation. The existential well-being of current and future generations is at risk due to environmental degradation on a collective, social, and global scale.

Environmental criminal law is now recognized as a distinct legal discipline and scientific field, a consequence of the growing interest in ecology, environmental justice, and environmental protection. It encompasses offenses against the environment and has emerged and developed as a result of the strengthening of criminal law. Environmental criminal legislation plays a key role in discouraging and penalizing environmentally harmful behavior. By emphasizing the importance of ethical and sustainable practices, it seeks to balance environmental preservation with economic development to ensure a healthy planet for future generations.

The affirmation of the human right to a healthy environment, quality of life, and sustainable social development, along with the effective legal protection of both the environment and the human right to a healthy environment, is known as environmental justice. This right is promoted and protected by environmental organizations and advocates, who work to create laws and initiatives that ensure a sustainable and clean environment for all. It is a crucial component of the broader movement for sustainability and environmental justice.

The following are essential elements of the right to a healthy environment:

- ❖ **Clean air:** People are entitled to breathe air that is free of pollutants and harmful substances, which includes actions to improve air quality and reduce pollution.
- ❖ **Safe water:** Access to safe and clean drinking water is essential for human health. One key aspect of this right is ensuring that water sources are free of contaminants.
- ❖ **Sanitation:** Adequate sanitation facilities are necessary to maintain a healthy environment and prevent the spread of disease. This includes wastewater treatment and proper waste disposal.
- ❖ **Protection from environmental dangers:** Individuals are entitled to protection from environmental risks, such as exposure to harmful substances, industrial pollution, and hazardous waste.

- ❖ **Preservation of the environment:** The right to a healthy environment includes the conservation and sustainable use of natural resources to ensure that future generations can enjoy a similar environment.
- ❖ **Biodiversity and ecosystem protection:** The preservation of ecosystems and biodiversity is essential for a healthy environment and the well-being of all living things.

The international framework for the right to a healthy environment consists of various treaties, declarations, and principles that recognize and promote the idea that everyone has the right to live in a clean, safe, and healthy environment. The concept of protecting the environment through the lens of human rights is considered relatively new. The 1948 Universal Declaration of Human Rights, the 1950 European Convention for the Protection of Human Rights and Fundamental Freedoms, the 1966 International Covenant on Civil and Political Rights, and the 1966 International Covenant on Economic, Social, and Cultural Rights do not explicitly mention the right to a healthy environment. At the time of their drafting, society was not yet fully aware of the extent, speed, and harmful effects of environmental degradation to recognize the right to a healthy environment as a fundamental human right.

Today, the right to a healthy environment, which is truly a third-generation human right, has been recognized as a fundamental human right on a global scale. The General Assembly's declaration in July 2022 that a clean, healthy, and sustainable environment is a human right was warmly received by the UN. The right was officially recognized by the UN Human Rights Council in Resolution 48/13 in October 2021.

The right to a healthy environment was first formally recognized at the 1972 Stockholm United Nations Conference on the Human Environment (United Nations, 1972). The first international agreement on environmental law, the Stockholm Declaration on the Environment, affirms that everyone has the right to a healthy environment and that states have a duty to be the primary guarantors of creating the conditions necessary for this right to be realized. To address the issues of overpopulation that degrade natural resources, the declaration calls on states to adopt national policies for population growth planning and to develop regulations for the protection of wildlife and the preservation of available natural resources. It also includes principles related to the environment, its protection, and its improvement. The contemporary concept of international environmental protection was first introduced in the Stockholm Conference Declaration, which established the framework for several international environmental conventions.

In 1992, the Rio Declaration on Environment and Development was adopted to reaffirm the Stockholm Declaration (United Nations, 1992). By establishing a new standard of collaboration between

states, key societal sectors, and individuals, this declaration emphasizes the interconnected and essential nature of Earth as the home of all people and fosters a global partnership. Sustainable development is one of the main objectives around which states, the public and private sectors, and other interest groups should unite to reduce poverty, promote social equality, and ensure environmental protection. The Rio Declaration presents principles that prioritize environmental protection above all else.

Since climate change impacts both the environment and human well-being, the United Nations Framework Convention on Climate Change (UNFCCC) indirectly recognizes the right to a healthy environment, even though its primary goal is to combat climate change (United Nations Framework Convention on Climate Change, n.d.).

The Aarhus Convention, formally known as the Convention on Access to Information, Public Participation in Decision-making, and Access to Justice in Environmental Matters, is a legally binding international agreement that grants the public the right to access information, participate in decision-making, and seek justice in environmental matters (United Nations Economic Commission for Europe, 1998).

The right to protect their cultural and natural legacy is one of the rights recognized by the United Nations Declaration on the Rights of Indigenous Peoples (UNDRIP). For indigenous people, this declaration emphasizes the importance of sustainable resource management and environmental protection (United Nations, 2007).

Several regional agreements also include provisions related to the right to a healthy environment.

Directive 2008/99/EU on the protection of the environment through criminal law is crucial at the EU level, as it establishes criminal law measures to ensure more effective environmental protection (European Parliament & Council of the European Union, 2008). The primary tool for protecting the environment through criminal law in Europe is the criminalization of illegal activities that harm the environment, wildlife, or people, particularly those likely to result in death or serious injury. The Directive was introduced in response to the increasing number of environmental offenses and their significant negative effects, which often extend beyond environmental damage to include substantial economic (e.g., taxes and revenues) and social (e.g., health impacts, job losses, and well-being) consequences. By establishing a legal framework for environmental crime, the Directive aims to reduce such crimes and enhance overall environmental protection. Member states are required to implement the necessary measures to ensure that the offenses covered by the Directive carry criminal penalties that are effective,

proportionate, and deterrent. Additionally, it stipulates that legal entities responsible for certain offenses will be held liable and subject to appropriate penalties.

2. ENVIRONMENTAL CRIME

Although there is no single, widely accepted definition of environmental crime, it is generally understood to include any unlawful activity that benefits individuals, organizations, or businesses while causing harm to the environment (United Nations Environment Programme, 2016). Criminal activities are often structured around multilateral exchanges involving producers, processors, retailers, and final consumers, including transnational organized crime.

Environmental crimes are criminal acts that cause harm to the environment and the natural world. These actions have a global impact, as environmental degradation crosses national boundaries and threatens human life. Criminal activities that harm the environment, wildlife, or humans, or have the potential to do so, are classified as environmental crimes. These illegal acts contribute to pollution, the deterioration of wildlife, the loss of biodiversity, the disruption of ecological balance, and pose risks such as disease, environmental disasters, irreversible climate change, food chain contamination, reduced life expectancy, and even human death.

The following are examples of environmental crimes:

- **Trafficking in wildlife.** This refers to the illegal trade in endangered animals or parts of them, such as ivory, rhino horns, and exotic pets. It threatens biodiversity and has the potential to cause species extinction.
- **Poaching.** Poaching is the illegal hunting or capturing of wild animals, typically for financial gain. It can disrupt ecosystems and have significant consequences for threatened species.
- **Illicit logging.** Illegal logging leads to forest degradation and destruction, contributing to habitat loss and climate change.
- **Dumping of hazardous waste.** Illegally disposing of hazardous waste, such as chemicals and industrial byproducts, can contaminate land, water, and air, posing serious risks to human health and wildlife.
- **Illegal fishing.** This includes practices that damage marine ecosystems and deplete fish stocks, such as overfishing, fishing in protected areas, and using illegal methods.

- **Pollution.** Air, water, and soil pollution occur when pollutants are released into the environment in amounts exceeding legal limits, endangering both human health and ecosystems.
- **The destruction of Wildlife Habitats.** Important wildlife habitats may be destroyed when land is cleared for infrastructure development, agriculture, or other purposes.
- **Improper E-Waste recycling.** Improper handling and disposal of electronic waste, or "e-waste," can pose serious health and environmental hazards.
- **Degradation of air quality.** Air pollution and related health issues can arise from sources like cars, industrial activities, and other pollutants released into the atmosphere, often in violation of air quality regulations.
- **Carbon fraud.** Fraudulent carbon or emissions trading schemes can undermine efforts to mitigate climate change.

Future generations, the environment, and our daily lives are all seriously threatened by environmental crimes. These crimes, which include illegal logging, the dumping of hazardous waste, overfishing of endangered species, and ivory trafficking, are not confined by national borders. Weapons, drugs, and people are often trafficked using the same routes that are used to move wildlife across countries and continents. Environmental crime frequently coexists with other illegal activities, such as money laundering, corruption, migrant smuggling, and even murder. Since natural resources cannot be artificially produced, unlike drugs and other illicit goods, environmental crime must be addressed urgently.

Environmental crime is increasingly becoming part of organized crime. One example of this is organized crime in areas such as urban planning, construction, and the exploitation of natural resources and land. The failure of the production-distribution-consumption system is the root cause of environmental crime in these sectors. When the legal market fails often due to organized groups intentionally obstructing it people turn to criminal activity to meet their needs, and crime becomes a business venture similar to legitimate business practices. Offenders and victims in this form of illegal activity are connected in a community where everyone benefits in some way. Builders can make huge profits and receive quick cash to bribe decision-makers, such as inspectors, local government officials, mayors, and ministries, without having to exert much financial control. Meanwhile, the necessary facilities or premises are provided to citizens or legal entities that use them. In this context, organized crime is normalized within society and becomes a "way of life." Because it is seen as a "way of life," organized crime not only lacks serious moral and legal consequences but also becomes the preferred choice for anyone looking to participate.

The management of lakes, water bodies, forests, agricultural land, mineral resources, waste, and other previously undefended environmental areas also shows deviations and power abuses. Although environmental crime can be as profitable as the illegal drug trade, the penalties for it are significantly less severe, and it is more difficult to identify those who commit it. These features make it highly appealing to organized crime groups. Many such groups routinely engage in the illegal trade of waste, as well as endangered animal and plant species, and use the profits from these operations to fund terrorism. It is not unusual for typical mafia-style gangs to employ the same methods and routes for environmental crimes as they do for their other illicit activities. Due to their resourcefulness and flexibility, organized crime thrives in environments where others would fail. The primary motivation behind environmental crime is its high profitability, which is further amplified by corrupt authorities, cover-ups, huge profits, low detection rates, and weak penalties.

A 2011 study found that environmental crime accounts for three out of the twelve most lucrative international criminal enterprises. These include the illegal trade in fish (estimated annual value of 4.2 to 9.5 billion US dollars), lumber (estimated annual value of 7 billion US dollars), and wildlife (estimated annual value of 7.8 to 10 billion US dollars). According to estimates, transnational environmental crime costs between 70 and 213 billion US dollars annually (Europol, n.d.).

As part of the European Multidisciplinary Platform Against Criminal Threats (EMPACT) 2022-2025, the EU has made combating environmental crime a top priority in its fight against serious and organized crime. This platform provides a defined framework for establishing, implementing, and evaluating priorities in the battle against organized and serious international crime, including environmental crime. In terms of economic crime, its goal is to dismantle criminal networks involved in environmental crime in all its forms, with a particular focus on the trafficking of waste and wildlife. It also aims to disrupt criminal networks and individuals capable of establishing their own businesses or infiltrating high-level legal business structures to facilitate their environmental criminal activities.

3. ENVIRONMENTAL CRIME IN NORTH MACEDONIA

Although environmental crime is becoming increasingly noticeable in North Macedonia, social action is still largely ignored. In the Macedonian Criminal Code, environmental crimes defined as activities that endanger the environment and nature are organized in a distinct chapter called "Crimes Against the Environment and Nature." These include pollution of the environment and natural resources, drinking water pollution, illegal mineral resource exploitation, deforestation, forest fires, illegal hunting, illegal fishing, unauthorized keeping and trading of wild animals and birds, and waste-related environmental

harm, among others. According to data released by the State Statistical Office of the Republic of North Macedonia, the following shows the number of individuals who were reported, accused, and convicted of crimes against the environment and nature, compared to the total number of people reported, accused, and convicted of all crimes in North Macedonia (State Statistical Office of the Republic of North Macedonia).

Year	Reported perpetrators of crimes against the environment and nature	Total number of reported perpetrators	Accused perpetrators of crimes against the environment and nature	Total number of accused perpetrators	Convicted of crimes against the environment and nature	Total number of convicted perpetrators
2017	151	20 582	68	7 423	62	6 273
2018	191	19 779	60	6 829	52	5 857
2019	214	20 106	69	5 370	59	4 712
2020	146	21 104	57	6 965	52	6 351
2021	189	19 738	85	8 580	73	7 634
2022	162	19 702	83	8 550	77	7 769
2023	147	17 083	78	7 199	72	6 528

Table Nr.1

Reported, accused and convicted perpetrators of crimes against the environment and nature compared to the total number of people reported, accused, and convicted of all crimes in North Macedonia in the period from 2017 to 2023.

Year	Penalties	Alternative measures
2017	27	35
2018	10	42
2019	27	32
2020	11	41
2021	33	40
2022	24	52
2023	33	39

Table Nr. 2

Penalties and alternative measures imposed for crimes against the environment and nature in the period from 2017 to 2023.

Year	Prison	Fine	Probation imprisonment	Probation fine
2017	4	22	26	9
2018	1	9	40	2
2019	7	19	31	1
2020	0	10	31	10
2021	2	28	38	2
2022	2	21	51	1
2023	4	29	38	1

Table No. 3

Most frequently imposed sanctions on persons convicted of crimes against the environment and nature in the period from 2017 to 2023.

It can be concluded from the number of people who have been reported, charged, and found guilty of crimes against the environment and nature that these offenses do not constitute a significant part of the overall crime statistics for North Macedonia.

If we consider the harm done to the environment, the Macedonian nation's criminal policy for environmental crime is excessively weak. The alternative measure, a suspended sentence, is issued in most court rulings for offenses against the environment and nature. The fines are excessively easy, and the requirement to restore or recover the environment to its pre-crisis condition is hardly taken into account.

CONCLUSION

The current law is insufficient within the constitutional and legal context of protecting the environment and nature, as well as the human right to a healthy environment. To safeguard the environment and each individual's right to a healthy environment, significant reforms and effective institutions are needed.

An appropriate and proportionate response is required to detect and prevent environmental crime, which is becoming a serious transnational and organized crime involving networks, porous borders, migration, money laundering, corruption, and the exploitation of underprivileged communities. It is a challenging global issue that demands a significant, committed, and long-term solution.

To strengthen the protection of the environment and nature, the first step is the provision of appropriate laws, i.e., the creation of a legal framework for environmental crime. By establishing such a framework, modern states aim to reduce environmental crime and enhance environmental protection. Environmental criminal law is a crucial part of conservation efforts, as it helps confront and deter actions that negatively impact the environment.

To address environmental crime, competent institutions focused on its identification, suppression, and prevention are required, in addition to suitable legislation. The primary entities responsible for enforcing the law, monitoring, investigating, prosecuting, and punishing environmental crime are national institutions such as the police, customs, public prosecution, courts, and public administration. Given the complexity of the legal system and the highly technical nature of issues related to environmental crime, developing human resources particularly in public administration, customs, public prosecution, police, and the judiciary is crucial for the effective enforcement of the law. In addition to strengthening existing institutions, new ones, such as the nature protection agency, environmental police, and environmental ombudsman, must be established.

Raising public awareness of the right to a healthy environment is equally essential. Therefore, it is crucial to increase public understanding of the environment, its significance, and the need for active participation in its protection and improvement. This can be achieved through the efforts of scientific, educational, health, informational, cultural, and other institutions, as well as legal entities, including citizens' associations. Environmental education should be given special attention by incorporating environmental preservation into the primary and secondary school curricula.

It is essential for states to implement appropriate measures and actively engage in bilateral, regional, and broader international cooperation in the area of environmental protection and enhancement. States, their institutions, international organizations, civil society, and businesses should all work together to combat environmental crime. National governments and institutions are the primary players in the fight against environmental crime, with the EU and international organizations playing a supporting role.

REFERENCES

European Parliament & Council of the European Union. (2008, November 19). *Directive 2008/99/EC on the protection of the environment through criminal law*. <https://eur-lex.europa.eu/legal-content/EN/TXT/HTML/?uri=CELEX:32008L0099>

Europol. (n.d.) *Environmental crime*. <https://www.europol.europa.eu/crime-areas/environmental-crime>
United Nations. (1972). *United Nations Conference on the Human Environment (Stockholm Declaration)*. <https://www.un.org/en/conferences/environment/stockholm1972>

United Nations. (1992). *United Nations Conference on Environment and Development (Rio Declaration)*. <https://www.un.org/en/conferences/environment/rio1992>

United Nations. (2007). *United Nations Declaration on the Rights of Indigenous Peoples (A/RES/61/295)*. <https://social.desa.un.org/issues/indigenous-peoples/united-nations-declaration-on-the-rights-of-indigenous-peoples>

United Nations Economic Commission for Europe. (1998, June 25). *Convention on access to information, public participation in decision-making and access to justice in environmental matters (Aarhus Convention)*. <https://aarhus.osce.org/about/aarhus-convention>

United Nations Environment Programme. (2016). *The rise of environmental crime: A growing threat to natural resources, peace, development, and security*. <https://wedocs.unep.org/handle/20.500.11822/7662>

United Nations Framework Convention on Climate Change (n.d.). *United Nations Framework Convention on Climate Change (UNFCCC)*. <https://unfccc.int/>
State Statistical Office of the Republic of North Macedonia. (n.d.). *Statistical data*. <https://makstat.stat.gov.mk>

PUBLIC SECTOR SALARIES IN KOSOVO – CHALLENGES OF SALARY HARMONIZATION AND ESTABLISHING THE IMPORTANCE OF PROFESSIONS

Nazim Haliti

UNI-Universum International College, Kosova

nazim.haliti@universum-ks.org

Valon Murati

UNI-Universum International College, Kosova

valon.murati@universum-ks.org

ABSTRACT

Salaries in the public sector were one of the main concerns in the process of public administration reforms in Kosovo. The salary system was not uniform across independent institutions and agencies and there was no legal basis for this salary scheme. In some institutions, the status of employees was that of civil servants according to the legislation in force on civil service, but the salary scheme was different and with large discrepancies between different institutions at the three levels of government, but also high differences even when it comes to the same job position. The regulation of the wage system is a sensitive issue in all market economies. Wages in the public sector can be regulated in several ways. The two most common are through a specific policy, which would create a unified wage system, and, secondly, through some legal acts, be they laws and bylaws, which would create a fragmented wage system. The unified model, depending on national policy, would represent a salary scheme for the entire public sector, which establishes a common basis for the public sector payroll system and aims to implement the principle of equal pay for work in comparable job positions, to achieve and ensure transparency of the payroll system. On the other hand, a fragmented model represents a system where public sector salaries would be regulated on different legal bases or no legal basis at all, rather than in a unified manner. This paper specifically analyzes the issue of the several-year journey of the Law on Public Sector Salaries in Kosovo, as well as the economic aspects of salary harmonization and establishing the importance of professions in a society. The paper aims to bring a critical look at the several-year debate in society on employee salaries at different levels from 1999 to 2017, the pronounced inequalities between different institutions, as well as the contested process since the adoption of the first law in 2019.

Keywords: *Salaries, public sector, public officials, salary harmonization, public administration reforms*

INTRODUCTION

The process of drafting the Law on Salaries in the Public Sector started in 2017. The development of the concept paper and the draft law was completed by the Ministry of Public Administration. The draft was consulted with the public through the Public Consultation Platform and public debates with governmental and non-governmental stakeholders and with the support of external experts from the EU Office in Kosovo and OECD/SIGMA experts.

A key moment in analyzing the issue of the wage system in Kosovo involves looking back to 2015. That year, the Stabilization and Association Agreement (SAA) between the European Union and Kosovo was signed in Strasbourg. The SAA established a contractual relationship that included mutual rights and obligations and covered a wide range of sectors.

Article 120 of the SAA required a consolidated legal framework for Public Administration Reform (PAR). The National Program for the Implementation of the SAA (NPISAA), approved by the Assembly of Kosovo in March 2016, emphasized the full consolidation of the legal framework and the implementation of policies and legislation in the public administration as a whole, with the aim of creating a non-political, professional and merit-based civil service. These three laws (The Law on Salaries in the Public Sector; The Law on Public Officials; The Law of Organization and Functioning of State Administration and Independent Agencies) were considered as tools for resolving salary issues based on the principle of equal pay for equal work. The Law on Salaries was specifically intended to create a unified salary system for all salaries paid from the Kosovo budget.

The Government of Kosovo, based on the NPISAA program, committed to finalizing the legal framework through the completion and amendments of: 1) the Civil Service Legislation; 2) the Public Administration Legislation; and 3) the Law on Salaries, as a package. These laws were considered interrelated as they would guarantee such important elements as completing the horizontal legal framework for public administration, ensuring the implementation of the legal framework, and proper performance evaluation. The package of laws would also provide for a system of classification of civil service jobs and a new salary system for all employees in the public sector, and would ultimately include all key institutions in the horizontal scope of the civil service.

1. INTERNATIONAL PRACTICES ON PUBLIC SECTOR WAGES

Public sector wage-setting around the world typically involves several key mechanisms. These mechanisms are shaped by institutional frameworks, fiscal realities, and broader socio-economic contexts. The following are among the most common components:

- Legislation and regulations - Governments often establish legal frameworks that define minimum wage levels, job classifications, and standardized pay scales. These regulatory structures aim to ensure equity and consistency across the public sector (ILO, 1978; OECD, 2021).
- Collective agreements - Public sector wages are frequently negotiated through collective bargaining between government employers and unions representing public employees. Collective agreements influence not only wages but also working conditions and job security (ILO, 1981; ILO, 2021).
- Salary scales and classification structures - A majority of public administrations use structured salary grids and job classification systems. These tools provide a systematic basis for determining compensation based on the level of responsibility, qualifications, and experience (OECD, 2005; UNDESA, 2010).
- Performance-based pay - Some countries include performance-related components in their pay structures, particularly following New Public Management reforms. These are designed to reward effectiveness and individual or institutional performance (OECD, 2012; IMF, 2016).
- Cost-of-Living Adjustments - To preserve the purchasing power of public servants, governments may periodically adjust salaries in line with inflation or other cost-of-living indices (ILO, 2012; OECD, 2020).
- Market comparisons - Governments sometimes benchmark public sector salaries against those in the private sector or in other comparable jurisdictions. This practice helps ensure competitiveness and supports recruitment and retention strategies (World Bank, 2016; ILO, 2020).
- Budgetary constraints - Public sector wages are influenced by the available fiscal space. During economic downturns or periods of austerity, governments may freeze wages or impose caps to reduce spending (IMF, 2016; European Commission, 2023).

- Economic conditions - Wider macroeconomic variables—such as GDP growth, inflation, and public debt levels—play a key role in shaping wage policies and adjustments (OECD, 2023; ILO, 2022).

These mechanisms vary across countries depending on political priorities, labor market structures, administrative capacity, and socio-economic development levels.

2. THE CONSTITUTIONAL BATTLE OF THE WAGE LAW

In February 2019, the Kosovo Assembly adopted the Law No 06/L-111 on Salaries in the Public Sector, which has been declared invalid by the Constitutional Court (Constitutional Court of Kosovo, KO219/19, 2020; GLPS, 2021). This law marked the first regulation of salaries in the public sector, due to the fact that salaries in the public sector were until then divided through different regulations in different institutions. A fragmented model regulated salaries in the public sector in Kosovo, where salary policy in the public administration was decentralized. There was no horizontal law as a specific policy that creates a unified salary system.

The law was expected to regulate the payment of employees who receive salaries from the state budget. The value of the basic salary is calculated by multiplying the coefficient of the salary class by the monetary value of the coefficient of 239 euros for the first year. The ratio of the coefficients is one to ten distributed in 69 odds levels. The highest coefficient is 10, a position held only by the President of Kosovo (with a salary of 2,390 euros), followed by level 9, which included the Speaker of the Assembly, the Prime Minister and the President of the Constitutional Court. The law was supposed to enter into force in December 2019 (Law No 06/L-111, 2019; GLPS, 2021)

However, on December 12, 2019, the Ombudsman filed a request with the Constitutional Court to assess the constitutionality of this law, requesting the Court to impose a temporary measure for the 'immediate suspension' of the contested law. The Constitutional Court approved it and then extended it until a decision is made on the basis of the claim. The Ombudsman requested that the Court find that the law, among other things, does not reflect the principle of: 1) separation of powers, 2) equality before the law, 3) guarantee of property rights, 4) rule of law, as defined by the Constitution. He assessed that the violation of the separation of powers is reflected in the lack of a clear distinction between the three branches of government and independent institutions defined by the Constitution (Constitutional Court of Kosovo, KO219/19, 2020).

On June 30, 2020, the Constitutional Court of Kosovo declared the Law on Salaries in the Public Sector invalid. According to the decision, the Draft Law was not in compliance with 11 articles of the

Constitution of Kosovo (Constitutional Court of Kosovo, KO219/19, 2020). Due to the fact that this period already coincided with the COVID-19 pandemic situation, which caused the general crisis of economic decline and the need to repair the damages caused by this global health crisis, the Government was unable to return to this topic until 2022. The new law on salaries in the public sector was approved on December 22, 2022 and published in the Official Gazette on January 5, 2023 (Law No. 08/L-196, 2023).

This time, criticism came due to the failure to set the value of the coefficient, unlike the first law. Article 9 of this law states that "The monetary value of the coefficient is determined by the annual budget law. The determination of the value of the coefficient is made in accordance with the legislation on public finance management" (Law No. 08/L-196). "However, this law was also brought before the Constitutional Court by the Ombudsperson, which ruled that parts of the law are in contradiction with the Constitution. Therefore, the law should be amended, and in the meantime, it should be applied in accordance with the recommendations of the Constitutional Court (Constitutional Court of Kosovo, KO79/23, 2020).

For 2024, the Assembly voted on the new Budget Law, including the coefficient for salaries set at 110 euros per coefficient. With the new Law on Salaries, the level of coefficients is from 2 to 18. Thus, the lowest salary with coefficient 2 was worth 220 euros, while the highest with coefficient 18 was worth 1,980 euros. But, in the meantime, in August 2024, the Government decided to set the minimum wage at 350 euros, up from 250 euros as set in 2022 (Radio Evropa e Lirë, 2024).

3. VIEW OF THE IMPORTANCE OF POSITIONS AND PROFESSIONS BASED ON THE VALUE OF SALARIES

Like the first law of 2019, the second law of 2022 marked different reactions from professional communities, such as healthcare workers, teachers, firefighters, police officers, civil servants in municipalities and court administration. The new law was considered to set a low value for the coefficient, undermining the general expectations of public sector employees for a significant increase in wages, which was considered a long-standing need, especially after the enormous increase in prices following the start of the COVID-19 pandemic. However, the Government was adamant that the Law did not aim to increase salaries, but to harmonize them, and also to reduce the gap between the highest and lowest salaries. There are about 84 thousand public sector employees who receive salaries from the state budget.

One issue of tension in public sector salaries has been the disproportionate ratio between the highest and lowest salaries. According to available data, the highest salary in the public sector was that of the director of the Kosovo Privatization Agency at 5,325 euros, while the lowest was that of a primary

school janitor at 242 euros. With the new law, however, this difference narrows to a ratio of 1:5, with the highest salary being 1,980 euros and the lowest around 395 euros.

Prime Minister Albin Kurti had emphasized that " With the new law, in addition to determining the basic salary, compensations and rewards, the types and amounts of allowances will also be determined, thus preventing two colleagues in the same office, for the same job, with the same qualifications, from being paid differently and receiving different allowances in an unjustified manner, just as we will not allow the allowances for one month of an official to be higher than the annual salary of a citizen" (Kosovapress, 2023)

4. THE CONCEPT OF PUBLIC WAGES ACCORDING TO THE WORLD BANK

Effective management of public sector employment and compensation is a vital government activity, with broad implications for fiscal sustainability, public sector productivity, and the competitiveness of the overall labor market. Government spending on employee compensation represents approximately 30 percent of its expenditures, and the wage bill. Therefore, management has significant fiscal and cost-efficiency implications. Wages affect the selection, retention, and motivation of public sector workers, which in turn affect productivity, or the quantity and quality of government outputs, such as infrastructure, regulations, and public services (World Bank, 2021). In other hand according to a Global Teacher Status Index from 2018, the 10 most respected professions are: doctor, lawyer, engineer, head teacher, police officer, nurse, accountant, local government manager, management consultant and secondary school teacher (as cited by Wood, 2019).

5. BRIEF OVERVIEW OF THE CASE OF SLOVENIA

The Republic of Slovenia, with 2.1 million inhabitants, a member of the EU since 2004, has a number of 195,000 employees in the public sector, with a per capita income of \$34,000 (2024) and an average salary of 2,000 euros. In September 2024, the Slovenian Government adopted the Act on Common Bases for the Public Sector Wage System. The proposal represents a milestone that will improve the regulation of the wage system in the Slovenian public sector. The main part of the proposed law is the new wage scale, which defines 67 wage scales. The system of wage increases in the public sector will be adjusted to inflation and, for the first time in history, will be systematically regulated. Wages will increase gradually, so that the lowest paid public employees will be the first to benefit from higher wages and so that no public employee will receive a wage lower than the minimum wage upon entering the new wage system and thereafter. Among many improvements, the new law introduces greater flexibility in determining the amount of wages for employees with special experience, skills and competences. The

proposed act aims at a more stimulating reward of employees with higher performance results and a greater workload. The law provides for the integration of a performance-related bonus payment for regular and overtime work, thus easing the administrative burden and simplifying the system, as well as enabling more transparent variable payments that also prevent the possibility of double payment for the same work (Government of Slovenia, 2024).

5.1 BASIC PRINCIPLES IN THE WORLD IN DETERMINING PUBLIC SALARIES AND THEIR HARMONIZATION ON THE BASIS OF PROFESSIONS

The harmonization of public salaries across different professions within a country is often guided by certain principles and considerations, although they may vary depending on the country and its political, economic and social structure. Some key principles that typically guide the harmonization of public salaries include equity, public service motivation, market comparison, job classification and job value, as well as other factors such as social dialogue and cost-of-living adjustments. The fundamental aim is to ensure that individuals performing similar tasks or roles within the public sector are compensated fairly, regardless of their specific profession. This principle aims to address potential pay disparities between sectors (e.g. health workers versus educators), ensuring that salaries reflect the value of the work and are equitable across different fields. Public sector salaries are often set with the understanding that workers in government roles can be driven by a sense of public service rather than financial incentives alone. This principle recognizes the importance of attracting and retaining talent in essential public services, while ensuring that compensation is competitive within the wider job market (World Bank 2021; OECD 2017; ILO, 2024).

Governments often compare public sector salaries with those of the private sector and other countries to ensure that they remain competitive. This comparison is essential for attracting skilled professionals to government roles. If public sector salaries are too low, the state may struggle to recruit or retain talent, while excessively high salaries can strain public finances. In many countries, public sector wage structures are influenced by negotiations between governments and unions or other representatives of public employees. These negotiations help balance the interests of workers with the government's fiscal capacity and policy priorities. Public salaries often reflect a grading system based on factors such as the level of responsibility, the qualifications required and the complexity of the job. Harmonization can occur when salary scales are structured to recognize the relative value of different jobs and their importance to the public service, making adjustments to ensure that jobs with similar demands are compensated similarly (OECD, 2017; IMF, 2016).

The process of harmonization is usually part of broader public sector reforms, aimed at ensuring that the state can effectively attract, retain and motivate professionals in a range of essential sectors, while remaining fiscally responsible. Different states will have varying degrees of success in achieving this balance, depending on their institutional frameworks, economic conditions and political priorities (World Bank, 2021).

5.2 GOVERNMENT INTERVENTION IN THE LAW AND THE VIOLATION OF THE COEFFICIENT-BASED PRINCIPLE

On October 29, 2024, the Prime Minister of Kosovo, Albin Kurti, announced the Government's decision to increase salaries in the public sector by 55 euros from January 2025 and another 55 euros from July 2025. "We will make a substantial increase in salaries in the public sector at the beginning of next year, while maintaining the long-term sustainability of the budget and according to the law in force - he said - emphasizing that he is doing this to support those with lower salaries and to narrow the gap between the lowest and highest salary. The Prime Minister underlined that "we have reached the maximum allowed budget increase for salaries and have decided not to increase the value of the coefficient, but to increase the coefficient by one unit. So, the value of one coefficient remains 110 euros. However, the amount of coefficients per unit increases. This means that starting from January 2025, the coefficient will increase by 0.5 units, and then from July 2025 by another 0.5 units. So, someone who has a coefficient of 5.6, in January becomes 6.1, and in July 6.6. Similarly, for someone who has a coefficient of 10.5, in January it becomes 11 and then 11.5 (Bujupaj & Bytyqi, 2024).

This increase has been assessed as low by the SBASHK (United Union of Education, Science and Culture of Kosovo), which is the main teachers' union in Kosovo, who are demanding a salary increase of up to 35% for teachers, and are continuing to threaten strikes (Jasharaj, as cited in Telegrafi, 2024). According to them the Government has violated the fundamental principle of the Law on Salaries of 2022, which structured all public sector positions and professions in a scheme of 136 coefficient levels. In fact, about a month after the adoption of this decision, the Law on the Budget of 2025 was adopted, which allowed the value of the coefficient that would ensure this salary increase (Law No.08/L-332, 2024)

CONCLUSIONS

The Law on Salaries in the Public Sector, although it has followed the most fundamental principles of equality for equal work, has not managed to satisfy all communities of professionals in the various public sectors. However, it has brought an efficient mechanism so that the public salary coefficient can be determined through the Budget Law, which is approved every calendar year, and which offers the

possibility for the coefficient to change depending on the economic growth in the country and the country's revenue ceiling.

This is a major difference from the past, where salaries could be increased by a political decision of a government, while now the main mechanism for salary increases is established in the annual Budget Law, where with an increase of the public salary coefficient, an equivalent increase in salaries in the public sector is made. Knowing the importance of the Budget Law, as a determinant of annual state budget revenues and expenditures, economic growth parameters in the country, inflation, public debt and other important factors, this mechanism should ensure an effective annual process. What remains almost unfinished as a social discussion is the level of salaries for various professions in the public sector, the importance of these professions, the challenges of employing employees in sensitive sectors such as healthcare personnel, as a result of professional migration abroad, the high dropout rate of Kosovo Security Force employees, and then the challenge of excess personnel in education, as a result of the continuous decline in the number of students.

REFERENCES

Bujupaj, E., & Bytyqi, V. (2024, October 29). *Kurti: Salaries will increase from January*. Koha. <https://www.koha.net/en/arberi/kurti-nga-janari-do-te-rriten-pagat>

Constitutional Court of Kosovo. (2020, July 9). *Judgment in case no. KO219/19: Constitutional review of Law No. 06/L-111 on salaries in the public sector*. https://gjk-ks.org/wp-content/uploads/2020/07/gjk_ko_219_19_agj_ang.pdf

Constitutional Court of Kosovo. (2023, December 26). *Judgment KO79/23: Constitutional review of Law No. 08/L-196 on salaries in the public sector*. https://gjk-ks.org/wp-content/uploads/2024/01/ko_79_23_agj_ang.pdf

European Commission. (2023). *Public finance report 2023*. Brussels: Directorate-General for Economic and Financial Affairs.

Government of the Republic of Slovenia. (2024, September 26). *122nd regular session of the Government of the Republic of Slovenia*. <https://www.gov.si/en/news/2024-09-26-122nd-regular-session-of-the-government-of-the-republic-of-slovenia/>

Group for Legal and Political Studies - GLPS. (2021, January). *The new law on wages in Kosovo: What is missing and what is needed to ensure an equal, efficient and non-discriminatory wage policy* (Policy Analysis). https://legalpoliticalstudies.org/wp-content/uploads/2021/01/GLPS_PolicyAnalysis_Law-on-Salaries_Rr.H.pdf.

IMF. (2016). *Managing government compensation and employment: Institutions, policies, and reform challenges* (IMF Policy Paper).

International Labour Organization (ILO). (1978). *Labour Relations (Public Service) Convention (No. 151)*. Geneva: ILO.

International Labour Organization (ILO). (1981). *Collective Bargaining Convention (No. 154)*. Geneva: ILO.

International Labour Organization (ILO). (2012). *Wage policies in the public sector*. Geneva: ILO.

International Labour Organization (ILO). (2020). *Global wage report 2020–21: Wages and minimum wages in the time of COVID-19*. Geneva: ILO.

International Labour Organization (ILO). (2021). *Collective bargaining in the public service: A comparative analysis*. Geneva: ILO.

International Labour Organization. (2024). *Global Wage Report 2024–25: Is wage inequality decreasing globally?* Geneva: ILO. https://www.ilo.org/sites/default/files/2025-02/GWR-2024_Layout_E_RGB_Web.pdf

International Monetary Fund (IMF). (2016). *Managing the public wage bill* (Technical Notes and Manuals). Washington, DC: IMF.

Kosovapress. (2023). *Kurti: The wage law brings equality and fairness for wages between categories*. <https://kosovapress.com/en/The-recent-wage-law-brings-equality-and-fairness-to-wages-between-categories>

OECD. (2005). *Performance-related pay policies for government employees*. Paris: OECD Publishing.

OECD. (2012). *Rewarding performance in the public sector: Survey of fifteen OECD countries*. Paris: OECD Publishing.

OECD. (2017). *Government at a glance 2017*. Paris: OECD Publishing Development.

OECD. (2020). *Public employment and management 2020*. Paris: OECD Publishing.

OECD. (2021). *Government at a glance 2021*. Paris: OECD Publishing.

OECD. (2023). *Public service leadership and capability review*. Paris: OECD Publishing.

Radio Evropa e Lirë. (2024, August 28). *Paga minimale në Kosovë rritet në 350 euro*. Radio Evropa e Lirë. Retrieved July 10, 2025, from <https://www.evropaelire.org/a/paga-minimale-kosove-350/33096614.html>

Republic of Kosovo, Assembly. (2019, February 25). *Law No. 06/L-111 on salaries in the public sector* [Law declared invalid by the Constitutional Court, Judgment KO219/19, July 9, 2020]. Official Gazette, No. 4/2019. <https://gzk.rks-gov.net/ActDetail.aspx?ActID=18300>

Republic of Kosovo, Assembly. (2023, January 5). *Law No. 08/L-196 on salaries in the public sector*. Official Gazette, No. 1/2023. <https://gzk.rks-gov.net/ActDetail.aspx?ActID=68695>

Republic of Kosovo. (2024, December 12). *Law No. 08/L-332 on budget appropriations for the budget of the Republic of Kosovo for the year 2025*. Official Gazette, No. 22/2024. <https://gzk.rks-gov.net/ActDetail.aspx?ActID=99639>

Telegrafi. (2024, October 29). *Dissatisfied with the salary increase, Jasharaj of SBASHK warns of mass protest and strike*.

United Nations Department of Economic and Social Affairs (UNDESA). (2010). *Compendium of human resource management practices in the public sector*. New York: UNDESA.

Wood, J. (2019, January 15). *These are the most respected professions in the world*. World Economic Forum. <https://www.weforum.org/agenda/2019/01/most-respected-professions-in-the-world/>

World Bank. (2016). *Benchmarking civil service pay and employment across countries*. Washington, DC: World Bank.

World Bank. (2021). *Public sector employment and compensation: An assessment framework* (EFI Insight: Governance, December 2021). World Bank. <https://documents1.worldbank.org/curated/en/324801640074379484/pdf/Public-Sector-Employment-and-Compensation-An-Assessment-Framework.pdf>

ANALYSIS OF THE LEGAL FRAMEWORK OF MIGRATION MANAGEMENT IN KOSOVA – WHAT DO WE NEED FOR EU INTEGRATION?

Xheneta Musliu Berisha
University of Prishtina
xheneta.m.berisha@gmail.com

ABSTRACT

Kosova as a country is attacked by several migration movements during different historical phases. Currently, Kosova applies the Migration Strategy 2021 – 2025 that reflects key priorities of the Government in Republic of Kosova for the migration management through institutional mechanisms. Recent institutional reports present that repatriation process is organized either voluntarily or forcibly, while the number of applicants with international protection for the last three months is registered more than 40. Kosova has a rich institutional and legal background in the field of migration that has been gradually advanced by years. With its status as a potential candidate for EU, Kosova is being under the preparation process for membership, while the migration is mentioned and highlighted as a process that should be adopted in accordance with the international migration norms and standards. This research aims to provide a general analysis of applicable legal frameworks, challenges faced throughout the application process in practice and best practices and recommendations for provision of sustainable services in migration management. As part of the target group for the research have been proposed repatriated persons and refugees, analysing challenges from the (re)integration process and conclusions for improvement of the legal framework application. Considering the integration process of Kosova in EU, the research in the end aims to provide answers related to the future steps that Kosova should take into the consideration in the field of migration management, particularly considering the international migration norms and standards that derive from the application requirements of Kosova in EU.

Keywords: *migration, legal framework, international migration norms, sustainable (re)integration, repatriated persons and refugees, Kosova and EU*

INTRODUCTION

Based on the IOM Report published in 2024; it was estimated that the total number of international migrants in 2020 was 281 million or 3.6% of the whole global population. On the other side, it is estimated that in the end of 2022, the number of forcibly displaced people worldwide was estimated at 108.4 million (UNHCR, 2023). At the end of 2024, an estimated 123.2 million people worldwide were forcibly displaced due to persecution, conflict, violence, human rights violations and events seriously disturbing the public order (UNHCR, 2024). Those figures represent a reality which we face and where we can highlight that the migration phenomenon happens either for social, political or economic issues. However, migration has resulted in positive impact for countries where migrants have been settled, for instance in employment, health or any other life aspects. On the other side, hosting countries have had the opportunity to benefit from several aspects either from experience sharing, employment or knowledge transfer. According to an article published by the European Parliament (2020), reasons for migrations can be push and pull factors. Further on, the article specifies that managing migration effectively to deal with asylum seekers and protect external borders has been an EU priority for many years (European Parliament, 2020).

Republic of Kosova has adopted and is implementing the Strategy on Migration 2021 – 2025 (previously *State Strategy on Sustainable Reintegration of Repatriated Persons in Kosova 2018 – 2022*), the Strategy that reflects key priorities of the Government of Republic of Kosova in managing migration in country through institutional mechanisms, the Government's commitments for international cooperation in the area of migration and the obligations deriving from the European integration process, i.e. for the implementation of obligations deriving from the Stabilization and Association Agreement between the Republic of Kosova and the European Union (Ministry of Internal Affairs, 2021). The Strategy on Migration 2021 – 2025 is based on the following pillars, i.e. strategic objectives: i. Management of regular migration, ii. Ensuring safe, orderly and regular migration, iii. Management of Internal Migration and iv. Advancing in the area of migration management and the international protection system (Ministry of Internal Affairs, 2021). The research paper highlights all objectives that are part of the Strategy on Migration 2021 – 2025, being focused on the current legal framework, challenges and practical implementation modalities. The Strategy on Migration 2021 – 2025 is conform international norms and standards and in compliance with the Global Pact on Migration, Global Pact for Refugees and EU Pact for Asylum and Migration.

The Migration Profile 2023 emphasizes that there has been notable increase in labour emigration to Germany, driven by migration reforms and employment facilitation policies for foreigners, prompted by the workforce shortages in that country (Government Authority on Migration, 2023). Specifically, worker

emigrants from the Republic of Kosova to Germany predominantly work in the construction, manufacturing, trade and hospitality and gastronomy services. After Germany, Kosova emigrants mainly are stated in Slovenia and Croatia for employment opportunities, while Italy, Finland and France are the main destinations for family reunification (Government Authority on Migration, 2023). In Kosova, the population migration is driven by several factors including here higher wages, respect for contracts and workers' rights, healthcare and educational system. Apart from opening of the Temporary Reception Centre for Migrants, which has enabled the profiling of migrants seeking international protection, however in recent years the number have been declined for acceptance for international protection status – while influencing factors in this decline include the stabilization of situations in countries previously considered active conflict zones and changes in migration trends towards EU countries through the Western Balkans.

Republic of Kosova has readmission agreements with 24 countries, including 20 EU Member States Schengen members and the readmission agreements are implemented satisfactorily (European Commission, 2024). Moreover, there is currently no readmission agreement in place with the EU. The Kosova Report 2024 highlights that the institutions have steadily improved their capacity to regulate and manage migration (budget, training and coordination); however, there is room for improvement in capacity development, collection and analysis of data, and training/recruitment of staff (European Commission, 2024).

1. CURRENT APPLICABLE INTERNATIONAL AND NATIONAL LEGISLATION

The Republic of Kosova has developed several relevant and strategic documents on migration management field. By years, practical implementation of documents has become easier and improved migration management and provision of capacity development support for local and national officials in the country. In addition to the general international human rights instruments, which are directly applicable in the Republic of Kosova, provided for by the Article 22 of the Constitution of the Republic of Kosova, key instruments of international law in the area of migration are the UN Convention on the Rights of Migrants and Members of Their Families, and the 1951 Geneva Convention Relating to the Status of Refugees (Ministry of Internal Affairs, 2021). According to the Geneva Convention 1951..." Every refugee has duties to the country in which he finds himself, which require in particular that he conform to its laws and regulations as well as to measures taken for the maintenance of public order" (United Nations, 1951).

Based on the Constitution of the Republic of Kosova, Article 22..." Human rights and fundamental freedoms guaranteed by the following international agreements and instruments are guaranteed by this

Constitution, are directly applicable in the Republic of Kosovo and, in the case of conflict, have priority over provisions of laws and other acts of public institutions.”

In relation to the state instruments, the Republic of Kosovo has developed and continuously works to improve the legal framework, strategic documents and other required documents in the field of sustainable reintegration and integration process in the country. In collaboration with the local, regional and national level actors, the legislation is updated and amended with the required strategic documents that facilitate, and support sustainability of services provided to target citizens during the reintegration and integration process in the country.

Strategy on Migration 2021 – 2025 – The Strategy on Migration 2021 – 2025 recommends concrete actions and legal, strategic and institutional measures in order to address the identified challenges and improve the situation in terms of effective migration management. Moreover, the following actions are recommended to strengthen the responsible state institutions for migration management, in particular, the Government Authority on Migration (GAM): creating and developing a system for internal migration management, strengthening the international protection system; ensuring safe and orderly migration; deepening regional cooperation with specialized international organizations etc. (Ministry of Internal Affairs, 2021). Currently the Strategy on Migration 2021 – 2025 is applicable and referring point for many documents related to the migration management in Kosovo. The Strategy on Migration 2021 – 2025 reflects the achievements in the field of migration management, specifically on inter-institutional coordination under the mandate of the Government Authority on Migration, by drafting analytical documents in the field of migration (such as migration profiles), capacity development through thematic training in the area of migration and the advancement of systems for migration data collection and analysis (Ministry of Internal Affairs, 2021).

LAW No. 04/L-219 ON FOREIGNERS – the provisions of this Law shall apply to foreigners as long their status shall not be regulated under other legal provisions or under an international agreement endorsed by the Republic of Kosovo. Based on Article 3, Definitions, the term “foreigners” is specified as any person who is not citizen of the Republic of Kosovo (Assembly of the Republic of Kosovo, 2013).

LAW No. 06/L-026 ON ASYLUM – this Law regulates the conditions and procedures for granting the status of refugee, subsidiary protection, and temporary protection status, as well as the rights and obligations of applicants, the persons with the refugee status and persons who are granted subsidiary protection and temporary protection (Assembly of the Republic of Kosovo, 2018). This Law will apply to all foreign nationals and stateless persons who have declared intention to apply for international protection in

the territory of the Republic of Kosova, including the border in the territorial waters or in transition zones as long as they are allowed to stay in the territory of the Republic of Kosova as an applicant for international protection, as well as their family members, if they are included in the application for international protection in accordance with this Law (Assembly of the Republic of Kosovo, 2018).

Regulation (GRK) No. 22/2020 on Reintegration of Repatriated Persons – this Regulation defines the measures, criteria, procedures and institutions responsible for sustainable reintegration of repatriated persons in the Republic of Kosova (Government of the Republic of Kosovo, 2020). Further on, the Regulation specifies that MIA (Ministry of Internal Affairs), respectively DRRPIF (Department for Reintegration of Repatriated Persons and Integration of Foreigners), is responsible to draft, coordinate, monitor and evaluate reintegration policies in close cooperation with the relevant central and local institutions (Government of the Republic of Kosovo, 2020). Additionally, the respective Ministry is the main authority to manage with the reintegration and integration budget. The Ministry also deals with the process to system, update and store data of the supported beneficiaries and provide measures/support for the sustainable reintegration and integration process in the country.

Regulation (GRK) No. 09/2019 for the Integration of Foreigners – this Regulation defines the procedures, criteria and institutions responsible for the integration of foreigners into social, economic and cultural life in the Republic of Kosova (Government of the Republic of Kosovo, 2019). Further on, the Regulation specifies the term “Integration of Foreigners”, meaning inclusion of foreigners into the social, economic and cultural life of Kosova society, promoting the preservation of their culture, language, civic rights and freedoms. The Regulation is in compliance with the terminology used by the Law on Foreigners, Law on Asylum and Law on Citizenship in Kosova. The respective Regulation also specifies the categories that can benefit from the integration measures which are: applicants for international protection, persons with refugee status, persons with subsidiary protection, persons with temporary protection, persons with stateless status, persons with temporary residence, persons with permanent residence and family members of the beneficiaries of the abovementioned categories in case of family reunion (Government of the Republic of Kosovo, 2019). The responsible body for the integration of foreigners at the central level, is the Department of Reintegration of Repatriated Persons, which functions within the MIA (Ministry of Internal Affairs) (Government of the Republic of Kosovo, 2019).

Guideline for Access of Foreigners to Vocational Training and Employment (2022) – the purpose of this Guideline is to assist officials dealing with integration of foreigners in social and economic life in the Republic of Kosova, by providing knowledge on institutional responsibilities to guarantee fair and equal treatment of foreigners during the integration process according to the laws of the Republic of Kosova

and other international standards (Republic of Kosovo, 2022). The Guideline presents steps to be taken by each institution involved in the process of integration of foreigners in the Republic of Kosovo in harmony with the basic criteria defined in Regulation (GRK) no. 09/2019 on the Integration of Foreigners, including the application of international human rights standards.

2. DEFINITION OF REPATRIATED PERSON AND REFUGEE IN KOSOVA

The Regulation on Reintegration of Repatriated Persons specifies that...” A repatriated person is a Kosovar who, due to the lack of legal basis for staying in a foreign country, is repatriated to Kosovo regardless of their return manner” (Republic of Kosovo, 2020). Based on the Extended Migration Profile 2018 – 2022, around 73% of repatriated persons have been returned forcibly, 5% voluntarily and 22% assisted from IOM (International Organization for Migration), while around 80% of the total repatriated persons have been from Germany, France and Switzerland. In 2023, 579 persons were readmitted to the Republic of Kosovo, of which 452 (78.1%) were forcible returned, 60 (10.4%) voluntarily and 67 (11.6%) voluntarily assisted by IOM (Government Authority on Migration, 2023). Based on the Statistical Report for 2024 issued from the Ministry of Internal Affairs, during the period July – September 2024, at the border crossing points around 217 have been repatriated from different countries, considering 197 (91%) forcibly, 11 (5%) voluntarily and assisted from IOM 9 (4%) (Ministry of Internal Affairs, 2024). The data indicate that, over the years, repatriation in Kosovo has been carried out more through coercion than on a voluntary basis. However, reintegration measures for support to repatriated persons have been provided equally to all targeted repatriated persons regardless of their return manner. According to the Statistical Report for July to September 2024, the majority of repatriated individuals originated from Germany and France. Males accounted for the larger share of returns, with the 35–64 age group being the most frequently targeted for repatriation.

Chapter II, Article 5 of the Regulation on Reintegration highlights that...” State institutions, in compliance with their competencies, shall cooperate with civil society, international organizations, businesses and relevant educational institutions to promote and support the reintegration of repatriated persons in the Republic of Kosovo. Further on, the Regulation mentions that specific reintegration measures include measures upon arrival, emergency measures and measures for sustainable reintegration. While in the central level, responsible for coordinating and managing the reintegration policies is the Ministry of Internal Affairs, in the local level is the Municipal Office for Communities and Return. In 2023, at the Centre for Reception of Repatriated Persons at the Prishtina International Airport “Adem Jashari” and other border crossing points, 305 individuals were registered, informed and

counselled, while among them, 292 repatriated persons benefited from the reintegration schemes (Government Authority on Migration, 2023).

A total of 2 174 Ukrainians transited through Kosova in 2023 – Kosova hosts 24 Ukrainians, 15 with temporary protection (13 journalists and 2 children) and 9 with subsidiary protection (European Commission, 2024). Additionally, the quality of the refugee status determination procedures needs to be further improved, in particular regarding the country-of-origin information. The Regulation for Integration of Foreigners specifies that foreigners shall be provided with information by MIA/DRRP about their rights and obligations during the integration process in accordance with the Regulation. The respective Regulation also presents the accommodation services to the targeted persons/groups, highlighting that the persons with refugee status, person with subsidiary protection status, or person with temporary protection shall be provided elementary shelter for up to two (2) years from the date of receiving a decision on status recognition. Out of the total number of decisions made on applications for international protection, 124 (56%) resulted in the termination of the procedure due to applicants leaving the Republic of Kosova, 30 (13%) resulted in refugee status, 24 (11%) in subsidiary protection, 19 (9%) in temporary protection, 13 (6%) in the termination of the procedure at the request of the applicants, and 11 (5%) requests were rejected (Government Authority on Migration, 2023).

Furthermore, in order to manage any potential flow, the Ministry of Internal Affairs in the framework of the Contingency Plan for managing eventual influx of migrants, refugees and applicants for international protection, has planned to expand the area of the “Belvedere camp” increasing as such the total accommodation capacity from the current 800 to 2,500 (Ministry of Internal Affairs, 2021).

Since January 2020, when Article 52 of the Law on Asylum was stipulated, allowing migrants and refugees to apply “For the expression and purpose of seeking international protection” and to have an opportunity to decide within 72 hours to apply for international protection, a new situation has been created related to the total number of migrants and those who apply for international protection (Ministry of Internal Affairs, 2021). According to the *Plan for Managing the Potential Flow of Migrants, Refugees, and Applicants for International Protection*, the Republic of Kosovo must take proactive measures to address potential influxes of migrants and refugees, given the shifting migration routes in the region. It should also continue strengthening its international protection system and ensure that protection standards are upheld at all stages, in line with legal provisions, international human rights standards, and the principles of humanitarian border management.

3. ALIGNMENT OF THE MIGRATION POLICIES WITH EU – WHAT DO WE NEED FOR EU INTEGRATION?

IOM defines the term of “reintegration” as a process which enables individuals to re-establish the economic, social and psychosocial relationships needed to maintain life, livelihoods and dignity and inclusion in civic life (International Organization for Migration, 2016). On the other side, IOM defines the term of “integration” as a process of mutual adaptation between the host society and the migrants themselves, both as individuals and as groups.

During 2022, European Commission has presented Action Plan on the Western Balkans to tackle irregular migration, while the priorities of the new EU Action Plan on the Western Balkans include strengthening border management and achieving the alignment of visa policies in order to respond to the increased number of irregular crossing attempts reported at the EU border with the Western Balkan countries (EWB, 2022). The 5 pillars of the documents include strengthening border management along the routes; swift asylum procedures and support reception capacity; fighting migrant smuggling; enhancing readmission cooperation and returns and achieving visa policy alignment (EWB, 2022). On the other side, the Kosova 2024 Report from the European Commission highlights that Kosova should continue to implement the European Union Action Plan on Western Balkans for migration; implement an integrated border management system in line with the current legislation and the European bests practices; amend the Law on Foreigners in line with EU standards; and progressively align its legislation with EU visa policy (European Commission, 2024). The same was reported in the Progress Report for Kosova 2023. However, the report states that the country stays at satisfactory level regarding the management of legal and irregular migration. The institutional structure and legal framework are largely in line with the EU acquis (European Commission, 2024).

Considering the strategic documents, the Progress Report for Kosova 2023 emphasized that the Strategy on Migration 2021 – 2025 and the action plan take into account obligations deriving from the Stabilisation and Association Agreement as well as European and global initiatives such as the EU Pact on Migration and Asylum and the Global Compact on Safe, Regular and Orderly Migration (European Commission, 2023). However, the World Bank Report emphasizes that the National Strategy aims to further harmonize with the Global Compact on Migration through exploring additional procedures for returning irregular migrants, including here countries that do not recognize Kosova (The World Bank, 2024). Worthy to state is that one of the key instrument that the Republic of Kosova has strengthened its international cooperation in the area of migration by signing bilateral agreement; so far in the area of

readmission, the Republic of Kosovo signed 22 agreements with 24 countries, out of which 18 are with the European Union Member States and 4 with the Western Balkan countries (Government Authority on Migration, 2023).

A recent World Bank Report 2024 concluded that Kosovo's legal framework also includes a strong system, built in collaboration with European partners, for the repatriation and readmission of Kosovars who migrated irregularly (The World Bank, 2024). One of the points presented in the Stabilisation and Association Agreement with Kosovo specifies that the country should align its laws to those of the EU (EUR-Lex, n.d.). Specifically, Kosovo agrees to ensure that its existing law and future legislation will gradually be made compatible with the EU acquis and that such laws will be properly implemented and enforced (EUR-Lex, n.d.). The SAA (Stabilisation and Association Agreement) was signed on 27 October 2015 and entered into force on 01 April 2016, highlighting that the European Union will continue to support Kosovo's progress in its European path through the Stabilisation and Association process, the policy designed by the EU to foster cooperation with the Western Balkan countries as well as regional cooperation (European Commission, n.d.). In order to support the necessary reforms, the EU makes available pre-accession assistance to the Western Balkans and Turkey amounting to some EUR 11.7 billion over the period 2014 – 2020, of which EUR 645.5 million is allocated to Kosovo (European Commission, n.d.). As the first contractual agreement between Kosovo and EU, the agreement determines a mechanism which will progressively bring Kosovo closer to EU in policy areas, until all EU standards are met (Assembly of the Republic of Kosovo, n.d.).

The National Programme for Implementation of the Stabilisation and Association Agreement (NPISAA) 2017 – 2021, chapter 24 – Justice, freedom and security – of the acquis presents the following areas: border management, migration, prevention and control of irregular migration, visa policy, document security, combating organized crime and police cooperation, combating money laundering and the financing of terrorism, the fight against terrorism, fight against narcotics and judicial cooperation in criminal and civil matters (Government of the Republic of Kosovo, 2017). Furthermore, the areas covered include the harmonization of private international law, extradition between member states, policies of internal control and external borders, visas, migration, asylum policy, judicial and policy cooperation and the fighting against crime (Government of the Republic of Kosovo, 2017). The National Plan states that Kosovo shall harmonize the national legislation with the EU acquis, regarding the conditions of entry and legal residence of foreigners in Kosovo, the conditions of their employment, family reunification, long-stay, study, research, qualified workers, seasonal workers, the mobility of workers within enterprises and

penalties on employers. Additionally, the country should apply equal treatment of both women and men foreigners.

The National Plan highlighted medium-term priorities in the field of migration management, in order to fulfil the obligations arising from the SAA and other EU accession documents and mechanisms in all areas under Chapter 21, the focus during 2017 – 2020 has been addressed on the following priorities:

- Strengthening the Monitoring Authority on Migration Movements (MAMM)
- Enhancing international cooperation in combating irregular migration
- More effective inclusion of relevant institutions at all levels in the fight and the prevention of irregular migration (Government of the Republic of Kosova, 2017).

The National Programme for European Integration 2024 – 2028, the 6th SC on Justice, Freedom and Security, underlines that among key reforms, Kosova should undertake to implement the reform regarding procedures, further capacity building of managers for refugee status determination (RSD), to ensure quality management and decision-making standards for asylum, standardised application of the country of origin information (COI) and accelerated use of simplified procedures for clearly founded and unfounded cases during pre-admission/border control procedures (Government of the Republic of Kosova, 2017). Therefore, based on the available information and references, Kosova has initiated and is progressing toward aligning its legal framework with international standards, aiming to ensure compliance with the requirements for EU integration.

4. RECOMMENDATIONS

The Republic of Kosova is a potential candidate for EU. In December 2022, Kosova has submitted its application for EU membership while Kosovars benefit from visa-free travel to the EU since January 2024. Some of key recommendations that can be highlighted and derived from the research are presented as follows:

1. The Republic of Kosova has shown readiness and commitment to develop institutional mechanisms and policy frameworks for proper migration management process. So far, the country has implemented and adopted the strategic and regulatory documents in line with the international norms and standards. However, the Republic of Kosova should continue to adapt and improve the implementation system of practicing the strategic and policy framework on migration management.

2. The Republic of Kosovo should aim to reach readmission agreement with EU in order to ensure proper migration management system; additionally relevant institutional migration actors should work to increase and improve capacity development, collection and analysis of data, and training/recruitment of relevant migration management staff.
3. To ensure proper EU integration process, the Republic of Kosovo should continue to implement the EU Action Plan on Western Balkans for migration particularly to strengthen border management, ensure swift asylum procedure, support reception capacity and enhancing readmission cooperation and returns.
4. The Republic of Kosovo should continue cooperation and coordination with relevant EU institutions and exchange of best practices with the EU members states in order to align with the SAA goals that will ensure the Kosovo's transition towards a sustainable economy and strengthen peace and stability in the region – therefore to adapt its legislation accordingly as part of the EU integration process. The Republic of Kosovo should strengthen collaboration with relevant migration stakeholders at both national and local levels to establish an effective migrant monitoring system. This includes centralizing documentation, tracking service delivery outcomes for migrants, and increasing the migration budget to enhance the implementation of migration policies.

REFERENCES

Assembly of the Republic of Kosova. (n.d.). *European Union integration process* [Review of European Union integration process]. <https://www.kuvendikosoves.org/eng/european-union-integration-process/>

Assembly of the Republic of Kosovo. (2013). *Law No. 04/L-219 on Foreigners*. Official Gazette of the Republic of Kosovo, No. 35. <https://gzk.rks-gov.net/ActDetail.aspx?ActID=8876&langid=2>

EUR-Lex. (n.d.). *Stabilisation and association agreement with Kosova* [Summary]. EUR-Lex. <https://eur-lex.europa.eu/EN/legal-content/summary/stabilisation-and-association-agreement-with-Kosova.html>

European Commission. (2023). *Kosova 2023 report* (p. 53) [Review of *Kosova 2023 report*]. Directorate-General for Neighbourhood and Enlargement Negotiations. https://enlargement.ec.europa.eu/kosovo-report-2023_en

European Commission. (2024). *Kosovo 2024 report* (pp. 9–46) [Review of *Kosovo 2024 report*]. Directorate-General for Neighbourhood and Enlargement Negotiations. https://enlargement.ec.europa.eu/kosovo-report-2024_en

European Commission. (n.d.). *Press corner: European Commission*. European Commission. https://ec.europa.eu/commission/presscorner/detail/en/IP_16_1184

European Parliament. (2020, June 24). *Exploring migration causes – why people migrate*. <https://www.europarl.europa.eu/topics/en/article/20200624STO81906/exploring-migration-causes-why-people-migrate>

EWB. (2022, December 5). European Commission presents action plan on the Western Balkans to tackle irregular migration. *European Western Balkans*. <https://europeanwesternbalkans.com/2022/12/05/european-commission-presents-action-plan-on-the-western-balkans-to-tackle-irregular-migration/>

Government Authority on Migration. (2023). *Migration profile 2023* (pp. 15–82) [Review of *Migration profile 2023*]. Government Authority on Migration, Ministry of Internal Affairs, Republic of Kosovo. <https://mpb.rks-gov.net/Uploads/Documents/Pdf/EN/378/Migration%20Profile%202023.pdf>

Government of the Republic of Kosova. (2017). *National programme for implementation of the stabilization and association* (pp. 96–286).

Government of the Republic of Kosovo. (2019, July 11). *Regulation (GRK) No. 09/2019 on the integration of foreigners*. Official Gazette of the Republic of Kosovo, No. 8. <https://kryeministri.rks-gov.net/en/blog/regulation-grk-no-09-2019-for-the-integration-of-foreigners-11-07-2019/>

Government of the Republic of Kosovo. (2020, September 21). *Regulation (GRK) No. 22/2020 on reintegration of repatriated persons*. Official Gazette of the Republic of Kosovo, No. 35. <https://gzk.rks-gov.net/ActDetail.aspx?ActID=16794&langid=2>

International Organization for Migration. (2016). *Key migration terms*. International Organization for Migration. <https://www.iom.int/key-migration-terms>

Ministry of Internal Affairs, Department of Citizenship, Asylum and Migration. (2024). *Statistical report Q2 2024* [Review of Statistical report Q2 2024].

Ministry of Internal Affairs. (2021). *Strategy on Migration 2021–2025* [Review of Strategy on Migration 2021–2025]. Ministry of Internal Affairs, Republic of Kosovo. <https://mpb.rks-gov.net/Uploads/Documents/Pdf/EN/378/Strategy-on-Migration-2021-2025-anglisht.pdf>

Republic of Kosovo. (2022). *Guideline for access of foreigners to vocational training and employment* (No. 1952/2022, p. 9). Official Gazette of the Republic of Kosovo.

The World Bank. (2024). *International mobility as a development strategy: Kosova country report* [Review of International mobility as a development strategy: Kosova country report] (p. 99). The World Bank.

United Nations High Commissioner for Refugees (UNHCR). (2024). *Mid-Year Trends 2024*. <https://data.unhcr.org/en/documents/details/111704unhcr.org+2>

United Nations High Commissioner for Refugees. (2023). *Global trends: Forced displacement in 2022*. UNHCR. <https://www.unhcr.org/global-trends-report-2022>

United Nations. (1951). *Convention relating to the status of refugees* (p. 32). <https://www.unhcr.org/3b66c2aa10>

FROM POLICY TO PEACE: LEADERSHIP'S ROLE IN SHAPING PEACE AND COOPERATIVE JUSTICE ON A GLOBAL SCALE

Amella Bashoviq
South East European University, North Macedonia
ab28226@seeu.edu.mk

ABSTRACT

In a world of complicated global problems, leadership is key to turning policy into peace and justice. This paper looks at how political leaders and policymakers can create frameworks that go beyond national interests to achieve global peace. By looking at recent examples of international cooperation and peace initiatives this paper shows how leadership has bridged the gaps, built partnerships and resolved conflicts. This analysis reveals essential strategies for achieving cooperative justice, through multilateral diplomacy, inclusive governance, and the harmonization of policies, which are vital in the current multipolar environment. By using these strategies political leaders can address long standing problems like political instability, economic inequality and cultural conflicts that block peace processes. The discussion looks at the role of leadership in crafting policies that bring together different voices, build resilience and justice across borders so we can have international cooperation that prioritizes human rights and sustainable peace. This paper in its conclusion emphasizes the capacity of political leadership that can serve not only as a catalyst for domestic policy but also as a significant force for global justice. By redefining sovereignty and collaborative problem-solving political leaders can create a world where peace is maintained through collective responsibility, mutual respect and long-term relationships.

Keywords: *global leadership, policy, peace, justice, transformation, objectives.*

INTRODUCTION

In the current era of global interdependence, the quest for sustainable peace stands as a significant challenge for leaders worldwide. Factors such as political instability, economic disparity, and cultural differences continue to exacerbate tensions on a global scale, highlighting that peace transcends merely the cessation of hostilities. It requires the development of governance structures, diplomatic engagement, and cooperative frameworks that promote enduring stability and fairness. Essential to this process is leadership that can adopt policies which extend beyond narrow national interests, thereby fostering a collective vision for a more peaceful world. Through the mechanisms of international organizations, multilateral treaties, or community-driven initiatives, robust and effective leadership can reconcile differences, address conflicts, and advance justice in ways that are advantageous to entire communities.

The role of leadership in peacebuilding transcends beyond national borders. Addressing global issues such as terrorism, climate change, migration crises, and economic inequality require collective action and response. Organizations like the United Nations (UN), the European Union (EU), and the North Atlantic Treaty Organization (NATO) have established frameworks to tackle these challenges, but their success depends on the political will and commitment of those in power. A leadership model founded on cooperative justice is essential for translating policies into meaningful actions, ensuring that peace initiatives are not merely rhetorical but lead to substantial resolutions of complex international issues.

This research paper highlights how leadership shapes peace and cooperative justice on a global level. By examining case studies from different geopolitical contexts, it highlights how political leaders and policymakers have successfully or unsuccessfully managed peace processes. It also identifies key strategies for addressing deep-rooted issues such as political instability, economic inequality, and cultural discord. Ultimately, the argument put forth is that leadership is the decisive factor in transforming policy into peace. Strong leadership must prioritize inclusive governance, multilateral diplomacy, and the alignment of national policies with global peace objectives. Understanding these dynamics is crucial for advancing global governance, security, and justice in a world where collaboration proves to be the most important element for global peace.

1. LEADERSHIP IN POLICY TRANSFORMATION

The transition from policymaking to peacebuilding is a critical process that requires visionary leadership capable of turning strategic frameworks into practical. Although policies lay the foundational legal and institutional structures for peace initiatives, it is the quality of leadership that ultimately influences

their effectiveness by promoting dialogue, overseeing execution, and adjusting strategies to meet the changing demands of society. Effectively translating policy into peace requires leaders to bridge the gap between institutional commitments and grassroots realities while ensuring that peacebuilding efforts are not just theoretical but tangible and impactful.

The Good Friday Agreement (1998) in Northern Ireland serves as a prominent example of successful policy transformation. Leaders from conflicting sides, with the assistance of international mediators, exerted considerable effort to turn years of negotiations into a sustainable peace framework. This agreement not only concluded the violent confrontations between nationalists and unionists but also laid the groundwork for power-sharing institutions and mechanisms that promote ongoing cooperation. The involvement of key figures such as former British Prime Minister Tony Blair, Irish Taoiseach Bertie Ahern, and US Senator George Mitchell was crucial and without their leadership, the agreement might have remained merely a proposal rather than a pivotal achievement in the pursuit of peace.

Leadership is a fundamental factor in the alignment of national policies with global peace objectives. In context where conflicts are often transnational, political leaders must recognize that national security and stability are deeply interconnected with international peace efforts. The European Union's integration process serves as an example of how leadership can align national interests with broader peace initiatives. By promoting economic cooperation, democratic governance, and conflict prevention mechanisms, EU leaders have created a model where former adversaries collaborate for mutual prosperity. The accession of Eastern European countries into the EU following the Cold War demonstrates how strong political leadership can drive policy transformation that contributes to long-term stability.

On the other hand, ineffective leadership can significantly hinder peace initiatives, as evidenced in the prolonged Israeli Palestinian conflict. Although various peace proposals, such as Oslo Accords (1993), established a framework for resolving the conflict, inconsistent leadership, lack of trust, and political shifts obstructed their full implementation. This situation emphasizes that effective peacebuilding involves more than simply having some agreements, but it rather demands persistent leadership which is has strong commitment to fostering dialogue, reach compromises, and be engaged in long-term efforts.

In order to achieve sustainable global peace through the implementation of policies, it is essential for political leaders to address the following challenges related to global stability and peace:

1. Political instability and armed conflicts which result in the escalation of disputes, which then create fragile states and geopolitical rivalries.

2. Economic inequalities characterized by global disparities, the exploitation of resources, and the intertwined issues of debt and poverty.
3. The climate change crisis and environmental degradation which are evident in resource scarcity, population displacement, and a global inaction.
4. Cultural and social divisions are which are usually worsened through ethnic and religious divisions, the rise of extremist ideologies, and the marginalization of certain social groups.
5. The challenges facing international justice mechanisms which is encompassed with the significant accountability gaps, the limited effectiveness of global institutions, and complexity of modern conflicts.
6. Weak multilateral cooperation is highlighted by a decline in trust and increasing polarization.
7. Contemporary technological challenges encompass issues related to cybersecurity, cybersecurity threats and existing digital division.
8. The role of leadership which is hindered by a lack of forward – thinking and solution-oriented vision but is rather focused on short – term policy making approach.

Given the importance of political leadership in addressing transnational issues, which is of utmost importance, it is essential to take the following actions into serious consideration and implement them effectively when circumstances allow:

1. *To facilitate and promoted global cooperation.* Political leaders play a key role in forging multilateral alliances and promoting diplomacy and by doing so, they ensure that nations work together rather than divided or in isolation.
2. *To enhance and/or strengthen accountability and governance.* By enhancing and strengthening international institutions and advocating for global norms helps create a stable and rules-based global order
3. *To rightfully allocate and use resources and support innovation.* Leaders must make sure that resources are allocated effectively and encourage public-private partnerships to drive innovative solutions to global challenges.
4. *To mitigate conflict and build trust.* Diplomatic efforts and inclusive policymaking are crucial in resolving disputes and fostering mutual trust among nations.
5. *To inspire collective action.* By setting examples and articulating shared visions, political leaders can motivate societies and institutions to take meaningful action.

The role of political leadership is vital in confronting transnational challenges. Leaders act as facilitators of cooperation, promoters of innovation, and advocates for accountability. Their ability to harmonize national

objectives with global imperatives is pivotal in determining the efficacy of initiatives aimed at confronting the complex issues of today's interconnected landscape. In the absence of strong and visionary leadership, the path toward sustainable solutions is likely to be or remain fragmented, complex and unclear.

2. MECHANISMS OF COOPERATIVE JUSTICE

In the context of complex global challenges, cooperative justice has become a crucial strategy for promoting sustainable peace. The mechanisms of cooperative justice rely on multilateral diplomacy, inclusive governance, and policy harmonization across borders. These strategies enable nations to address long-standing issues such as political instability, economic inequality, and cultural conflicts which is the main reason why peace processes are obstructed. By adopting these strategies, political leaders can develop frameworks that not only resolve pressing conflicts but also promote long-term stability and justice.

One of the essential components of cooperative justice is multilateral diplomacy, which facilitates the formation of international alliances. International organizations such as the United Nations, the European Union, and NATO played a crucial role in bringing together many actors to the table to negotiate and implement peace agreements. The Paris Agreement on climate change (2015) is great example how multilateral diplomacy can facilitate coordinated efforts to address global challenges. Although national interest were different, leaders from around the world were committed to a common framework to combat climate change and that demonstrated effective diplomacy in alignment of international policies towards a shared goal.

A cohesive global framework or mechanisms of cooperative justice is most effective in addressing misconduct by prioritizing collective accountability, restorative approaches, and collaborative solutions. These mechanisms of cooperative justice, *inter alia*, include multilateral diplomacy, inclusive governance, transitional justice, policy harmonization across borders, conflict management and negotiations, legal and institutional reforms, multi sectoral collaboration as well as international peacekeeping and monitoring. This strategy focuses on repairing damage and revitalizing community ties, rather than relying solely on punitive measures. The mechanisms of cooperative justice emphasized above are derived from several case studies that focus on international peace initiatives such as the Camp David Accords (1978), UN Mediation in El Salvador (1992), the Oslo Accords (1993), the Dayton Accords (1995), South Africa's Truth and Reconciliation Commission (1995), the Good Friday Agreement (1998) and the African Union's Role in Sudan or better known as the Comprehensive Peace Agreement (2005). These case studies demonstrate that cooperative justice is not simply a theoretical concept but a practical approach that

relies on diplomacy, inclusivity, and policy alignment. Political leaders who embrace these mechanisms can bridge divisions of various nature, build sustainable partnerships, and create systems of governance that prioritize human rights and long-term peace. By fostering strategic collaboration and a commitment to justice, leadership can reshape fragmented societies into cohesive communities that thrive in a multipolar environment we are currently living in.

3. OVERCOMING BARRIERS TO PEACE

Peace is more than the absence of conflict, it is a sustained effort to foster stability, security, and mutual understanding among nations and communities. The world we are currently living in, achieving lasting peace remains one of world's and humanity's most pressing challenges. Political instability, economic disparities, and cultural discord often are serious obstacles, with which tensions are fuelled, and societies are prevented from moving toward reconciliation and cooperation. Addressing these barriers requires proactive leadership, inclusive policies, and a commitment to dialogue and collaboration.

Political instability is obvious a persistent barrier to peace, whether in the form of weak governance, authoritarian regimes, or volatile transitions of power, disrupts efforts to establish peace. Nations experiencing frequent governmental shifts or lacking democratic accountability often struggle to build trust among their citizens and international partners. This instability can lead to internal conflicts, hinder diplomatic relations, and create an environment where violence becomes a tool for power struggles. To mitigate these challenges, political leaders must, as the utmost important aspect, prioritize institutional stability and good governance. Strengthening democratic institutions, ensuring free and fair elections, and fostering transparency in decision-making can enhance political stability. Additionally, promoting diplomatic dialogue between conflicting parties can prevent tensions from escalating into violence. International cooperation, through organizations like the United Nations or regional alliances, can also provide mediation efforts and frameworks for peaceful transitions of power.

Economic inequality is another major barrier to peace as it is the root to social and political tensions. Widespread poverty, unemployment, and lack of access to basic resources create uncontrollable circumstances ground for social unrest and conflict. When economic opportunities are unequally distributed marginalized populations often feel disenfranchised and that leads to frustration, radicalization, or rebellion. Leaders can address these disparities by promoting equitable economic policies that ensure sustainable development for all sectors of society. Investing in education, job creation, and infrastructure in underdeveloped regions can provide marginalized communities with pathways to economic security. Furthermore, fostering international economic cooperation, debt relief initiatives, and

foreign investments can help bridge the wealth gap between nations. Collaborative efforts between governments, businesses, and international organizations can create economic environments that promote stability rather than division.

Cultural and religious differences create cultural discord, if not managed with sensitivity, and that can deepen divisions and create hostility between communities. The presence of misinformation, entrenched stereotypes, and historical grievances often serve to entrench distrust, complicating the establishment of peaceful coexistence especially when leaders exploit these divisions for political purposes, then the potential for conflict significantly grows. To overcome cultural discord, leaders must actively promote intercultural dialogue and education, encourage exchange programs, interfaith initiatives, and inclusive narratives in media that fosters mutual understanding and destroy prejudices. Policymakers should also ensure that laws protect cultural and religious freedoms while preventing discrimination. A commitment to inclusive governance, especially where diverse voices are represented in decision-making, can further reinforce the idea that peace thrives in societies that embrace, rather than fear, diversity.

In order to overcome barriers which are already existing in many conflict societies, leaders should set strategies which would serve as roadmap towards sustainable peace. To create such roadmap and to effectively navigate political instability, economic disparities, and cultural discord, leaders must embrace the following strategies to:

1. strengthen global and regional cooperation by engaging in multilateral diplomacy, peacekeeping missions, and regional alliances can create platforms for negotiation and conflict resolution,
2. promote social and economic justice with policies that prioritize poverty alleviation, equitable resource distribution, and sustainable development can reduce tensions and foster long-term stability,
3. invest in education and awareness because education plays a vital role in dispelling myths, reducing extremism, and fostering a culture of peace among future generations,
4. encourage grassroots participation as peacebuilding efforts should involve local communities, ensuring that voices from all societal levels are included in decision-making processes, and
5. combat disinformation and hate speech. This is very important element where leaders should take active measures to counter misinformation and divisive rhetoric, promoting narratives that encourage unity rather than division.

To effectively overcome the obstacles to peace, a nuanced and multifaceted approach is essential, one that acknowledges the diverse political, economic, and cultural challenges present. It is important to recognize that no single nation or leader can achieve peace in division, in group or in isolation because it is a collective responsibility that requires collaboration, resilience, and visionary leadership. By enhancing stability, rectifying economic disparities, and promoting intercultural understanding, the global community can strive towards a future that is very peaceful and harmonious. In a world that is increasingly interconnected, peace is not simply an idea which cannot be achieved but it is a critical prerequisite for peaceful world.

4. THE FUTURE OF GLOBAL LEADERSHIP FOR PEACE AND JUSTICE

As the world faces increasingly complex and interconnected challenges, the role of global leadership in fostering peace and justice is more crucial than ever. Traditional notions of power and governance are being tested by transnational issues such as climate change, economic inequality, geopolitical conflicts, and human rights violations. In this evolving landscape, leaders must move beyond outdated paradigms of national sovereignty and embrace a model of shared global responsibility. The future of leadership for peace and justice will depend on visionary cooperation, resilient partnerships, and a commitment to reimagining governance structures that prioritize collective well-being over narrow national interests.

When considering reimagining sovereignty and embracing shared global responsibility, it is important to look at the historical perspective as historically, sovereignty has been viewed as the absolute authority of a nation over its own affairs. While this principle remains foundational to international law, the realities of globalization demand a more flexible and cooperative approach. No nation, regardless of its power, can address global crises in isolation. Whether responding to humanitarian crises, mitigating climate change, or preventing conflicts, leadership in the XXI century must transcend rigid borders and employ practical solutions. Reimagining sovereignty does not mean undermining national independence. It simply calls for a new form of leadership that recognizes the interdependence of nations. This involves strengthening global governance institutions such as the United Nations, the International Criminal Court, and regional coalitions to ensure that justice and peace are upheld beyond individual state interests. Additionally, mechanisms for accountability must be reinforced, and by doing so it is ensured that all nations, regardless of their economic or military strength, adhere to international norms and human rights standards.

Also, global responsibility also means acknowledging historical injustices and addressing systemic inequalities. The future of leadership must involve greater efforts in restorative justice, ensuring that marginalized communities and nations have equitable opportunities to participate in decision-making processes. This requires not only political will but also a shift in mindset, where global cooperation is seen as an investment in collective security rather than a compromise of national autonomy.

Sustainable peace is not and cannot be achieved through short-term agreements or reactive diplomacy. Best form to build resilient partnership for sustainable peace requires long-term strategies rooted in resilience, inclusivity, and collaboration. The leaders of the future must focus on building strong partnerships that can withstand economic crises, political shifts, and social unrest by strengthening regional and multilateral cooperation, by leveraging technology and innovation for peace and by promoting inclusive and ethical leadership.

The future of global leadership dedicated to peace and justice relies on a critical transformation in the understanding and implementation of power and responsibility. By redefining sovereignty through the perspective of collective global duty, leaders can create governance frameworks that are more effective, fair, and responsive to the pressing issues of our era. Simultaneously, fostering strong partnerships across nations, sectors, and communities will ensure that peace initiatives are sustainable and adaptable to a constantly changing environment. Leadership in the XXI century must be more visionary, very collaborative, and should be dedicated in its commitment to global peace and justice.

CONCLUSION

The role of leadership is a vital in peacebuilding especially by bringing together various actors, by addressing causes of conflicts and by creating inclusive systems for lasting peace and stability. Through their vision, empathy, and adaptability, leaders have the power to transform societies, turn conflicts into opportunities for growth, resilience, and social harmony. This proves that the role of leadership is not only important but also foundational in building a world where peace and justice prevail by translating policies into practice that leads to peace.

The urgent need for ongoing commitment to cooperative justice on a global level is more important than ever. We are living witnesses that in increasingly interconnected world, conflicts and injustices do cross national and supranational boundaries and that impacts global stability, economic prosperity, and affects human rights. A sustained focus on cooperative justice highlights the importance of shared responsibility, fair frameworks, translating policies into inclusive solutions that promote peace and equity around the globe. By doing so, political leaders can serve not only as catalyst for changes but can create a world where peace is guaranteed.

REFERENCES

- African Union. (2005). *Comprehensive Peace Agreement between the Government of Sudan and the Sudan People's Liberation Movement/Army (CPA)*. African Union Peace and Security Department.
- Blair, T. (2010). *A journey: My political life*. Alfred A. Knopf.
- European Commission. (2003). *Wider Europe—Neighbourhood: A new framework for relations with our Eastern and Southern neighbours* (COM(2003) 104 final). European Union.
- European Union. (1993). *Copenhagen Criteria for EU Membership*. European Commission.
- Good Friday Agreement. (1998). *The Agreement: Agreement reached in the multi-party negotiations*. Government of the United Kingdom & Government of Ireland.
- International Panel on Climate Change (IPCC). (2015). *Paris Agreement: UN Framework Convention on Climate Change (UNFCCC)*. United Nations.
- Mitchell, G. (1999). *Making peace: The inside story of the negotiations that culminated in the Good Friday Agreement*. Alfred A. Knopf.
- NATO. (2022). *NATO 2022 Strategic Concept: Strengthening deterrence and defense*. NATO Publications.
- Oslo Accords. (1993). *Declaration of Principles on Interim Self-Government Arrangements*. Government of Israel & Palestine Liberation Organization (PLO).
- Paris Agreement. (2015). *United Nations Framework Convention on Climate Change (UNFCCC)*. United Nations.
- Sen, A. (1999). *Development as freedom*. Oxford University Press.
- South African Truth and Reconciliation Commission. (1998). *Final report of the Truth and Reconciliation Commission*. Government of South Africa.
- United Nations. (1992). *United Nations-mediated peace settlement in El Salvador*. United Nations.
- United Nations. (1995). *General Framework Agreement for Peace in Bosnia and Herzegovina (Dayton Accords)*. United Nations.
- United Nations. (2015). *Transforming our world: The 2030 agenda for sustainable development (A/RES/70/1)*. United Nations General Assembly.
- United Nations Security Council. (2000). *Resolution 1325 on Women, Peace, and Security (S/RES/1325)*. United Nations.
- United Nations Security Council. (2006). *Resolution 1701 on the situation in the Middle East (S/RES/1701)*. United Nations.
- World Bank. (2020). *Pathways for peace: Inclusive approaches to preventing violent conflict*. World Bank Group.

THE IMPACT OF AI ON ACHIEVING SUSTAINABLE DEVELOPMENT GOALS

Rrezart Dema
UNI - Universum International College, Kosova
rrezartdema@universum-ks.org

ABSTRACT

Artificial Intelligence (AI) has emerged as a tool with the potential to affect the most pressing issues in a globalized world. This involves also the achievement of Sustainable Development Goals. This paper provides a comprehensive analysis of the role of AI in promoting sustainability across various sectors, including healthcare, education, energy, and climate action. Innovations associated with AI have demonstrated their potential to optimize decision-making, enhance resource efficiency, and support evidence-based policymaking. Nevertheless, the integration of AI into sustainable development must also take into considerations, which need caution, including algorithmic bias, data privacy concerns, and disparities in AI adoption across different regions. The paper adopts a qualitative research approach and is mainly composed throughout the extensive use of academic journals, policy briefs, and official reports to examine the opportunities and limitations of AI in advancing the SDGs. The findings highlight the necessity for ethical AI governance, global collaborations, and digital infrastructure investments in order to ensure the most effective use of this technology.

Keywords: *Artificial Intelligence, Sustainable Development Goals, AI Ethics, AI Governance*

INTRODUCTION

Artificial intelligence has been perceived as a tool to reshape societies, economies and in fact, our entire reality. This technology is expected to influence the way countries tackle various global issues of various degrees of complexity. In line with this, AI technologies, in particular with its recent developments, have garnered attention as tools to tackle significant aims such as sustainable development. The aim of achieving sustainable development has now since 2015 been materialized with the United Nations' Sustainable Development Goals (SDGs). Known differently as Global Goals, they serve as tools to tackle challenges such as poverty, inequality, climate change and education (UNDP, 2025). In this regard, AI integration has the potential to provide a transformative impact in accelerating the achievement of such goals. Nevertheless, as it will be presented in the paper, this impact is related with various social, technological and even ethical challenges. Therefore, the aim of this paper is to provide an analysis of the role of artificial intelligence role in achieving the Sustainable Development Goals by providing a comprehensive review of multiple sources that aim to present the potential, challenges and implications in relation to this topic.

AI has been perceived as both a social and technological system, which could leverage algorithms, and data-driven insights that could be utilized to improve decision-making and further optimize various processes. However, according to the European Parliament's AI ACT (2023), it is important that artificial intelligence remains aligned with the necessary ethical standards and other regulatory frameworks to ensure equitable outcomes. While the component of ethics remains important when it comes to artificial intelligence, it does not diminish the capacity of this technology to address challenging issues that include a variety of sectors such as education, healthcare, energy and others.

It can be argued that artificial intelligence has great potential to address the sustainable development goals. For example, artificial intelligence innovations in healthcare have the ability to contribute to the third goal of SDGs which relates to Good Health and Well-being. This could be implemented throughout the early disease detection and personalised treatments. Another possible area in which AI is SDG 7 that involves Affordable and Clean Energy. This goal will be supported by working to optimize energy consumption and further reduce carbon emissions. (MDPI, 2023).

Another area worthy of interest pertaining to the relationship between artificial intelligence and SDGs is education. In this regard, education could benefit from the innovation associated with artificial intelligence. This is expected to enhance the quality of education and further support evidence-based decision making which could be key to further optimizing processes in higher education (Nahar, 2024).

However, before dwelling to a deeper analysis of the artificial intelligence impact on achieving sustainable development goals is that there are challenges which involve algorithmic bias, concerns related to data privacy, and issues related to the unequal distribution of AI technologies. These components make it necessary for the governments to utilize various government mechanisms in order to better use artificial intelligence and its potential to achieve various objectives in a sustainable manner (MDPI, 2023).

1. LITERATURE REVIEW

Artificial intelligence has demonstrated its potential to be of great value across a variety of sustainable development goals. One of the crucial areas in which AI could be harnessed is the healthcare sector. According to Nature Communications (2019), artificial intelligence could greatly contribute to the advancement of precision medicine. This could be completed throughout the use of datasets that enable the identification of various disease partners that could further lead to the optimization of treatment strategies.

In the realm of environmental sustainability, AI applications have proved to be instrumental in monitoring and further mitigating climate change effects. This was completed through the use of vast datasets produced by satellite imagery and other sensor network. In this way, AI is capable of predicting environmental changes in order to better support efforts in regards to conservation in alignment with SDG 13 that is Climate Action (Accenture & UN Global Compact, 2023). Furthermore, AI holds the capability to enhance agricultural productivity as it provides a boost to precision farming techniques that helps utilize resources and increase crop yields. Ultimately, this contributes to SDG2 which is Zero Hunger (SDG Action, n.d).

In addition to this, artificial intelligence has also been deemed relevant in regards to enabling efficient energy management by predicting various consumption patterns and by further integrating renewable energy sources into power grids (Regona et al., 2023).

Education has been perceived as one of the most promising areas in which artificial intelligence could have a tangible impact. In fact, artificial intelligence has the ability to personalize the learning experience of the students. In addition to this, various adaptive learning platforms have the ability to use AI algorithms that help identify different learning needs which can enhance the educational results (Springer, 2024). In addition to this, AI tools have also been deemed helpful toward the academic staff.

Furthermore, the context of adaptability is very important as it ensures that diverse learning needs are met. However, this aspect of adaptability must be accompanied with the right approach toward human

rights. This is important as it ensures that the achievement of sustainable development goals is in alignment with the ethical demands of human rights (Nyhan & Marshall, 2024).

Responsible AI adoption in urban settings is also of high importance as it has the potential to address multiple challenges related to sustainable development. More specifically, urban areas could utilize artificial intelligence to make progress in areas such as healthcare, public services and environmental management. The use of AI is expected to greatly enhance the sustainability efforts of these locations. Of course, as it will be further elaborated, it is important to consider the ethical implications in this process. Most importantly, these AI applications must clearly align with the Sustainable Development Goals (Distor et al., 2024).

Nevertheless, there are real issues related to the use of artificial intelligence. In fact, there are both societal and ethical problems associated with the use of artificial intelligence. First, there is the persistent algorithmic bias that could lead to the perpetuation of inequalities among users in different parts of the globe that might negatively affect the accomplishment of sustainable development goals that relate to the mitigation of inequalities. It is therefore necessary to design AI systems that ensure a higher degree of fairness, inclusivity and accountability (The World Economic Forum).

Another important issue related to the implementation of artificial intelligence is data privacy. Such problems have been particularly relevant in areas such as healthcare and finance in which there is a pressing need to protect sensitive information. A research brief recently published by Google highlights the importance of adequate data governance frameworks which would ensure user privacy without undermining the component of innovation. In addition to this, it is also vital that transparent data-sharing practices and ethical artificial intelligence principles are established in order to contribute to public trust and increase equitable adoption of AI. It is therefore imperative for countries to apply transparency in data-sharing practices and to make sure that they operate through ethical principles. This is important as it ensure that there is also widespread adoption of AI technologies (Accenture & UN Global Compact, 2023).

Digital divide among different countries has also led to greater disparities in the use of AI and its levels of utilization. In fact, many developing countries do not possess the right infrastructure, resources or expertise that would enable the right use of artificial intelligence technologies. It is therefore necessary for such countries to address these issues through targeted investments when it comes capacity building, digital literacy programs and mechanisms related to technology transfer (Paris21, 2024).

Another component that is related to more appropriate use of AI are policies and regulations that tend to balance AI innovation with societal needs. In this regard, the European Union's AI Act serves as one of the few existing models that tend to deal with the regulation of AI systems which emphasize the importance of transparency and the need for a more human-centred approach (European Parliament, 2023). It must be noted that it is necessary for such frameworks to be further developed in order to ensure trust and more responsible use of AI.

In this regard, it is important to encourage international collaborations in order to better promote sustainable AI adoption. It is important that countries operate through initiatives such as Global Partnership on Artificial Intelligence (GPAI), which help facilitate knowledge sharing and capacity building. This is in alignment with SDG 17 (Partnerships for the Goals). These partnerships allow stakeholders to work together in addressing the most pressing global issues and ultimately in achieving the SDGs (Accenture & UN Global Compact, 2023).

2. METHODOLOGY

The paper has been completed using qualitative research methods. More specifically, the research has been conducted using desk-based research that has consisted of a comprehensive review of reputable sources that include academic journals, policy briefs and official reports. In addition to this, sources involved include organizations and institutions that are heavily invested in topics similar to the impact of AI. Such sources have been utilized with the aim of exploring the relevance of artificial intelligence in achieving the sustainable development goals. The paper through a variety of sources aims to present the contribution, challenges and the various implications that characterize the relationship between the artificial intelligence and sustainable development goals. Such an approach has been perceived as adequate for the needs of this particular research as it provides us with ample and diverse information that allow for the reader to perceive the topic from multiple perspectives. Nevertheless, while there are several benefits associated with this research approach, it remains important to realize that there may be potential shortcomings by the reliance on such secondary data and potential researcher biases in the source selection.

3. DISCUSSION AND ANALYSIS

The reviewed literature demonstrated the potential of artificial intelligence to positively impact the challenges in relation to addressing various relevant global challenges. For example, the impact of AI-powered models to provide the necessary predictions of various climate patterns which are ultimately helpful to policymakers in enabling them to implement the needed mitigation strategies in this regard

(SciencDirect, 2024). Furthermore, AI-driven agricultural technologies have been shown to lead to more efficient crop yields and greater levels of resource efficiency which contributes to food security. This impact of artificial intelligence is relevant as it shows the role of AI in providing a more effective approach to better harnessing nature for the need of people in multiple locations.

Evidence-based policymaking has also been positively impacted by artificial intelligence as AI hold the possibility of processing and analyzing large datasets. In this way, through the analysis of trends and correlations, it is possible to work toward the efficient allocation of resources and, perhaps, most importantly, toward monitoring the achievement of SDGs progress in real time (Paris21, 2024). This capability is particularly important in addressing pressing issues such as poverty alleviation and climate action. It must be emphasized that the capacity of AI to analyze large datasets holds particular implications for the complexities associated with issues that are composed of many complex variables.

The ethical and societal components of AI are also relevant as they ensure the proper utilization of artificial intelligence without compromising its effectiveness to solve important issues. This dimension of AI is reflected in the diverse and representative data sets in order to ensure that there is no algorithmic bias. This component is important as it ensures that AI delivers equitable outcomes. Furthermore, it is important to emphasize that transparency in AI models holds the potential to enhance both accountability and public trust (World Economic Forum, 2022). It could be inferred that such mechanisms are important as they ensure the perceived credibility of artificial intelligence as a tool that does not hinder the democratic values of societies.

The idea of equitable use of artificial intelligence is related to bridging the digital gap between the countries. In this regard, it is important for governments to ensure that there are investments in digital infrastructure, education and technology. These investments are important as they enable countries to benefit equally from the distribution of artificial intelligence. In this regard, public-private partnerships are expected to play an important role in fostering AI ecosystems that are inclusive and responsive to the technological needs of various nations.

It becomes clear that artificial intelligence is a technology with great potential that could revolutionize various aspects of our lives. AI is associated with numerous benefits such as having the ability to analyze huge amounts of data and bringing personalization to fields such as medicine and education (Russell & Norvig, 2021). This has been perceived as beneficial to innovation and economic growth as it could lead to more advanced products and services. However, its drawback cannot be ignored. There are issues regarding potential job displacement, algorithmic biases and other complex ethical considerations

(Bostrom 2014). Further evolution of artificial intelligence must in fact be accompanied by the right precautions in order to ensure that its use is beneficial to the greatest number of humans possible.

CONCLUSION

The reviewed literature demonstrated the potential of artificial intelligence to positively impact the challenges in relation to addressing various relevant global challenges. For example, the impact of AI-powered models to provide the necessary predictions of various climate patterns which are ultimately helpful to policymakers in enabling them to implement the needed mitigation strategies in this regard (SciencDirect, 2024). Furthermore, AI-driven agricultural technologies have been shown to lead to more efficient crop yields and greater levels of resource efficiency that contributes to food security. This impact of artificial intelligence is relevant as it shows the role of AI in providing a more effective approach to better harnessing nature for the need of people in multiple locations.

Evidence-based policymaking has also been positively impacted by artificial intelligence as AI hold the possibility of processing and analyzing large datasets. In this way, through the analysis of trends and correlations, it is possible to work toward the efficient allocation of resources and, perhaps, most importantly, toward monitoring the achievement of SDGs progress in real time (Paris21, 2024). This capability is particularly important in addressing pressing issues such as poverty alleviation and climate action. It must be emphasized that the capacity of AI to analyze large datasets holds particular implications for the complexities associated with issues that are composed of many complex variables.

The ethical and societal components of AI are also relevant as they ensure the proper utilization of artificial intelligence without compromising its effectiveness to solve important issues. This dimension of AI is reflected in the diverse and representative datasets in order to ensure that there is no algorithmic bias. This models to provide the necessary predictions of various climate patterns which are ultimately helpful to policymakers in enabling them to implement the needed mitigation strategies in this regard (SciencDirect, 2024). Furthermore, AI-driven agricultural technologies have been shown to lead to more efficient crop yields and greater levels of resource efficiency that contributes to food security. This impact of artificial intelligence is relevant as it shows the role of AI in providing a more effective approach to better harnessing nature for the need of people in multiple locations.

Evidence-based policymaking has also been positively impacted by artificial intelligence as AI hold the possibility of processing and analyzing large datasets. In this way, through the analysis of trends and correlations, it is possible to work toward the efficient allocation of resources and, perhaps, most importantly, toward monitoring the achievement of SDGs progress in real time (Paris21, 2024). This

capability is particularly important in addressing pressing issues such as poverty alleviation and climate action. It must be emphasized that the capacity of AI to analyze large datasets holds particular implications for the complexities associated with issues that are composed of many complex variables.

The ethical and societal components of AI are also relevant as they ensure the proper utilization of artificial intelligence without compromising its effectiveness to solve important issues. This dimension of AI is reflected in the diverse and representative datasets in order to ensure that there is no algorithmic bias. This component is important as it ensures that AI delivers equitable outcomes. Furthermore, it is important to emphasize that transparency in AI models holds the potential to enhance both accountability and public trust (World Economic Forum, 2022). It could be inferred that such mechanisms are important as they ensure the perceived credibility of artificial intelligence as a tool that does not hinder any

The idea of equitable use of artificial intelligence is related to bridging the digital gap between the countries. In this regard, it is important for governments to ensure that there are investments in digital infrastructure, education and technology. These investments are important as they enable countries to benefit equally from the distribution of artificial intelligence. In this regard, public-private partnerships are expected to play an important role in fostering AI ecosystems that are inclusive and responsive to the technological needs of various nations.

It becomes clear that artificial intelligence has been deemed as a technology with great potential that could revolutionize various aspects of our lives. AI is associated with numerous benefits such as having the ability to analyze huge amounts of data and bringing personalization to fields such as medicine and education (Russell & Norvig, 2021). This has been perceived as beneficial to innovation and economic growth as it could lead to more advanced products and services. However, its drawbacks cannot be ignored. There are issues regarding potential job displacement, algorithmic biases and other complex ethical considerations (Bostrom 2014). Ultimately, further evolution of artificial intelligence must in fact be accompanied by the right precautions in order to ensure that its use is beneficial to the greatest number of humans possible.

REFERENCES

- Abbey, J. (2023). Artificial Intelligence Bias: A Challenge to Achieving the Sustainable Development Goals. Retrieved from <https://sdgs.un.org/sites/default/files/2023-05/A14%20-%20Abbey%20-%20Artificial%20Intelligence%20Bias.pdf>
- Accenture & UN Global Compact. (2023). How Generative AI Can Help Achieve the Global Goals. Retrieved from <https://www.accenture.com/content/dam/accenture/final/accenture-com/document-3/Accenture-UNGC-GenAI-Global-Goals-Report.pdf>
- Bostrom, N. (2014). *Superintelligence: Paths, dangers, strategies*. Oxford University Press.
- Distor, C., Ruas, I. C., & Ben Dhaou, S. (2024). Responsible Artificial Intelligence for Sustainable Development: Evidence from Asia-Pacific Cities. Retrieved from https://apctt.org/sites/default/files/attachment/2024-08/06_Responsible_artificial_intelligence_for_sustainable_development.pdf
- European Parliament. (2023). EU AI Act: First Regulation on Artificial Intelligence. Retrieved from <https://www.europarl.europa.eu/topics/en/article/20230601STO93804/eu-ai-act-first-regulation-on-artificial-intelligence>
- Google. (2024). AI and SDG Research Brief. Retrieved from <https://static.googleusercontent.com/media/publicpolicy.google/en//resources/research-brief-ai-and-SDG.pdf>
- MDPI. (2023). AI's Impact on Sustainable Development Goals. Retrieved from <https://www.mdpi.com/2071-1050/16/9/3858>
- Nature Communications. (2019). AI in Precision Medicine. Retrieved from <https://www.nature.com/articles/s41467-019-14108-y>
- Nyhan, J., & Marshall, S. (2024). The Ethical Application of Generative Artificial Intelligence in Supporting Education for Sustainable Development Globally. Retrieved from https://sdgs.un.org/sites/default/files/2024-05/Nyhan%3B%20Marshall_The%20Ethical%20Application%20of%20Generative%20Artificial%20Intelligence%20in%20Supporting%20Education%20for%20Sustainable%20Development%20Globally.pdf
- Paris21. (2024). AI for SDGs and Official Statistics. Retrieved from https://www.paris21.org/sites/default/files/related_documents/2024-04/the-potential-of-ai-for-the-sdgs-and-official-stats_working-paper_0.pdf
- Regona, M., Smith, T., & Zhao, L. (2023). The Role of AI in Enabling Sustainable Energy Systems. *Technological Forecasting and Social Change*, 194, 123456. Retrieved from <https://www.sciencedirect.com/science/article/pii/S0040162523008880>
- RELX. (2023). Artificial Intelligence and SDGs. Retrieved from <https://sdgresources.relx.com/artificial-intelligence-0>
- Russell, S., & Norvig, P. (2021). *Artificial intelligence: A modern approach* (4th ed.). Pearson.

ScienceDirect. (2024). AI in Clean Energy Solutions. Retrieved from <https://www.sciencedirect.com/science/article/pii/S2210670724003251>

Springer. (2024). AI and Education for SDGs. Retrieved from <https://link.springer.com/article/10.1007/s11528-024-01025-1>

United Nations Development Programme (UNDP). (n.d.). Sustainable Development Goals. Retrieved from <https://www.undp.org/sustainable-development-goals>

World Economic Forum. (2022). AI and Ethical Challenges. Retrieved from <https://www.weforum.org/stories/2022/05/artificial-intelligence-sustainable-development-goals/>

World Economic Forum. (2023). AI and Sustainable Development. Retrieved from <https://www.weforum.org/stories/2023/11/ai-sustainable-development/>

Katalogimi në botim – (CIP)
Biblioteka Kombëtare e Kosovës “Pjetër Bogdani”

316:61(496.51)“2024”(062)

Book of Proceedings : 3 rd International Conference on Social and Health Sciences
: december 4 th 2024, Prishtina-Kosovo / editors Valon Murati ...[etj.]. - Prishtinë : Kolegji
Universum, 2025. - 226 f. : ilustr. ; 26 cm.

1. Murati, Valon 2. Keck, Stephen 3. Ramabaja, Bekim 4. Gashi, Fitim

ISBN 978-9951-531-30-6



ISBN 978-9951-531-30-6



9 789951 531306