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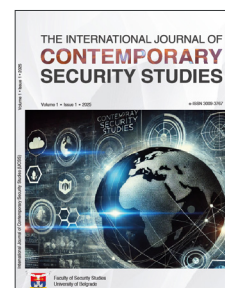
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Article

A Holistic Approach to Multidimensional Aspects of School Safety

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ABSTRACT

School safety is a complex and multidimensional concept that includes physical, social, and psychological aspects of the school environment. The aim of this paper is to investigate how different dimensions of safety affect students' and teachers' perceptions of safety and to evaluate the importance of an integrated approach to improving the school climate. The analysis of relevant literature and evaluation studies shows that physical-technical factors (such as architectural solutions and surveillance systems) significantly contribute to the objective sense of protection, while social-psychological factors - the quality of interpersonal relationships, the sense of belonging, and teacher support - have the most significant impact on the subjective sense of security. The organizational aspect, based on the school's cooperation with parents, the local community, and institutions, proves crucial to building a long-term culture of safety and the school's resilience to risks. The results indicate that an integrated, holistic approach, which combines physical protection measures with the prevention of violence and the development of a supportive climate, contributes most to perceptions of safety and the overall quality of the educational process. Applied multidimensional analysis provides guidelines for the development of school safety policies by linking legal, organizational, and psychological factors.

KEYWORDS

Dimensions of school safety; physical-technical and social-psychological factors; integrated approach to safety; quality of school climate; prevention of school violence.

1. Introduction

Safety in schools is a complex, multidimensional concept encompassing physical, social, psychological, and organizational aspects of the school environment. In the scientific and professional literature, there are two basic approaches to defining school safety: the narrower one, which emphasizes the absence of violence and the preservation of the physical and psychological integrity of students and teachers, and the broader one, which sees safety as a dynamic process that includes a favorable school climate, the quality of relationships, student participation in the community, and support for their personal and academic development (Cornell & Huang, 2016). Based on this understanding, modern research indicates that a safe school is not only an institution without incidents but also an environment that fosters a sense of belonging, trust, and mutual respect (Cvetković, 2015; Cvetković et al., 2024; Jankovic et al., 2023). Achieving that goal requires an integrated approach that combines physical protection measures (technical equipment, architectural solutions, and emergency response procedures), social-psychological factors, and organizational measures.



This paper aims to analyze the multidimensional aspects of school safety and to highlight the importance of a holistic approach that integrates physical, psychological, and organizational components into a unified model. The paper seeks to identify which factors most influence students' and teachers' perceptions of safety, as well as how cooperation among school, family, and community contributes to building a culture of safety (Sprague & Walker, 2021).

The research question is: how does an integrated approach to school safety improve the sense of safety and well-being in the school environment?

The research hypothesis is based on the assumption that an integrated model of school safety, which combines physical, psychological, and organizational measures, contributes to greater well-being, a better school climate, and a higher level of students' academic success.

The structure of the paper follows this setting: In the first part, the methodological foundations and research approach are presented. In the second part, theoretical models and conceptual demarcations of school safety are analyzed (Bear, 2020).

The third part is devoted to multidimensional approaches and factors influencing the school climate. At the end, there is a conclusion and recommendations for improving school safety practices. A holistic approach to school safety, which combines physical, psychological, and organizational measures, creates an environment in which students and teachers are not only protected but also actively involved in building a culture of trust, cooperation, and shared responsibility.

2. Integrated Approach to Safety in the School Environment: Formal and Subjective Aspects

The issue of school security is a fundamental condition for fulfilling its educational functions. The most common definition of school security, a complex phenomenon, refers to the condition in which the school is safeguarded against all security threats, meaning there is no danger to students' lives and health or the integrity of school property (Metić, 2025). Educational institutions are legally obligated to conduct a risk assessment of disasters and develop a protection and rescue plan for all facilities where education takes place (Cvetković, Nikolić & Lukić, 2024). Formal or objective aspects of school security refer to institutional mechanisms, regulations, and measures that ensure the physical protection of students and employees. This level of security is based on laws, regulations, and procedures that regulate the functioning of the school system, as well as on technical and organizational solutions that prevent risky situations (Klinger, Klinger, 2018). In practice, formal security entails the application of risk assessments, behavioral protocols for emergencies, evacuation plans, and physical-technical protection systems, such as video surveillance and access control (Tadić, 2022; Dada et al., 2025; Janković et al., 2025; Popović Mančević, 2025; Vidović & Beriša, 2025). An example of good practice is the introduction of a school safety protocol in cooperation with the local police and fire department. That measure, which includes regular evacuation drills and employee training, resulted not only in better organizational preparedness but also in increased trust among students and parents (Sulkowski & Lazarus, 2017). In this way, formal rules and procedures serve as the foundation of a safety culture, but by themselves they are not sufficient to create a complete sense of safety in the school. Subjective aspects of school safety refer to individuals' personal experiences of safety and trust within the school community. This includes how students, teachers, and parents perceive the school environment, their relationships with each other and the level of support they receive (Calabrese, 2018).

While the formal aspects provide structure and procedures, the subjective aspects build confidence, motivation, and a sense of inner stability. It is their connection that forms the essence of an integrated approach — only a school with balanced institutional mechanisms and a favorable social climate can be permanently safe and stimulating for all actors of the educational process.

2.1. School Safety: Conceptual Distinctions and Multidimensional Approaches

The concept of school safety in the literature is most often considered through two basic approaches - narrower (minimalist) and broader (holistic). Both approaches start from the common assumption that the school must provide conditions in which students, teachers, and other employees can function without physical and psychological threats. However, they differ in the depth and breadth of the observation of that term (Bo, 2021). In a narrower, minimalist approach, school safety is defined as the absence of violence, threats, and undesirable behaviors that disrupt the educational process. According to this understanding, a school is safe when the physical and psychological well-being of students and teachers is protected, and all actors can fulfill their roles unhindered in an atmosphere of respect and safety (Duke, 2022; Đurić, 2008). This approach emphasizes formal and preventive measures, such as behavioral control, supervision, disciplinary rules, and physical-technical protection. In contrast, a broader, holistic approach views school safety as a dynamic process that encompasses not only the absence of risk but also the development of a favorable school climate and a sense of belonging and mutual support within the school community. In this model, safety is integrated with educational quality, student well-being, and collaboration between school, family, and community (Mayer & Cornell, 2017; Bucher & Manning, 2015). Although these two approaches seem contradictory at first glance, modern research shows that the most effective model is the one that integrates them, i.e., combines objective protection mechanisms with a subjective sense of security and trust within the school. It is this synthesis that forms the basis of the multidimensional approach, which, in this paper, represents the theoretical basis for the analysis of school safety.

Table 1. Comparison of narrow and broad approaches to school safety

Criterion	Narrower (minimalist) approach	Broader (holistic) approach
Basic understanding	Safety = absence of violence and risk.	Safety = favorable school climate and student well-being.
Basic understanding	Duke (2022), Đurić (2008), Squelch (2014).	Mayer & Cornell (2017), Bucher & Manning (2015).
The main goal	Physical protection and incident prevention.	Development of a sense of belonging, trust, and psychological security.
Dimensions	Formal measures, discipline, supervision, risk control	Social-psychological relations, cooperation, and student involvement.
Typical questions	Is the school free of violence?	Do students feel accepted and supported?
Limitations	Ignores internal emotional and social factors.	Difficult to measure indicators and to assess subjectively.
An example from practice	Introduction of video surveillance and access control.	Programs for building school climate and student mentoring.

By summarizing the various definitions in this form, the enumeration of sources is avoided, while their essential contribution is preserved. The table visually shows the differences and indicates that the modern approach tends to integrate narrow and wide models, which aligns fully with your work and the professor's expectations.

3. Multidimensional Approaches to School Safety

The concept of school safety can be most fully understood through a multidimensional approach, which integrates different models - risk management, violence prevention, and shaping a favorable school climate. These approaches complement each other: the first emphasizes institutional mechanisms to prevent risky situations, the second focuses on psychological and social factors that influence student behavior, and the third emphasizes the importance of the school environment as a community that fosters a sense of security and belonging. Contemporary research (Đurić, 2008; Juvonen et al., 2020; Aleem & Moles, 2023) indicates that their integration yields the most significant preventive and educational effects.

The physical-technical dimension includes all measures that contribute to the structural protection of the school space and the reduction of opportunities for risky situations. These include architectural solutions, security systems, evacuation plans, and regular training for employees and students (DeWitt, Slade, 2014). Analysis of risk management shows that measures combining technical and organizational elements, such as clearly marked exit routes, video surveillance systems in common areas, and regular security exercises, had the most significant preventive effect. In addition to infrastructure, the physical environment also has a psychological function: well-lit, orderly spaces reduce anxiety and foster a sense of control. Therefore, the assessment of physical and technical safety must include not only the functionality of the equipment but also the way the space is perceived as predictable, organized, and conducive to learning (Henrich et al., 2016). Methodologically, this dimension can be measured using indicators of infrastructural security (degree of surveillance coverage, existence of security plans, frequency of training) as well as perceptual indicators (subjective feeling of protection for students and teachers).

The social-psychological aspect of safety refers to the quality of interpersonal relationships, the sense of belonging, and the level of emotional support within the school. Research shows a clear correlation between positive relationships and perceived safety (Buhs, Ladd & Herald, 2016). In schools where teachers show empathy and consistently enforce rules, students are less likely to report feeling fearful and more likely to participate in activities.

Risk factors in this dimension include emotional isolation, peer violence, and lack of communication. Early signs of risk – such as social withdrawal, aggressive behavior, or declining academic performance – can be identified and addressed in time by introducing mentoring, peer support, and counseling programs. According to Hawkins, Lishner, and Catalano (2021), early recognition of social and emotional deficits has the most potent preventive effect. Measurement of this dimension can be done through survey instruments that assess trust, communication, and sense of belonging, as well as through qualitative methods (focus groups, interviews) that provide deeper insights into the school climate experience.

The third component is the school's cooperation with parents, local institutions, and social organizations. It provides social support and long-term resilience of the school to risks. Quality cooperation with parents increases trust, while partnership with the police, social work centers, and health institutions enables a faster response in crises (Cvetković et al., 2024). Best practice examples show that inter-institutional agreements and joint prevention programs (e.g., non-violent communication training or training of school patrols) have led to a significant reduction in the number of incidents and a strengthening of the sense of collective security. That cooperation contributes to the development of a "safety culture" that extends beyond the school and encompasses the entire community (Đurić, 2008; Calabrese, 2018). Methodologically, this dimension can be analyzed through indicators of connection and engagement (number of partnerships, joint activities, degree of parental involvement) and outcome indicators (level of trust, number of reported risks, success of interventions).

A multidimensional approach to school safety has twofold research value:

- (1) enables the identification of priorities in interventions - which measures have the most significant effect in specific contexts;
- (2) provides a basis for the development of measurement instruments that can quantify the level of physical, social, and organizational security (Lazarus, Sulkowski, 2024).

The operationalization of these dimensions requires the application of combined methods: quantitative (surveys, risk indices) and qualitative (interviews, case studies). In this way, security is seen as a dynamic system that can be measured, analyzed, and improved.

4. Conclusion

A comprehensive analysis of different theoretical approaches and practical models of school safety showed that this phenomenon requires an integrated, holistic approach, in which physical-technical, social-psychological, and organizational aspects are viewed as interconnected elements of a single system. From a theoretical point of view, the work contributed to the synthesis of existing security concepts, showing that a safe school is more than an institution without violence; it is a space where physical protection, a favorable school climate, and supportive relationships that build a sense of belonging and trust come together. Such integration enables a deeper understanding of security as a dynamic category, the essence of which lies in the balance between formal protection measures and the subjective feeling of security. From a practical perspective, the results of the work indicate that effective management of school security is achieved by applying preventive and developmental strategies that combine physical measures (architecture, surveillance, evacuation plans), psychological support (counseling centers, mentoring, interpersonal communication), and partnerships with parents and local institutions. The application of these principles in school practice contributes to a greater sense of security, a better school climate, and encourages the academic success of students. At the same time, the work emphasizes that safety is the collective responsibility of all actors of the school community and that it can only be maintained through continuous education, cooperation, and adaptation to new social and technological challenges.

In terms of future research, the paper indicates the need for empirical validation of the proposed multidimensional model of school safety. Future research could aim to operationalize indicators for each dimension – physical, psychological, and organizational – and analyze the correlation between perceived safety and educational outcomes. In addition, an in-depth study of the impact of digital technologies on student safety is recommended, as is the development of innovative forms of cooperation among schools, parents, and the local community. Synthesizing theory and practice, this paper confirms that a safe school is not only an institutional goal but also a social value that unites the knowledge, trust, and responsibility of all actors in the educational process.

5. References

1. Aleem, D., & Moles, O. (2023). *Review of research on ways to attain goal six: Creating safe, disciplined, and drug-free schools*. Washington, DC: Office of Educational Research and Improvement.
2. Bear, G. G. (2020). *Improving School Climate: Practical Strategies to Reduce Behavior Problems and Promote Social and Emotional Learning*. New York: Routledge.
3. Bo, N. (2021). *School climate matters: Shanghai schools from a comparative perspective*. London: Routledge.
4. Bucher, K. T., & Manning, M. L. (2015). Creating safe schools. *The Clearing House: A Journal of Educational Strategies, Issues, and Ideas*, 79(1), 55-60.
5. Buhs, E. S., Ladd, G. W., & Herald, S. L. (2016). Peer exclusion and victimization: Processes that mediate the relation between peer group rejection and children's classroom engagement and achievement. *Journal of Educational Psychology*, 98(1), 1-13.
6. Calabrese, R. L. (2018). *Leadership for safe schools: A community-based approach*. London: Scarecrow Press.
7. Cornell, D. G., Huang, F. (2016). Authoritative school climate and high school student risk behavior: A cross-sectional multi-level analysis of student self-reports. *Journal of Youth and Adolescence*, 45(11), 2246–2259.
8. Cvetković, V. (2015). Faktori uticaja na znanje i percepciju učenika srednjih škola u Beogradu o klizištima kao prirodnim katastrofama [Factors influencing the knowledge and perception of secondary school students in Belgrade about landslides as natural disasters]. *Bezbednost*, 1, 32–51.
9. Cvetković, V. M., Nikolić, N., & Lukić, T. (2024). Exploring students' and teachers' insights on school-based disaster risk reduction and safety: A case study of Western Morava Basin, Serbia. *Safety*, 10(2), 50. <https://www.mdpi.com/2313-576X/10/2/50>.

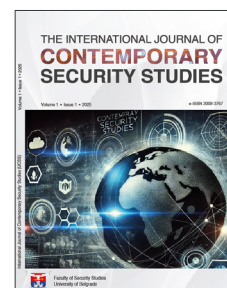
10. Cvetković, V. M., Nikolić, N., & Lukić, T. (2024). Exploring Students' and Teachers' Insights on School-Based Disaster Risk Reduction and Safety: A Case Study of Western Morava Basin, Serbia. *Safety*, 10(2), 50.
11. Cvetković, V. M., Tanasić, J., Renner, R., Rokvić, V., & Beriša, H. (2024). Comprehensive risk analysis of emergency medical response systems in Serbian healthcare: Assessing systemic vulnerabilities in disaster preparedness and response. *Healthcare*, 12(19), 196. <https://www.mdpi.com/2227-9032/12/19/1962>.
12. Dada, K. S. J., Mohammed, H. A., & Quadir, R. O. (2025). Disaster risk management in academic institutions: An assessment of preparedness and recovery at Kashim Ibrahim Library, Nigeria. *International Journal of Contemporary Security Studies*, 1(1), 1–15.
13. DeWitt, P., Slade, S. (2014). *School climate change: How do I foster a positive learning environment?* Alexandria: ASCD.
14. Duke, D. L. (2022). *Creating safe schools for all children*. Boston: Allyn & Bacon.
15. Đurić, S. (2008). *Strategije za identifikovanje parametara bezbednosnih rizika u školama*. Beograd: Fakultet za specijalnu edukaciju i rehabilitaciju.
16. Hawkins, J. D., Lishner, D. M., & Catalano, R. F. (2021). Childhood predictors and the prevention of adolescent substance abuse. *Etiology of Drug Abuse: Implications for Prevention*, 20(4), 75-125.
17. Henrich, C. C., Schwab-Stone, M., Fanti, K., Jones, S. M., & Ruchkin, V. (2016). The association of community violence exposure with middle school achievement: A prospective study. *Journal of Applied Developmental Psychology*, 25(3), 327–348.
18. Jankovic, B. ., Cvetkovic, V. M. ., Ivanovic, Z., Ivanov, A., Jovanovic, S. ., & Otasevic, B. (2023). Sustainable development of trust and police presence in schools: implications for school safety policy. *Journal of Liberty and International Affairs*, 9(3), 22-52.
19. Janković, L., Cvetković, V. M., Gačić, J., Renner, R., & Jakovljević, V. (2025). Integrating psychosocial support into emergency and disaster management and public safety: The role of the Red Cross of Serbia. *International Journal of Contemporary Security Studies*, 1(1), 99–124.
20. Juvonen, J., Nishina, A., & Graham, S. (2020). Peer harassment, psychological adjustment, and school functioning in early adolescence. *Journal of Educational Psychology*, 92(2), 349-359.
21. Kitsantas, A., Ware, H. W., & Martinez-Arias, R. (2022). Students' perceptions of school safety: Effects of community, school environment, and substance use variables. *The Journal of Early Adolescence*, 24(4), 412-430.
22. Klinger, A., Klinger, A. (2018). *Keeping Students Safe Every Day: How to Prepare for and Respond to School Violence, Natural Disasters, and Other Hazards*. Alexandria: ASCD.
23. Lazarus, P. J., Sulkowski, M. L. (2024). *Leadership for safe schools: The three-pillar approach to supporting students' mental health*. New York: Taylor & Francis.
24. Mayer, M. J., & Cornell, D. G. (2017). New perspectives on school safety and violence prevention. *Educational Researcher*, 39(1), 5-6.
25. Metić, A. (2025). The Significance and Role of Police Officers in Building the School as a Safe Environment for All Students. *International Journal of Contemporary Security Studies*, Vol. 1, No. 1, 17-24. https://doi.org/10.18485/fb_ijcss.2025.1.1.2
26. Popović Mančević, M. (2025). Non-Traditional Roles of Military Actors: NATO's Engagement in Natural Disaster Response. *International Journal of Contemporary Security Studies*, 1(1), 75–84.
27. Preble, W. K., Gordon, R. M. (2016). *Transforming school climate and learning: Beyond bullying and compliance — creating safe schools from the inside out*. California: Corwin.
28. Sprague, J. R., & Walker, H. M. (2021). *Safe and Healthy Schools: Practical Prevention Strategies (2nd ed.)*. New York: Guilford Press.
29. Spring, J. (2015). *The politics of American education*. New York: Routledge.

30. Sulkowski, M. L., Lazarus, P. J. (2017). *Creating safe and supportive schools and fostering students' mental health*. New York: Routledge.
31. Tadić, V. (2022). O pristupima definisanju i operacionalizaciji pojma bezbednosti u školi. *Nastava i vaspitanje*, 71(2), 249-266.
32. Vidović, N., & Beriša, H. (2025). Economic aspects of cyber security: Socio-financial consequences of cyber attacks. *International Journal of Contemporary Security Studies*, 1(1), 149–162.





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Review article

A Nuclear Policy Framework: Identifying Challenges and Ways to Solutions

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ABSTRACT

This article explores the possibility of restructuring current nuclear policy frameworks to address the evolving landscape of global politics and the challenges posed by nuclear proliferation. Currently, many nuclear treaties and arrangements are weakening due to inherent structural flaws. Disarmament efforts between major nuclear powers have been stalled, non-proliferation efforts have failed, and most Nuclear-Weapon Free Zones lack universal recognition, particularly from the United States. Meanwhile, central nuclear states are investing heavily in their nuclear modernization programmes. Despite this turbulent environment, policymakers and the public often appear relaxed, assuming that the non-use of nuclear weapons since 1945 guarantees their continued role as a deterrent rather than a weapon of war. While many perceptions regarding non-use of nuclear weapons seem logical, it is imprudent to ignore the current realities. Scholars like Herman Kahn have predicted a significant possibility of limited nuclear warfare in the future, and his arguments align closely with the current global nuclear scenario. This paper examines contemporary nuclear problems- such as its growing popularity and availability, and the policies and frameworks that have indirectly contributed to non-proliferation and disarmament. Finally, it also presents several solutions to address contemporary nuclear challenges, directly or indirectly. These include bringing unrecognised nuclear-armed states (for example, India and Israel) under the ambit of the Non-Proliferation Treaty, restructuring Nuclear-Weapon-Free-Zone agreements to reflect political realities, and adopting a ratio-based disarmament system. Together, these steps are among the solutions advanced in this research paper.

KEYWORDS

Nuclear disarmament; non-proliferation; nuclear-weapon-free-zone; nuclear policy; disarmament framework; conventional strategic deterrent; nuclear intelligence.

1. Introduction

The world is divided roughly into two sides regarding nuclear war. One believes nuclear war cannot be won, therefore must never be fought (Joint statement of President Ronald Reagan and Mikhail Gorbachev, November 21, 1985) (Jervis, 1989). The other side (scholars like Herman Kahn) believes that nuclear war is unthinkable but not impossible. A nuclear war does not have to be an all-out war; it can be a sub-limited nuclear war with limited annihilation (Kahn, 1962). Unfortunately, there is no time machine in this world that can reveal whether a nuclear war will really occur in the future. If we accept the first argument, it fails to explain the growing number of operational warheads and nuclear modernization programmes worldwide. It is not believable that



the world needs almost 10,000 operational warheads solely as a deterrent. At this point, we should not worry about the future but about our precarious present (Cvetković & Martinović, 2021; Cvetković et al., 2021; Garba & Akaan, 2025; Janković et al., 2025; Kalanj, 2025; Onimisi, 2025; Petrović, 2025), which is dwindling with the demise of arms control treaties and arrangements. In this article, we focus solely on nuclear terror spread by states and not by non-state actors. However, the concept of nuclear terrorism has gained considerable attention in recent years. It is an exaggerated concern, as handling nuclear and other radiological weapons involves technical difficulties and a lack of availability. It makes nuclear and other radiological weapons less practical compared to other readily available means of instilling fear among the masses (Basrur, 2006). There is substantial evidence that terrorists have shown interest in acquiring nuclear weapon technology to use as a deterrent against states. Nevertheless, if humanity ever faces the threat of a nuclear war on Earth, it is most likely that the states would be the primary culprits.

Russia's invasion of Ukraine has reignited the longstanding debate on disarmament, raising a critical question: What lies ahead for nuclear disarmament after the dilution of the New START Treaty? Since the invention of nuclear weapons, every country in the world that was capable of acquiring such a weapon became fascinated with this weapon of mass destruction. Nuclear weapon technology spread across different continents despite controlling arrangements such as non-proliferation, disarmament, and Nuclear-Weapon-Free-Zone treaties. Many civil society organisations, NGOs, and individual activists have sought to build widespread opposition to nuclear weapons on ethical and environmental grounds. Although Treaties like the Partial Test Ban Treaty (PTBT), Threshold Test Ban Treaty (TTBT), and Nuclear Free Zone Treaties established a taboo around nuclear testing, two decades ago, North Korea tested nuclear weapons despite negative world opinion (Bennett, 2024). It seems the world is unlikely to give up on nukes anytime soon, since they remain the only strategic weapon that is capable of penetrating the deepest underground military assets of enemy nations and capable of standing against missile defence systems. Conventional weapons still lack these capabilities; therefore, nuclear weapons will exist until a similarly deadly and precise alternative emerges.

In the 1960s, U.S. President John F. Kennedy predicted that nuclear weapons would spread rapidly around the world: by 1970, there would be ten nuclear-armed countries instead of four, and by 1975 this number would rise to between fifteen and twenty. However, the reality has unfolded differently: there are currently only eight nuclear powers. Kennedy's predictions could have been more accurate had policymakers not implemented extensive measures to curb proliferation and negotiate arms control treaties. Some countries were diplomatically forced to abandon their nuclear-weapon programme, such as South Korea, South Africa, and Sweden (Sokolski, 2019). Other countries had clandestine programmes directly targeted by military action — examples include Syria, Iraq, and Iran. Change in geopolitics and the evolving nature of conflict have complicated the nuclear question. Nuclear technology proliferated rapidly in third-world countries, where it has been widely regarded as a symbol of political prestige and influence, and as a source of power to counter Western dominance (Basrur, 2006).

Nuclear arms-control and disarmament treaties can be broadly categorised into four types: nuclear test-ban treaties, non-proliferation treaties, disarmament treaties, and Nuclear-Weapon-Free-Zone treaties. Most of these treaties have failed miserably, while most countries have voluntarily renounced nuclear testing. Since the 1990s, Nuclear testing has been renounced by major nuclear powers. The United States imposed a moratorium on testing in 1992, and the Comprehensive Test Ban Treaty (CTBT), signed in 1996 by the United States, Russia, and China, completely banned all types of nuclear explosions. However, unrecognised nuclear powers such as India, Pakistan, and North Korea have continued to conduct nuclear weapons tests even after that, despite widespread public protests against testing. The moratorium on nuclear tests by major nuclear powers is primarily driven by two factors: first, international condemnation and public protest because of the health and environmental effects of radioactive contamination. Second, there is no technical necessity for conducting nuclear testing, thanks to advances in computer simulations (Maloney, 2025). Major nuclear powers, including the U.S., Russia, and France, have conducted thousands of nuclear tests and accumulated extensive data regarding nuclear explosions. New scientific research, combined with historical test data, enables virtual experimentation through computer simulations to generate new insights and assess the reliability, safety, and security of these weapons. Therefore, nuclear testing has become obsolete for major powers unless motivated by specific political reasons.

The major Non-Proliferation Treaty (NPT) has failed to prevent proliferation despite various attempts. The last of the disarmament agreements, the New Start treaty between the USA and Russia, has been diluted by

geopolitical rivalries. Among Nuclear-Weapon-Free-Zone Treaties, only those established on global commons, such as the Antarctic Treaty, the Outer Space Treaty, and the Seabed Treaty, have been unanimously acknowledged. Most regional nuclear-weapon-free zones are not acknowledged due to political and security reasons. Hence, the ultimate goal should be to establish a new nuclear arrangement that realistically addresses the geopolitical realities of the 21st century and brings all nations to a single negotiation table to curb nuclear proliferation as well as reduce global nuclear threat. This article focuses on conceptual policy analysis that is based on historical accounts rather than empirical study. It synthesizes primary treaty texts, authoritative historical accounts, and scholarly literature to trace the successes and failures in nuclear arms control and proliferation dynamics. This article aims to identify patterns in the historical record and contemporary policy debates, identify gaps in existing arrangements, and propose feasible directions for policy reform. It does not present new quantitative datasets or original fieldwork; where empirical claims are made, they are supported by established secondary sources and official documents.

2. Growing appeal of nukes

The popularity and availability of nuclear technology seem prevalent globally despite the possibility of mass destruction, negative world opinion, and massive discouragement. It has some genuine reasons:

2.1. Nukes are too Good to abandon

Among the three weapons of mass destruction (WMD), chemical and biological weapons have been unanimously disbanded by most of the powerful countries. In contrast, nuclear weapons have remained in national arsenals. So, the reason behind abandoning the other two WMDs is not particularly based on ethical grounds. The effectiveness of chemical and biological weapons is heavily influenced by external variables, significantly diminishing their strategic advantage. For example, during the Iraq-Iran war, Iraqi chemical weapons backfired on its own troops when weapons were used in damp conditions in the southern border area. Mustard gas was used to dislodge Iranian troops, but when the wind shifted toward Iraqi positions, it harmed Iraqi forces and changed the outcome of the war (Central Intelligence Agency, 2010). Biological weapons can also have strategic disadvantages in this globalized world, where a local disease can quickly turn into a global epidemic. By contrast, nuclear warfare can be strategically planned and does not depend much on external variables (although blast damage can depend on factors such as weather, building construction materials, and the target's location) (Office of Technology Assessment, 1979). Nevertheless, damage caused by a nuclear weapon is almost inevitable, and the indirect effects of the blast can cause numerous casualties that are beyond assessment. Indirect effects include deaths from radiation and disease, contamination of water, air, and soil, and consequent crop failures that can lead to mass starvation. There is a chance that the attacked areas might lose their industrial civilization altogether. Therefore, a handful of nuclear weapons is enough to send an enemy country back to the pre-industrial era, thus eradicating its existence from the modern world.

2.2. Misuse of Atomic Assistance and South-South Cooperation

In 1955, U.S. President Eisenhower decided to share nuclear technology with the world for peaceful purposes. The U.S. 'Atoms for Peace' propaganda swept up all the developing countries with the hopes of clean, cheap nuclear energy, along with peace and prosperity. However, classified U.S. government reports warned that nuclear power was neither economically viable nor ready for export, and that it posed serious proliferation risks (Drogan, 2016). Therefore, misuse was inevitable; some countries legally purchased subcomponents from the suppliers and then built weapons indigenously under the guise of a civil nuclear programme. Notably, India built its nuclear device using a Canadian reactor and American nuclear fuel (Fuhrmann, 2012). The U.S., UK, and France offered training to Iranian nuclear scientists before the Islamic Revolution in 1979 (University of Calgary, 2003). Despite the risks of nuclear proliferation, major nuclear powers chose to spread the technology as a geopolitical gambit. Atomic assistance has been highly selective and highly discriminating in nature: states have utilized atomic aid to strengthen alliances, spread influence, and, at times, use it as a bargaining chip—for example, in exchanges involving oil with petroleum-producing nations. France supported Israel's programme

by transferring a reactor and reprocessing facility, while the Soviet Union supported the Chinese bomb programme. Beyond Cold War politics, countries of the Global South also cooperated to proliferate nuclear technology as a means of balancing regional political rivalries and defying Western geopolitical dominance. China assisted Pakistan to counterbalance the Indian nuclear programme. Pakistan, in turn, assisted in Libya, Iran, and North Korea (Lettow, 2010). The most recent example being North Korea's transfer of Plutonium reactors to Syria (Federation of American Scientists, 2008).

2.3. Change in Geopolitics and Failure of Disarmament

The beginning of the end of the Cold War was marked by the Intermediate-Range Nuclear Forces treaty (INF), which banned an entire category of missiles capable of launching nuclear warheads. This treaty ended in 2019 when the USA withdrew, alleging Russian noncompliance (NATO, 2019). Conventional arms control is also falling apart in the wake of the Russia-Ukraine war, as the North Atlantic Treaty Organization (NATO) and Russia officially withdrew from the Conventional Armed Forces in Europe (CFE) treaty, a key post-Cold War disarmament treaty. Russia suspended its active participation in the treaty since 2007, noting that the USA and its allies did not ratify the 1999 updated version of CFE (Faulconbridge & Kelly, 2023). Meanwhile, NATO has expanded, with recent members being Sweden and Finland. The membership of all three Scandinavian countries in NATO significantly heightens Russia's security concerns. This is underscored by Article 5 of the NATO treaty, which establishes the NATO alliance as a military alliance committed to mutual defence. The talks of universal nuclear disarmament also failed many times. When the New Start treaty was extended in 2021, the USA attempted to include China as a party, which was obviously unsuccessful (Parsie, 2024). In the second decade of the twenty-first century, global geopolitics has become increasingly tense. More countries in the Global South are actively engaging in an arms race, while rivalries reminiscent of the Cold War are reviving.

An ongoing global arms race characterizes the dangerous reality of today's world. Unlike the arms races of the World Wars, this contemporary competition is truly global in nature, encompassing nearly every region and continent. Nuclear weapons play a crucial role in this global competition. These weapons are not merely instruments of mass destruction; they also serve as powerful deterrents and symbols of national pride and political influence. They function as a diplomatic language among powerful nations, shaping geopolitical dynamics and influencing international relations. Nuclear weapons possess the power to unleash chaos on Earth by igniting a global war, yet, paradoxically, they also serve as instruments of deterrence that some argue can prevent large-scale catastrophes. It is now too late to encourage states to abandon this highly dangerous yet politically convenient weapon of mass destruction. However, the greater risks associated with these weapons may paradoxically lead to a deeper pursuit of global peace.

3. Rising possibility of sub-limited nuclear war

According to the SIPRI yearbook 2023, nine nuclear-weapon states together possess approximately 12,512 nuclear weapons, of which 9,576 are operationally available (SIPRI, 2023). The USA and Russia are running extensive programmes to dismantle retired warheads and to replace them with new-generation counterparts. The number of operational warheads all over the world is increasing due to the failure of existing nuclear arrangements. All eight nuclear-weapon-possessing states are investing substantially in nuclear modernizing programmes, which include warheads, delivery systems, and other related infrastructure that support precision, survivability, and safety (Acheson, 2022). An advanced nuclear stockpile, along with advanced space-based surveillance and reconnaissance, can be used to target critical targets (enemy forces, military installations, command and control centres, urban industrial centres, etc.). In the early 1960s, John F Kennedy's administration pursued this policy of targeting particular critical enemy targets, the destruction of which would diminish the enemy's retaliatory power without undermining their ability to live and function as a society. This policy is known as flexible deterrence. American technological development made this concept and policy feasible (Clodfelter & Zielinski, 2002).

Most of the nuclear-possessing nations can target challenging targets in their enemy nations. As the SIPRI yearbook 2023 notes, India's long-range missiles are capable of targeting the entire of China, as it emphasizes deterring China more in recent years (Kristensen & Korda, 2023). Christopher Clary and Vipin Narang, in their

article “India’s Counterforce Temptations: Strategic Dilemmas, Doctrine, and Capabilities, argued that India may be shifting toward a counterforce strategy (Clary & Narang, 2019). This approach is particularly appropriate for technologically less developed countries, such as India and Pakistan, where arsenals do not become equally vulnerable: those with sufficient resources and technology can better secure their stockpiles (Lieber & Press, 2017). Nations with fewer resources to spend on nuclear modernization programmes face the danger of obliteration of their entire arsenal in a specific and calculated nuclear strike. Scholar Herman Kahn, in his book “Thinking about the Unthinkable, predicts that future wars- unlike the World Wars- are likely to be brief and primarily waged by military forces stationed at concentrated bases. Mass destruction of people and property is less likely to achieve any immediate military and strategic objective. Therefore, the revolutionary tide in technology is more likely to herald an era of controlled warfare, where nuclear weapons are not an annihilator of humanity but a tool to neutralize other nuclear arsenals. This weapon of mass destruction might destroy itself in future sub-limited warfare, leading to its own obsolescence.

4. Virtual Nuclear Capabilities and Unanticipated Agreements That Curbed Nuclear Proliferation & Armament

Historically, concepts like disarmament and non-proliferation were established to reduce the global stockpile of nuclear weapons; however, they have not been particularly successful in achieving this goal. Interestingly, some nuclear agreements that were not originally designed to reduce nuclear weapons have nevertheless contributed to this aim indirectly. Concepts such as nuclear alliances, virtual nuclear capability, and nuclear-modernization programmes have effectively discouraged many countries from pursuing nuclear weapons or have reduced the number of warheads, even among those with the technological, political, and financial capacity to develop and maintain them.

5. Nuclear Alliances

As geopolitics becomes increasingly complex, states are relying on the deterrent effect of nuclear weapons more than ever before. However, the concept of nuclear deterrence is highly subjective, resembling more of an art than a science. It was subject to the interpretation of individual countries, shaped by their perceptions of threat. The USA intends to protect its allies in the Euro-Atlantic and Indo-Pacific regions against nuclear threats (U.S. Department of Defence, 2002). This is the concept of extended deterrence, which worked well during the Cold War. NATO deployed U.S. nuclear weapons on European soil. U.S. nuclear weapons (air-delivered gravity bombs) are still deployed in Turkey, Italy, Belgium, and the Netherlands (Trachtenberg, 2012). All 32 NATO countries are under the U.S. nuclear umbrella. The USA is no longer the only country to provide a nuclear shield to its allies. Recently, Russia claimed to have included Belarus and seized Ukrainian territories under its nuclear umbrella (Erästö, 2023). We are witnessing a new surge of nuclear tug-of-war, in which protected allies expect their nuclear patrons to intervene in the event of a crisis. This type of alliance raises the chance of nuclear escalation as nuclear states can get dragged into allied conflicts that these states would generally prefer to avoid. On the contrary, these nuclear alliances contribute indirectly to non-proliferation by actively discouraging countries from pursuing nuclear capability despite possessing sufficient resources, manpower, technology, and security needs (Bradley, 2024). For example, countries in Indo-Pacific (Japan, South Korea, Australia) did not pursue nuclear weapons despite facing nuclear threats from China and North Korea. Conversely, the situation in the Middle East is opposite and has become very tense in recent years. If Iran possessed nuclear weapons, it might provoke its rich and industrialised neighbours (Saudi Arabia, Turkey, and other Gulf states) to seek their nuclear arsenals. Iran is also disparately seeking weapons as a deterrent against Israel’s unconfirmed arsenal. In this context, Extended deterrence has the potential to solve the Middle East nuclear problem. Eight nuclear powers, with their substantial arsenals, can effectively dissuade a nuclear arms race in the Middle East, even discourage Iran from pursuing nuclear capabilities. Nuclear alliances should not be viewed solely with suspicion; they offer a constructive potential. Such alliances can enhance accountability, curb weapon proliferation, and encourage nations to forgo costly nuclear programs. Thus, nations can reallocate their scarce resources to other military initiatives that deliver tangible, lasting benefits.

6. Virtual Nuclear Capable States or VNCS

Some states possess latent nuclear capabilities, meaning they have access to sufficient quantities of weapon-usable fissile material or the ability to produce it, as well as the necessary technology and skilled personnel. These are called Virtual Nuclear Capabilities (VNCs), which means they are capable of making nuclear weapons in a matter of a few months or a year. Theoretically, any nation with civil nuclear power plants, a sufficient industrial infrastructure, and scientifically skilled people can be considered a VNC, even if it has never had any military nuclear ambitions (Horvath, 1998). In 1988, the U.S. Department of Defence published a report, *"Discriminate Deterrence: Report of the Commission on Integrated Long-Term Strategy,"* which estimated that almost 40 states would be capable of manufacturing a nuclear device by 2000. Out of this list, five or six countries could make a nuclear weapon in a few months. These states are Belgium, Germany, Japan, Italy, and the Netherlands (Wohlstetter, 1988). In this context, India, Pakistan, and North Korea all fell into this category at one point. Sweden and South Africa dismantled their nuclear programmes only halfway, which means they can reconstitute them quickly if the need arises.

Virtual capability to develop nuclear weapons has provided many countries with a sense of security: if push comes to shove, they can produce such weapons within a small timeframe. This logic is rooted in the modern nature of inter-state warfare, which has evolved through multiple layers as technology and society have advanced. The progression follows a sequence roughly like this: cyber war, information war, trade war, traditional military mobilization, and, as a last resort, nuclear confrontation. If a state is virtually capable of building nuclear weapons, it is much more likely to do so within the time it takes for these preliminary stages to unfold. This reasoning may also explain why Russian forces are persistently attacking and occupying Ukrainian nuclear power plants. Russia may be wary of a nuclear-armed Ukraine, which operates four nuclear power plants with 15 reactors, generating half of the country's electricity (Holt & Nikitin, 2024). Warfare surrounding nuclear plants can prove to be environmentally disastrous. However, the rationale of virtual nuclear capability has deterred many industrialized states from actively pursuing nuclear arsenals, preventing the world from descending into a 'nuclear jungle' dominated by widespread proliferation. Despite playing an active role in non-proliferation, VNCs often obstruct disarmament. They frequently refuse to grant the IAEA full access to nuclear sites and related information, arguing that if nuclear-armed states are indifferent to disarmament, non-nuclear states should not have to bear the burden of intrusive inspections. This breeds a cycle of distrust between nuclear states and VNCs and creates an environment in which nuclear-armed states constantly fear nuclear hedging by VNCs.

7. Nuclear Modernization Programmes & Arms Control

"The deterrence value of a nuclear weapon depends on its accuracy, reliability, and the adversary's perception of its credibility."

George P. Shultz, former U.S. Secretary of State

Scholars like Thomas C. Shelling and Bernard Brodie also advocated the fact that quantity does not determine effectiveness when it comes to nuclear weapons because, unlike conventional arms, they cannot be used repeatedly without catastrophic consequences. A 2014 study conducted by Michael J. Mills revealed that even a regional conflict between India and Pakistan, involving nuclear weapons, can trigger nuclear winter if each side decides to detonate 50 weapons of 15 kilotons each (Mills et al., 2025). Thus, even with fewer weapons, effective deterrence can be established if accuracy, reliability, and credibility are ensured. A huge arsenal is meaningless if it is not rationally deployed and strategically delivered. In recent years, nuclear-armed states have increasingly recognized this principle. The SIPRI report (2023) shows that the number of nuclear warheads in the world is decreasing as Russia and the USA are dismantling retired warheads while simultaneously investing heavily in extensive and costly modernization programs. China is modernizing its relatively small arsenal to increase survivability, reliability, safety, and penetration ability (Acheson, 2022).

Nuclear modernization programmes can offer three key benefits. First, as arsenals become more modern, countries are more likely to prefer a counterforce strategy. In the future, targeting cities would be a foolish move, given that nuclear forces are increasingly becoming vulnerable all over the world. Therefore, people are more likely to escape the blast effect of a nuclear catastrophe, although they will still face significant aftereffects.

Second, modernization can reduce the overall number of weapons. Experts such as Kingston Reif and Alicia Sanders-Zakre suggest that 1000 strategically deployed U.S. warheads are enough to provide a strong deterrent for both the U.S. and its allies globally. Therefore, if the U.S. were to adopt this strategy, it could put pressure on Russia and China to reconsider their expanding arsenals (Reif & Zakre, 2019). Third, U.S. nuclear modernization can influence states such as Russia and China to participate in arms-control negotiations out of fear of a more capable U.S. nuclear arsenal (Costlow, 2021).

Possible solutions

8. NPT for the Twenty-First Century

The NPT has failed terribly in preventing the proliferation of nuclear weapon technology for several reasons. One is the intelligence failure in detecting and curbing the nuclear-proliferation black market. The Pakistani A. Q. Khan network contributed a great deal to spreading sensitive nuclear technology and fissile materials in countries such as Libya, North Korea, and Iran (Kerr & Nikitin, 2012). The International Atomic Energy Agency (IAEA) has repeatedly demonstrated its inability to detect nuclear developments effectively and to ensure compliance. This is the high time NPT recognises certain nuclear-armed states as Nuclear Weapon States (NWS). The U.S. Nuclear Posture Review (2022) also postulates that the U.S. will continue to pursue engagement with other nuclear-armed states with realistic expectations, understanding, and shared responsibility to reduce nuclear risks. Countries such as India and Israel possess substantial nuclear arsenals and the capacity to export sensitive technologies. However, Israel follows an approach of secrecy, vowing that 'it would not be the first nation to introduce nuclear weapons in the Middle East'. Meanwhile, India has long sought membership in the Nuclear Suppliers Group (NSG); recognition as an NPT Nuclear-Weapon State would automatically grant it entry. The rationale behind the expanding NWS status to India includes the following:

1. The budget and multilateral cooperation of the IAEA will increase, bolstering its surveillance and detection abilities.
2. This cooperation would integrate India into the global non-proliferation framework, thereby increasing transparency and legitimacy of its strategic weapons programme.
3. As an immediate neighbour of Pakistan, India is better positioned to monitor potentially dangerous activities related to the nuclear black market. It may help prevent the proliferation of nuclear materials to terrorist groups such as Al-Qaeda.
4. Unlike North Korea or Iran, India has never violated the NPT principles. While North Korea and Iran both signed the NPT to acquire nuclear fuel, they later violated its conditions by pursuing secret nuclear programmes. In contrast, India has pursued its own nuclear development programme and has neither transferred its technology nor leaked its secrets (Bhat, 2020).
5. The Indo-U.S. civil nuclear deal, or 123 agreement of 2008, has already placed Indian civilian nuclear facilities under IAEA supervision. Through this agreement, India shoulders rights and responsibilities similar to those of NPT member states, even without signing the treaty (Curtis, 2010).

9. Inspiration from the Washington Naval Conference

After World War I, the U.S. announced a bold proposal to reverse global naval expansion. During the Washington Naval Conference of 1921-22, the Five-Power Treaty was established, which fixed a naval-tonnage ratio among the major naval powers at the time. According to this treaty, the fixed tonnage ratio for capital ships (battleships and cruisers) among the five major naval powers was as follows: Great Britain and the United States, 5; Japan, 3; France and Italy, 1.75, resulting in a ratio of 5:5:3 (Kuehn, 2022). Additionally, the submarine strength of the U.S. and Britain was fixed at 100,000 tons each, while Japan, Italy, and France were limited to 60,000 tons each (Andrade, 1969). This proposal effectively halted ten years of naval construction. It was a daring move even for the U.S., as it involved scrapping a large portion of the American fleet and mid-construction cancellation of all ships that were a part of the U.S. Navy expansion programme initiated in 1916 (Munson, 2017). The Washington naval conference was widely regarded as a diplomatic success because all major naval powers believed they had secured the best deal for themselves while safeguarding their security interests. It halted the

arms race to some extent, easing additional economic burden on post-World War I societies. However, it failed to resolve underlying mutual suspicions among naval powers or the race for domination, ultimately triggering a new wave of the arms race, including the construction of a large number of cruisers. Despite these shortcomings, this conference marked a historic achievement as one of the first successful arms-control treaties, bringing together nations from three continents to sit at a negotiation table, reach unanimous agreements, and take collective action on an issue of global significance.

The post-World War I era was dominated by sea power, during which technological development made battleships heavier, faster, and better-armed (Zhai, 2019). In contrast, the present era is defined by nuclear capabilities, where nuclear-modernization programmes have enhanced precision, permeability, and survivability of nuclear weapons. The horrors of World War I may have forced major powers to reach an agreement and establish a successful arrangement. However, we cannot afford to wait for a third world war to negotiate an agreement regarding the most powerful weapon of all time. The ratio-based system of the Five-Power Treaty could really provide a valuable model for addressing the modern nuclear-disarmament problem. China has consistently refused to participate in New START treaty negotiations, primarily due to the vast disparity between the U.S. and Russian nuclear arsenal compared to that of China, and because other capable nuclear powers like France and the United Kingdom are excluded from the trilateral arms-control framework. To address this, all nuclear-armed states should be categorized into two groups- Nuclear Weapon States (NWS): U.S., UK, Russia, China, and France- and de facto nuclear weapon states (DFNWS): India, Israel, Pakistan, and North Korea. The NWS should first commit to a disarmament treaty that is based on a ratio system after thoroughly examining its relative nuclear capabilities. Once this framework is in place, the DFNWS could join a disarmament treaty, which will also be based on a separate ratio system, with assurance that their vital security interests will be assured even after joining the treaty.

10. Limited Nuclear-Weapon Free Zones

In the 1960s, a powerful and ambitious global movement emerged against militarization and against the deployment and testing of nuclear weapons by the major nuclear powers. Nations across Asia, Africa, and Latin America choose not to be a part of the global nuclear arms race and established Nuclear-Weapon-Free-Zones (NWFZs) in certain regions. At the onset of the Cuban crisis, the Brazilian representative to the UN General Assembly first proposed a Latin American nuclear-weapon-free zone (U.S. Department of State archive). This led to the creation of one of the first NWFZs through the Treaty of Tlatelolco, which established the foundational framework for later NWFZ treaties. The Treaty of Rarotonga (The South Pacific Nuclear-Weapon-Free-Zone) and the Treaty of Pelindaba (the African Nuclear-Weapon-Free-Zone) were established in response to French nuclear tests in those regions. (Ogunbanwo, 1996), while the Treaty of Bangkok (the Southeast Asia Nuclear-Weapon-Free Zone) was created in response to American militarization in the Philippines (Centre for Arms Control and Non-Proliferation).

Unfortunately, the strong anti-nuclear sentiment in the developing world soon faded in the face of harsh geopolitical realities. Most recognised nuclear powers do not fully acknowledge all of these nuclear-free treaty zones. Only the Treaty of Tlatelolco enjoys recognition from all five recognised nuclear-weapon states: the United States, Russia, China, the UK, and France- because this treaty does not bar transit of nuclear material, the dumping of nuclear waste, or peaceful nuclear explosion in the zone (Mendenhall, 2020). In contrast, the other four treaties bar nuclear manufacturing, testing, storage, transit, waste dumping, and peaceful nuclear explosion, which led to their non-recognition by the United States. The proposed Arctic NWFZ is also becoming unfeasible due to the full integration of Scandinavian countries into NATO. It means most of the Arctic region now falls under the defence umbrella of either the U.S. or Russia. Nuclear-armed submarines of both nations often patrol Arctic waters, although neither has stationed intercontinental ballistic missiles or nuclear-armed bombers in this region (Wallace & Staples, 2010). It seems that, as long as geopolitical rivalry persists, controlling the storage and transit of nuclear materials- especially nuclear-armed submarines- remains nearly impossible in some strategic regions of the world, such as the Strait of Malacca, the Indian Ocean, and the Arctic. The rigid idea of a “pristinely pure” anti-nuclear environment has become increasingly obsolete as more states started to acquire nuclear weapons. Unrecognised nuclear powers such as India, Pakistan, Israel, and North Korea do not even fall within the ambit of these treaties, and are therefore not obligated to ratify the protocols. While NWFZs have the potential to enhance arms control, they will be effective only if they consider

the realities of modern geopolitical rivalry and the ongoing arms race. Implementing targeted restrictions on the type and quantity of nuclear assets, together with a reliable monitoring system and transparent verification practices, could significantly strengthen the arms-control potential of NWFZs (Moreno, 2007).

11. Evolution of Nuclear Intelligence

The nuclear arms race between the USA and the USSR stimulated advancements in technological intelligence ability, enabling the monitoring and analysis of large and sophisticated strategic nuclear forces. These capabilities include advanced reconnaissance aircraft such as the U-2 as well as reconnaissance satellites (Graham & Hansan, 2007). However, nuclear proliferation in the 21st century is different. It presents unique challenges that have rendered high-end monitoring technology largely ineffective. Smaller countries that pursue clandestine nuclear weapon programmes often lack the extensive and sophisticated infrastructure of larger nations, allowing them to mask dual-purpose facilities as legitimate civilian nuclear activities. Therefore, the intelligence capability that was developed to monitor the USSR's nuclear activities is inadequate for monitoring these covert operations. Nations have quickly adapted to this game of cat-and-mouse with the IAEA, which uses satellite imagery and rapid communications. Historically, countries such as South Africa and India demonstrated their ability in concealing and deceiving the international community regarding their nuclear activities. Tehran deeply buried and sanitized its nuclear infrastructure. At the same time, Syria concealed its reactor inside an ordinary-looking building that showed no indicators of ongoing nuclear activities, such as external cables or a cooling tower (Hansen, 2011).

It appears that technology has taken a backseat in preventing nuclear proliferation, especially when it involves non-state actors such as the A. Q. Khan network. Despite rapid advancements in Signal Intelligence (SIGINT), Overhead Imagery Intelligence (IMINT), and Electronic Intelligence (ELINT), HUMINT operations may remain the most feasible option for nuclear intelligence in the foreseeable future. The Washington Naval Conference serves as an inspiring example in this context. The U.S. Office of Naval Intelligence played a vital role at this conference by collecting information on foreign naval capabilities. At that time, inadequate surveillance and reconnaissance capabilities compelled intelligence officers to rely heavily on human intelligence. They primarily depended on open-source intelligence collection, but they also cultivated a network of personal sources to obtain valuable insights into Japanese naval affairs. Simple methods were used, such as engaging with Japanese friends, foreign technical experts, or travellers who may have passed through a sensitive area. Personal sources, which provided information out of friendship or after consuming too much alcohol, or information traded from foreign intelligence services (Munson, 2017). In the modern era, technologically empowered HUMINT has the potential to mitigate proliferation challenges by gaining a comprehensive understanding of adversaries' capabilities and intentions (Gioe, 2017). Inclusion of powerful nations such as India and Israel in the NPT as 'permanent members' would increase this capability, particularly since Israel has already demonstrated its ability to neutralize clandestine nuclear programmes in Syria, Iraq, and Iran (Yadlin, 2018).

12. Non-Nuclear Deterrent

In the 2022 U.S. Nuclear Posture Review, the Department of Defence (DoD) stated its intent to explore non-nuclear or conventional weapon capabilities to use as an effective deterrent for the United States and its allies. Non-nuclear or conventional weapons must meet certain criteria to be an effective deterrent: they should possess strategic range (i.e., intercontinental capability), precision, and destructive potential. The Advent of nuclear weapons marked a revolution in military affairs; however, another transformation is currently occurring, giving conventional weapons superiority over nuclear options in many respects. Advanced surveillance and reconnaissance systems, cruise and ballistic missiles of intercontinental range, precision-guided warheads, and stealth technology now enable strikes across the globe with non-nuclear weapons (Mazarr, 1991). However, non-nuclear strategic weapons are not yet suitable as a deterrent for one primary reason: they are more susceptible to countermeasures than nuclear weapons. For example, if a conventional missile is launched at a country, it can potentially be intercepted by an advanced missile defence system. In contrast, if a nuclear missile is launched, no defence system can fully protect against the catastrophic effects of a nuclear explosion and the resulting radiation, which would inevitably impact the defending nation. Therefore, currently, non-nuclear

weapon systems remain underdeveloped and are not yet capable of replacing nuclear weapons as a reliable deterrent. Here, we have to place our faith in science and human ingenuity, trusting that one day a revolution in conventional weapon technology will replace nuclear weapons entirely, rendering the knowledge of this radioactive weapon completely obsolete. This new capability would retain all the critical attributes that are present in nuclear weapons- such as deep penetration, global-strike ability, high destructive power, and survivability against counter-defence systems-while eliminating harmful indirect effects of nuclear weapons, including radiation, diseases, and radioactive contamination.

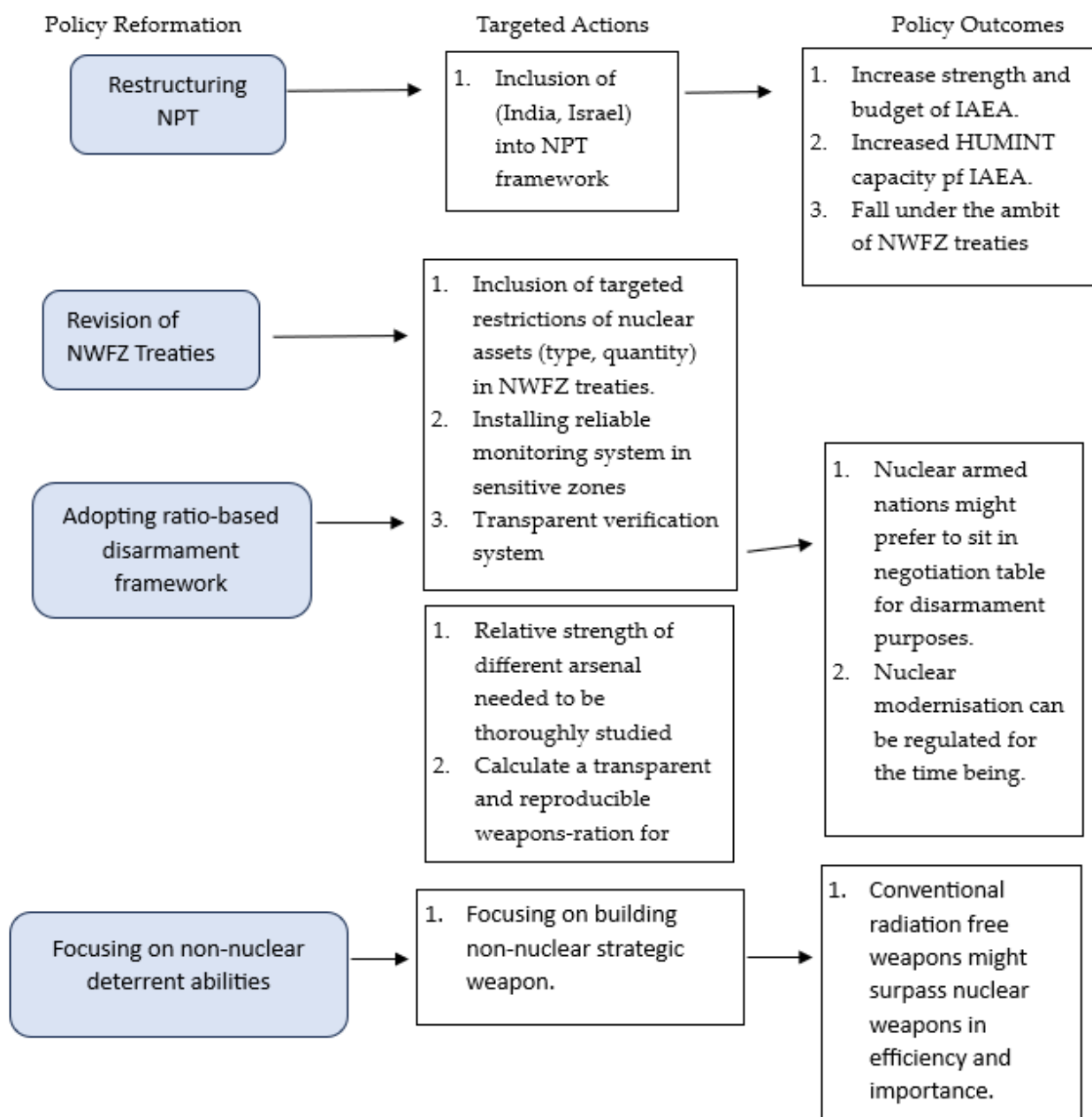


Figure 1. Nuclear Policy Framework. (Source: Self-developed)

13. Conclusion

अण्डपरमिणात्।

Aṇḍa-parimāṇāt ।

ब्रह्मसूत्र, श्लोक 2.1.33

Badarayana, 400–450 CE

Translation: “Even the smallest particles, like atoms, have a purpose as determined by the divine will.”

Every object, animate or inanimate, serves a purpose in the universe, regardless of whether we perceive that purpose as good or evil. Even nuclear weapons have served their purpose in human history, despite not being used in war since the Hiroshima and Nagasaki incidents in 1945. Like other wartime technologies such as GPS and the internet, nuclear technology- initially invented as a weapon- has also led to the development of a clean, cheap, reliable, and renewable energy source. It has also changed the tide of global politics. The 2018 Singapore Summit, a one-on-one meeting between the U.S. and North Korea regarding denuclearization of the Korean peninsula, exemplifies this. The summit delivered a massive diplomatic victory to Kim Jong Un. North Korea bagged a lucrative deal: the suspension of U.S. military exercises with Japan and South Korea in exchange for a vague commitment to denuclearization without a clear plan (Haenie et al., 2018). Such is the power of the ‘nuclear card’, which allows a smaller and relatively less significant country like North Korea to stand on equal footing with a global superpower on the international stage. For North Koreans, it was likely a moment of pride as their press quickly publicized the lopsided concessions. However, such events can negatively impact non-proliferation efforts in South Asia. If the United States were to withdraw its protective umbrella from countries like South Korea and Japan, these nations could pursue their own nuclear programme, since they possess the virtual capability to do so. Therefore, even if the chances of a conventional conflict escalating to a nuclear-scale conflict remain slim, the contribution of nuclear technology to modern society and politics is undeniable.

During the Cold War, the public and policymakers were far more concerned about the proliferation of nuclear weapons to additional states than they appear to be today. Driven by that fear, they were willing to take considerable risks, devise innovative ideas, and sign numerous treaties to curb nuclear proliferation and excessive nuclear armament. In recent times, however, public and political concern about this topic has appeared to ease. Current non-proliferation efforts primarily focus on the denuclearization of North Korea and Iran, largely due to perceptions that their nuclear behaviour is unpredictable. Meanwhile, disarmament by the major nuclear powers is often naively overlooked, based on the assumption that these states are thought to be more responsible and therefore will never resort to nuclear weapons. This shift in focus and the resulting policy fatigue can be attributed to several factors:

First, nuclear weapons have not been used in war since 1945; therefore, the world has, to some extent, forgotten the horrors of nuclear war and of escalatory events such as the Cuban Missile Crisis.

Second, major recognised nuclear powers have stopped full-scale testing of these weapons, so environmental protests related to such testing have also disappeared.

Third, advancements in conventional weapons technology have significantly increased accuracy and destructive power, enabling them to effectively strike some fixed targets that were previously vulnerable only to nuclear attacks (CIA, 1983). Consequently, nuclear weapons are increasingly viewed as tools of deterrence rather than instruments with tangible wartime utility.

Fourth, the counterintuitive academic discourse on nuclear stability has also contributed to this policy shift. Some scholars argue that nuclear-armed states are more prone to engage in low-level conflicts (Horowitz, 2019). For instance, the ongoing disputes between India, Pakistan, and China in Asia primarily manifest as border clashes, the fostering of terrorism, and cyber-attacks. Thus, more nuclear power might not be uniformly detrimental to peace; in some respects, it could potentially reduce the intensity of modern conflicts.

Despite the predominant belief that nuclear weapons will never be used in war, nine nuclear-armed states continue to modernize their nuclear arsenals. According to a 2023 report by the International Campaign to Abolish Nuclear Weapons (ICAN), these states spent a combined \$91.4 billion on modernization efforts (Olsen, 2024). In light of current global instability, nuclear policy needs to be restructured to address existing loopholes

and weaknesses in the framework. To be politically acceptable, technologically feasible, and economically viable, a revised nuclear policy framework should incorporate several points:

First, it must acknowledge the possibility of nuclear war, even with the prevalence of low-level conflicts, given the present volatile nature of world politics and nuclear modernization efforts of some states.

Second, it should set realistic arms-control and disarmament goals that are acceptable to all major nuclear powers, ensuring that no nation feels its security is compromised. In this article, the analogy of the Washington conference serves as a major inspiration for future disarmament negotiations, in which the weapons ratio would be based on the operational capabilities of nuclear arsenals.

Third, the IAEA needs to address the challenge of states withdrawing from the NPT. To strengthen the IAEA's effectiveness, it is also important to recognize and enrol additional states, currently unrecognized as Nuclear Weapon States (NWS), such as India and Israel, into the NPT as NWS.

Fourth, diplomacy is very crucial when it comes to dealing with latent nuclear states such as Germany, Japan, South Korea, and Sweden; extended deterrence remains the most viable solution to prevent them from building their own arsenals. On the other hand, these VNCs should enable stringent inspections of civilian nuclear facilities to build confidence in the global community about the safe use of nuclear power.

In addition, Nuclear-weapon-free zone (NWFZ) treaties should be revised and strengthened to prevent states from transporting or deploying nuclear materials in an unregulated manner anywhere in the world. At the same time, nations should collectively commit to developing robust non-nuclear deterrents to replace nuclear weapons in their arsenals.

Nuclear-Supplier States need to adopt a criteria-based system to decide which countries receive enrichment and reprocessing related facilities and technologies (Lettow, 2010). The influence of alliance politics within the Nuclear Suppliers Group (NSG) has already negatively affected non-proliferation efforts. Therefore, nations with military ambitions or unclear intentions should be denied access to enrichment and reprocessing facilities. However, many countries initiate civil nuclear programmes with noble intentions, but these intentions can shift when faced with significant security threats, potentially leading to the weaponization of these programmes. For instance, Iran received atomic aid from the U.S. beginning in the 1950s. Even after the Islamic Revolution, Ayatollah Khomeini opposed nuclear weapons on religious grounds. However, the situation changed after the Iraq-Iran war in the 1980s, when Iran started to work towards its weapons programme (Fuhrmann, 2012). Pakistan also began a civilian nuclear programme in the 1950s but decided to build weapons following its humiliating defeat in the 1972 war with India. Therefore, nations possessing latent nuclear capabilities or existing civilian nuclear programs require close monitoring during periods of strategic threat or prolonged conflict, as these factors have historically triggered the development of nuclear weapons programs.

This rationale can also be applied to the present-day Russia-Ukraine war. Over the past three years, Russia has attacked two Ukrainian nuclear power plants- Chornobyl and Zaporizhzhia-despite the potential risk for a radiological disaster (Dolzikova, 2023). These assaults on nuclear infrastructure may be motivated by two factors: either Russia aims to dismantle Ukraine's energy supply or seeks to suppress Ukraine's ambition to develop nuclear weapons. The Ukrainian President has already voiced an opinion shared by many Ukrainians: the perceived choice between joining NATO and pursuing nuclear armament. Although the chances of Ukraine achieving a fully functional nuclear-weapons capability are slim due to a lack of international support and funding, alternatives such as so-called 'dirty bombs' made from radioactive waste remain a possibility (Davlikanova, 2024). Additionally, HUMINT might see a comeback in monitoring nuclear proliferation, as advanced technologies often prove insufficient in modern conflicts. For example, despite superior equipment and training, American soldiers faced significant challenges against less-equipped guerrilla fighting soldiers during the Vietnam War. Similarly, supreme-quality surveillance and reconnaissance capabilities consistently fail to detect low-profile proliferation activities. These factors need to be considered when establishing a nuclear framework for the present era. Given the changing tide of world politics, nuclear stability can no longer be taken for granted. Countries are engaged in a cat-and-mouse game, each trying to sabotage rival nuclear programs or destroy the adversary's nuclear facilities before completion of the weapon. Examples such as Israel's attack on a Syrian facility and America's cyber-attack on an Iranian facility raise concerns that Russia and Ukraine may be participating in the same game. The world needs to be more cautious and sceptical, for the nuclear clock is ticking faster than ever.

References

1. Andrade, E. (1969). The United States Navy and the Washington Conference. *The Historian*, 31(3), 345–363.
2. Basrur, R. M. (2006). *Minimum deterrence and India's nuclear security*. Stanford University Press.
3. Bennett, B. W. (2024). North Korea's October surprise: A nuclear weapons test? RAND Corporation.
4. Bhat, A. S. (2020). India's position on Nuclear Non-Proliferation Treaty. *International Journal of Research Publication and Reviews*, 1(3), 50–55.
5. Bradley, J. (2024). Preventing the nuclear jungle: Extended deterrence, assurance, and nonproliferation. *Joint Force Quarterly*, 112(1), 70–75.
6. Central Intelligence Agency. (1988). *Impact and implications of chemical weapons use in the Iran-Iraq War (Interagency Intelligence Memorandum)*. Washington, DC: Author. (Declassified/released 2010.)
7. Clary, C., & Narang, V. (2019). India's counterforce temptations: Strategic dilemmas, doctrine, and capabilities. *International Security*, 43(3), 7–52.
8. Clodfelter, M., & Zielinski, J. (2002). *Nuclear strategy in the new world order* [Report/manuscript]. (Puni izdavač/serija nisu pouzdano identifikovani u pretrazi.)
9. Costlow, M. R. (2021). An overlooked aid to arms control: US nuclear modernization. *Strategic Studies Quarterly*, 15(3).
10. Curtis, L. (2010). *Enhancing India's role in the global nonproliferation regime*. Center for Strategic and International Studies (CSIS) & Nuclear Threat Initiative (NTI).
11. Cvetković, V., & Martinović, J. (2021). *Upravljanje u nuklearnim katastrofama [Management in Nuclear Disasters]*. Beograd: Naučno-stručno društvo za upravljanje rizicima u vanrednim situacijama.
12. Cvetković, V., Öcal, A., Lyamzina, Y., Noji, E., Nikolić, N., & Milošević, G. (2021). Nuclear Power Risk Perception in Serbia: Fear of Radiation Exposure vs. Social Benefits. *Energies*, 14, 2464.
13. Davlikanova, E. (2024, October 22). Ukraine can go nuclear—should it? Centre for European Policy Analysis (CEPA).
14. Dolzikova, D., & Watling, J. (2023, April 28). *Dangerous targets: Civilian nuclear infrastructure and the war in Ukraine*. Royal United Services Institute (RUSI).
15. Drogan, M. (2016). The nuclear imperative: Atoms for peace and the development of U.S. policy on exporting nuclear power, 1953–1955. *Diplomatic History*, 40(5), 948–974.
16. Erästö, T. (2023). *The role of umbrella states in the global nuclear order*. Stockholm International Peace Research Institute (SIPRI).
17. Faulconbridge, G., & Kelly, L. (2023, November 7). Russia formally withdraws from key post-Cold War European armed forces treaty. Reuters.
18. Fernández-Moreno, S. (2009, April). Nuclear-weapon-free zones: Past lessons and future prospects [Conference presentation]. Carnegie International Nonproliferation Conference, Washington, DC. (Napomena: 2007 verzija/proceedings nisu pouzdano pronađeni online.)
19. Fuhrmann, M. (2012). *Atomic assistance: How “Atoms for Peace” programs cause nuclear insecurity*. Cornell University Press.
20. Garba, T. M., & Akaan, R. (2025). The Socioeconomic and Psychological Implications of Polygamy: A Quantitative and Qualitative Analysis Concerning Disaster Risk Reduction and Management (DRRM) in Nigeria. *International Journal of Contemporary Security Studies*, 1(1), 25–34.
21. Gioe, D. V. (2017). ‘The more things change’: HUMINT in the cyber age. In R. Dover, H. Dylan, & M. S. Goodman (Eds.), *The Palgrave handbook of security, risk and intelligence* (pp. 213–228). Palgrave Macmillan.
22. Graham, T., & Hansen, K. A. (2007). *Spy satellites and other intelligence technologies that changed history*. University of Washington Press.
23. Haenle, P., Li, B., Paal, D. H., Pak, J. H., Swaine, M. D., & Zhao, T. (2018, June 14). Foreign policy experts on the Singapore summit and what comes next. Carnegie China.
24. Hansen, K. A. (2011). *Intelligence and nuclear proliferation: Lessons learned* [Report/paper]. Paris.

25. Holt, M., & Nikitin, M. B. D. (2024). Russian military actions at Ukraine's nuclear power plants (CRS Report). Washington, DC: Congressional Research Service.
26. Horowitz, M. C. (2009). The spread of nuclear weapons and international conflict: Does experience matter? *Journal of Conflict Resolution*, 53(2), 234–257.
27. Iklé, F. C., & Wohlstetter, A. (1988). *Discriminate deterrence: Report of the Commission on Integrated Long-Term Strategy*. Washington, DC: U.S. Department of Defense.
28. Janković, L., Cvetković, V. M., Gačić, J., Renner, R., & Jakovljević, V. (2025). Integrating psychosocial support into emergency and disaster management and public safety: The role of the Red Cross of Serbia. *International Journal of Contemporary Security Studies*, 1(1), 99–124.
29. Jervis, R. (1989). *The meaning of the nuclear revolution: Statecraft and the prospect of Armageddon*. Cornell University Press.
30. Kahn, H. (1962). *Thinking about the unthinkable*. Horizon Press.
31. Kalanj, S. (2025). Gender-based violence in armed conflicts. *International Journal of Contemporary Security Studies*, 1(1), 125–138.
32. Kerr, P. K., & Nikitin, M. B. D. (2012). Pakistan's nuclear weapons: Proliferation and security issues (CRS Report RL34248). Washington, DC: Congressional Research Service.
33. Kristensen, H. M., & Korda, M. (2023). World nuclear forces. In *SIPRI yearbook 2023: Armaments, disarmament and international security* (Chap. 7). Stockholm International Peace Research Institute (SIPRI).
34. Kuehn, J. T. (2022). A template for peace. *Naval History*, 36(1).
35. Lettow, P. (2010). *Strengthening the nuclear nonproliferation regime* (Council Special Report). Council on Foreign Relations.
36. Lieber, K. A., & Press, D. G. (2017). The new era of counterforce: Technological change and the future of nuclear deterrence. *International Security*, 41(4), 9–49.
37. Maloney, A. (2025). Introducing certification of technical necessity for resumption of nuclear explosive testing. Federation of American Scientists.
38. Mazarr, M. J. (1991). *START and the future of deterrence* (1st ed.). Palgrave Macmillan.
39. Mendenhall, E. (2020). Nuclear-weapon-free zones and contemporary arms control. *Strategic Studies Quarterly*.
40. Mills, M. J., Toon, O. B., Taylor, J. L., & Robock, A. (2014). Multidecadal global cooling and unprecedented ozone loss following a regional nuclear conflict. *Earth's Future*, 2(4), 161–176.
41. Munson, M. (2017, November 13). ONI and the Washington Naval Conference of 1921–1922. Centre for International Maritime Security.
42. NATO. (2019, August 2). NATO and the INF Treaty. NATO.
43. Office of Technology Assessment. (1979). *The effects of nuclear war*. U.S. Congress, Office of Technology Assessment.
44. Office of the Director of National Intelligence. (2008). Background briefing with senior U.S. officials on Syria's covert nuclear reactor and North Korea's involvement. (Hosted by Federation of American Scientists).
45. Ogunbanwo, S. (1996). The Treaty of Pelindaba: Africa is nuclear-weapon-free. *Security Dialogue*, 27(2), 185–200.
46. Olsen, J. M. (2024, June 17). Nuclear-armed nations are deepening their reliance on their nuclear weapons, watchdog finds. Associated Press.
47. Onimisi, T. (2025). Improved security and education: Pathways to national development. *International Journal of Contemporary Security Studies*, 1(1), 205–212.
48. Paloczi-Horvath, G. (1998). *Virtual nuclear capabilities and deterrence in a world without nuclear weapons* [Report]. London.
49. Parsie, Y. (2024). Has New START reached a dead end? Arms Control Association.
50. Petrović, T. (2025). (Re)Constructing Europe: Has a common identity integrated Europe? *International Journal of Contemporary Security Studies*, 1(1), 139–148.

51. President's Commission on Strategic Forces. (1983). Report of the President's Commission on Strategic Forces. Washington, DC: Author.
52. Pytlak, A., & Acheson, R. (Eds.). (2022). Assuring destruction forever (2022 ed.). Reaching Critical Will (WILPF).
53. Reif, K., & Sanders-Zakre, A. (2019). U.S. nuclear excess: Understanding the costs, risks, and alternatives. Arms Control Association.
54. Sokolski, H. (2019). Improving the role of intelligence in counterproliferation policymaking. *Studies in Intelligence*, 63(1).
55. Stockholm International Peace Research Institute. (2023). SIPRI yearbook 2023: Armaments, disarmament and international security. Stockholm: SIPRI.
56. Trachtenberg, D. J. (2012). US extended deterrence: How much strategic force is too little? *Strategic Studies Quarterly*, 6(2), 62–92.
57. U.S. Department of Defense. (2022). National defense strategy. Washington, DC: U.S. Department of Defense.
58. University of Calgary. (2003). A list of bilateral civilian nuclear cooperation agreements (PRISM Platform). (Napomena: online su dostupne kasnije/republikovane verzije; original iz 2003 nije jednoznačno verifikovan.)
59. Wallace, M., & Staples, S. (2010, March). Ridding the Arctic of nuclear weapons: A task long overdue. Canadian Pugwash Group & Rideau Institute.
60. Yadlin, A. (2018, March 21). The Begin Doctrine: The lessons of Osirak and Deir ez-Zor (INSS Insight No. 1037). Institute for National Security Studies.
61. Zhai, S. (2019). Road to infamy: Interwar Pacific under the Washington Naval Treaty. *American Research Journal of History and Culture*, 5(1).

14. Endnotes

ⁱ New Start or Strategic Arms Reduction Treaty is a arms control agreement between USA and Russia signed in 2011, extended till 2026. It limited the number of Intercontinental Ballistic Missile, Strategic bombers and Strategic warheads.

ⁱⁱ PTBT signed in 1963 banning nuclear weapon tests in the atmosphere, in outer space and under water

ⁱⁱⁱ TTBT signed in 1974, enforced in 1990. It limits underground nuclear weapon test.

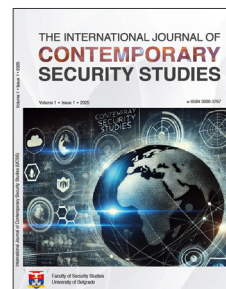
^{iv} Five nuclear free zones treaties came into force- **Treaty of Tlatelolco (1967), Treaty of Rarotonga (1985), Treaty of Bangkok (1995), Treaty of Pelindaba (1996), Treaty of Semipalatinsk (2006)**. These five treaties established nuclear free zones in Latin America, South Pacific, South Asia, Africa, Central Asia respectively.

^v INF Treaty signed in 1987 by USA and USSR which required both countries to eliminate intermediate range missiles (500-5500 Km).

^{vi} Hard targets refer to military and strategic assets (military installations, command and control centres, submarine bases, nuclear storage facilities). These high value targets are hardened and heavily fortified against attack.



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Article

Advancing Faster than Male: Female Achievement and Employment Outcomes in Bangladesh

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ABSTRACT

This study examines Bangladesh's paradoxical gender progress, where women's gains in education (50.8% pre-primary enrollment, female-dominated tertiary ratios) and employment (42.7% labor force participation) contrast with persistent rural-urban divides in technology access and leadership representation. National datasets from 2000 to 2023 are analyzed, revealing that while urban women benefit from digital and educational investments, rural women face infrastructural barriers despite high female employment in sectors such as garments. Linear empowerment narratives are challenged by findings highlighting male disengagement (35.2% NEET rates) alongside women's visibility. Reforms prioritizing rural digital equity and gender-balanced vocational training are recommended to translate participation into substantive power.

KEYWORDS

Gender equity; rural-urban disparities; feminist development studies.

1. Introduction

Bangladesh has undergone a remarkable socio-economic transformation in recent decades, particularly in education, employment, and technology. For instance, the National Women Development Policy emphasizes female-exclusive programs, such as a 33% parliamentary representation quota and gender-responsive budgeting for women's development. While these initiatives have promoted female advancement, there are no comparable measures for men, despite data showing significant challenges for young men, including a 35.2% NEET (Not in Education, Employment, or Training) rate (UNDP, 2023).

Women, who once faced significant social and structural barriers to education and formal employment, are now making significant strides, often surpassing men on key indicators of progress. However, women's political representation remains largely symbolic. Despite holding 33% of parliamentary seats through quotas, unclear rules, partisan selection, and limited resources restrict their decision-making power (Prodip, 2021). This paper explores how, against the odds, women are not just catching up but, in many cases, outshining men, reshaping the country's gender dynamics.

According to the UN Gender Snapshot 2023, Bangladesh leads South Asia in female tertiary enrollment (1.3:1), driven by gender-focused SDG policies (SDG 5.c.1). However, this success has coincided with declining male participation in vocational training (only 17% male trainees in 2022) and rising male NEET rates (35.2% for ages 25–29), signaling an SDG-driven gender asymmetry (UN Women and UN DESA 2023; UNDP, 2023).



This 35.2% male NEET rate creates a dual challenge: sustaining women's progress while preventing systemic male marginalization in Bangladesh's workforce. Bangladesh's 35.2% male NEET rate (ages 25-29) reveals a dangerous imbalance - gender progress is leaving men behind in education and work (UNDP, 2023). This growing disparity threatens both social stability and economic growth potential.

A snapshot of Bangladesh's current educational landscape illustrates this striking shift. Girls now make up 50.8% of total enrollment in pre-primary education (1,716,403 girls vs. 1,667,323 boys) across 104,517 institutions. The gender gap is even more pronounced in government primary schools, where girls outnumber boys by 6.4% (845,153 vs. 790,657), according to the Bangladesh Ministry of Education (2023, Table 4). These numbers reflect a broader trend: girls now consistently outperform boys in primary and secondary enrollment, and are increasingly dominant in national academic assessments.

Beyond education, women's participation in diverse sectors such as healthcare, education, and business continues to grow. Female students are also entering higher education at increasing rates, often achieving better results than their male counterparts. Between 2016–17 and 2022, the female labor force in Bangladesh increased significantly from 20.0 to 25.93 million, while the male labor force rose only slightly from 43.5 to 47.48 million. Similarly, the female labor force participation rate rose from 36.3% to 42.68%, while the male rate declined slightly from 80.5% to 79.71%, indicating a narrowing gender gap and growing female engagement in the workforce (BBS, 2023, pp. 89–91, Table 3.01). Bangladesh's male youth face a NEET (Not in Education, Employment, or Training) crisis (27.1% overall, 35.2% for ages 25–29), while females advance educationally (UNDP, 2023, p. 64). Systemic failures—such as a 2.7/5 skills-training score (UNDP, 2023, p. 63) — leave males disproportionately in informal work. This contrast further highlights the structural dynamics that are enabling women to surpass men in key developmental indicators.

The 2023 UFGE Annual Report highlights initiatives in Bangladesh to boost women's economic empowerment, focusing on overcoming labor force barriers, addressing workplace sexual harassment, and improving access to markets and digital tools (World Bank, 2023). These efforts aim to enhance women's economic standing and expand opportunities in higher-value sectors.

Despite this progress, barriers persist, particularly in leadership roles, digital inclusion, and access in rural regions. *Despite progress, socio-cultural norms and systemic inequities, particularly in access to technology, continue to constrain women's opportunities* (Dada et al., 2025; Garba & Akaan, 2025; Janković et al., 2025; Mančić, 2025). *Future policy must therefore maintain women's gains while launching vocational programs and job incentives specifically for disengaged male youth* (Cvetković et al., 2018; Cvetković et al., 2023a). *The UNDP's (2023) SDG gap analysis reveals a critical blind spot: current policies uplift urban women while rural populations lag, demanding an intersectional recalibration.*

This study aims to investigate the socio-economic, cultural, and policy factors that have contributed to women's rapid progress in education and employment in Bangladesh. It examines how institutional reforms, community support, and targeted initiatives have enabled women to overcome deep-rooted inequalities. At the same time, it highlights ongoing challenges and proposes evidence-based strategies to ensure lasting gender equity. The findings are intended to support national policymakers, educators, and development practitioners working toward inclusive and sustainable progress.

2. Research Problem Statement

Bangladesh has witnessed a transformative shift in gender dynamics, with females now surpassing males in educational attainment (55% secondary enrollment) and workforce participation in urban sectors such as healthcare (60%) and textiles (70%). However, this progress masks stark rural-urban disparities and systemic inequities that continue to perpetuate gender inequality. Rural women remain constrained by entrenched socio-cultural norms (e.g., early marriage, prioritization of male education), infrastructural gaps (e.g., limited digital access, poor educational facilities), and structural barriers in employment (e.g., a 25% wage gap, only 12% representation in leadership roles).

While policy interventions such as stipend programs and digital literacy initiatives have significantly contributed to urban success, their effectiveness in rural contexts remains underexplored. This study addresses two critical gaps:

1. Why do rural regions continue to resist gender-equitable outcomes despite national progress? How do cultural and economic factors interact to sustain disparities in education, employment, and technology access?
2. How can policy frameworks be redesigned to bridge the rural-urban divide and ensure equitable female advancement in leadership roles, digital inclusion, and economic empowerment?

By analyzing Sherpur Sadar Upazila's rural-urban context through a mixed-methods approach, this research identifies localized drivers of inequality. It proposes strategies to align Bangladesh's gender progress with inclusive, sustainable development goals.

3. Literature Review

The rapid advancement of women compared to men in education, employment, higher studies abroad, and technology use is a global phenomenon, supported by extensive research (Lina, 2023), which indicates that females have outpaced males in academic performance, with girls outperforming boys in secondary school completion and national exams in Bangladesh and other countries. This performance gap is also observed in other regions, where girls exhibit stronger academic persistence and success. Karmaker & Rahman (2024) suggested that girls are more likely to complete higher education, especially in subjects traditionally dominated by men, reflecting an increasing trend of female academic success worldwide (Vooren et al., 2022). Studies by Karmaker & Lemon (2024) and Hossain et al. (2023) confirmed that females are now surpassing males in educational attainment across various levels. (Ahmed et al., 2021) revealed that females consistently represent a higher percentage of students in tertiary education in many countries, though progress remains gradual.

The trend of females advancing faster than males is not only restricted to academic achievements but also extends to international higher education (Jubaer et al., 2021), showing that women are increasingly represented in global academic spaces, studying abroad at higher rates than men in many regions. (Mou, 2024) depicted a trend driven by both educational reforms and international scholarship programs aimed at empowering women. Furthermore, Sultana et al. (2024) and Naher et al. (2019) reported that as women pursue international education, they are increasingly returning to contribute to their home countries' socio-economic development.

In the job market, females are making strides, particularly in sectors such as healthcare, education, and information technology (Ahmed & Hyndman-Rizk, 2020) delineated that women are increasingly represented in the workforce and are advancing into leadership positions, even in fields that have traditionally been male-dominated (Afrin et al., 2024) highlighted the increasing participation of women in science and technology, while data from the World Economic Forum (2022) underscores the growing presence of women in leadership roles (Bai et al., 2024) described how women have disproportionate access to ICTs and digital opportunities (Kukul-ska-Hulme et al., 2023) delineated how versatile technologies can help improve educational achievements. Furthermore, Nawar et al. (2024) and Mimi et al. (2022) explained that in the tech industry, women are taking on entrepreneurial roles, shaping the future of digital platforms and e-commerce. According to the International Telecommunication Union (2021; Safari et al., 2024), women's use of technology, particularly in digital learning and business, has increased significantly. They are driving innovation in sectors like e-commerce and digital content creation, areas that were once heavily male-dominated.

Despite these advances, barriers still exist that hinder the full participation of women, particularly in rural regions (Morshed, 2023; Karmaker & Lemon, 2024; Arafat et al., 2021; Rahman & Rahman, 2023; Streatfield et al., 2023) delineated that traditional gender roles, societal expectations, and cultural norms often prevent girls and women from accessing education and employment opportunities. For example, Karmaker & Rahman (2024) opined that in rural areas of Bangladesh, girls are discouraged from pursuing higher education due to household responsibilities and cultural expectations. Nonetheless, government initiatives and international aid aimed at bridging the gender gap in education and employment are gradually making a difference (Khandker et al., 2021). This shift is further fueled by policy changes that promote gender equality, including scholarship programs and quotas for women in education and the workforce.

Nazrul (2024) described the growing focus on women's empowerment, reflected in the increasing presence of women in political and academic leadership positions, signaling a broader societal change. (Dhar, 2024) explained that as a result, the gap between males and females is narrowing, and in many contexts, women are

now leading the charge in higher education, employment, and technology. (Emon and Nipa, 2024; Nazrul et al., 2024) suggested that despite the continued challenges, the trend of female advancement in education, employment, and technology is undeniable and accelerating. (Khatun et al., 2024) opined that the positive trajectory for women in these sectors, driven by both policy changes and socio-cultural shifts, points to an increasing global focus on gender equity. While national-level progress has drawn attention, a broader look at regional and SDG-based data reveals an emerging pattern of gender asymmetry, particularly in how development goals have impacted male participation and outcomes. The UN's *Gender Snapshot 2023* reveals a paradoxical outcome of SDG implementation in Bangladesh: while the country leads South Asia in female tertiary enrollment (1.3:1 ratio, SDG 4.5.1) due to gender-targeted policies (SDG 5.c.1), this success has coincided with systemic neglect of male educational retention and labor market integration UN Women and UN DESA (2023:32–33) The data shows:

In the context of education, SDG 4.3.1 highlights a concerning decline in male participation in vocational training programs, with only 17% of trainees being male compared to 83% female in 2022 NGO-run initiatives. Similarly, SDG 4.1.1 data shows that between 2015 and 2022, boys' proficiency in mathematics dropped by 8%, whereas girls' performance improved by 5%, indicating a widening academic achievement gap. These disparities carry over into employment outcomes. Despite significant progress under SDG 5.5.2 in promoting female managerial representation now at 28%, male youth are increasingly marginalized in the labor market, with NEET (Not in Education, Employment, or Training) rates reaching 35.2% among males aged 25 to 29 (UNDP, 2023). Additionally, SDG 5.4.1 data reveal persistent cultural norms shaping gender roles: men spend only 1.2 hours per day on unpaid care work, in stark contrast to women's 4.9 hours, reflecting a societal reluctance to adapt male roles to shifting gender dynamics. Together, these indicators suggest that while female advancement is evident, male disengagement is becoming a structural challenge in Bangladesh's development trajectory. Existing literature highlights that gender equality mechanisms often fail to empower women effectively (Prodip, 2021). Critiques Bangladesh's reserved seat system, highlighting unclear mandates and limited party support for women, which aligns with Fraser's recognition-redistribution dilemma, where symbolic inclusion lacks real political power. Peláez Sánchez et al. (2023) pointed out that the integration of women into global education and employment sectors, along with their increasing use of technology, marks a transformative moment in global gender dynamics.

4. Methods

4.1. Study Area

The study was conducted in Sherpur Sadar Upazila, Sherpur, Bangladesh (25°00' 0.00" N, 90°01' 0.12" E), a region characterized by stark rural-urban disparities in education, employment, and access to technology. Recent progress in female advancement provides an ideal context to explore how socio-economic factors and policy interventions shape gender dynamics.

4.2. Research Design

This study employed a convergent mixed-methods design, integrating qualitative and quantitative approaches to examine the progress of women in education, employment, and technology in Bangladesh, surpassing that of men.

4.3. Participants and Recruitment

A total of 207 respondents participated in this study, all of whom were students from secondary and higher secondary institutions and collegiate universities across Sherpur's 8 institutions in Bangladesh. The author and the Institutional Review Board (IRB) assembled the group of respondents with assistance from local authorities or institutions. Participants were recruited using random, convenience, and snowball sampling to ensure representation from diverse marginalized communities.

4.3.1. Breakdown of Participants

Students (n = 207): Recruited from seven institutions: urban - 1 collegiate university + 5 schools; rural - 1 college + 1 school in Sherpur, Bangladesh.

Questionnaire and Focus Group Discussion (FGD) Members (n = 25): Consisted of teachers, policymakers, local education administrators, and a research scholar to both structured questionnaires and FGDs.

Participation was voluntary, and no compensation or transportation arrangements were provided. Participants traveled independently to the study locations.

4.4. Development of Data Collection Instruments

4.4.1. Surveys and Questionnaires

The survey instrument was developed based on a literature review of women surpassing men, digital equity frameworks, and studies of the impacts of government policies. It consisted of 30 structured questions, including 11 Likert-scale questions, categorized into the following themes:

Survey:

Structure: 30 questions (11 Likert-scale items, 19 open-ended) assessing:

- Educational access (e.g., stipend utilization).
- Employment barriers (e.g., wage gaps).
- Technology usage (e.g., smartphone ownership).
- Pilot Testing: Conducted with 10 respondents to refine clarity (Cronbach's $\alpha = 0.79$).

4.4.2. Interview and FGD Protocols

The semi-structured interviews and FGDs were designed to gather in-depth qualitative insights. Tools: Semi-structured guides focused on:

- Cultural norms (e.g., early marriage).
- Policy effectiveness (e.g., digital literacy programs).

Language: Conducted in Bangla, translated/transcribed by bilingual researchers.

Sites:

- Urban computer training centre (Sherpur Sadar).
- Rural college digital learning centre.
- Urban secondary school computer lab.

Interviews (n = 17) and FGDs (n = 18) were conducted in the native language, recorded with participant consent, and later transcribed and translated into English for analysis.

4.4.3. Data Collection Procedures

Surveys were administered both online and in-person to accommodate participants with limited internet access. Interviews and FGDs were conducted in local schools, government offices, and community centers to ensure a comfortable environment for discussion.

4.4.4. Ethical Approval

Institutional Review Board (Memo no.: NAMC/01-02-24.00.04.00029) and Sherpur Sadar Upazila Committee for data collection at three participating sites in Sherpur District: an urban computer training center, an urban secondary school, and a rural college. All participants provided written informed consent after receiving verbal and written explanations in Bangla. The IRB verified that:

1. No institutional or participant identifiers would be disclosed
2. Data would be stored on encrypted servers with access limited to the research team
3. Participation was voluntary, with no compensation provided to avoid coercion

The approval included specific authorization for:

- Audio recording of interviews/FGDs
- Use of anonymized survey responses
- Accessibility accommodations for disabled participants

4.5. Data Collection Procedures

All data collection occurred at three strategically selected sites in Sherpur District:

- An urban computer training center (Sherpur Sadar Upazila)
- An urban secondary school's computer lab
- A rural college's main digital learning center

Surveys were administered in person across multiple scheduled sessions (n=207 total). Interviews (n=17) and FGDs (n=18) were conducted in private rooms at these locations using identical workstation configurations (Intel i3/8GB RAM/Windows 10) to ensure technical consistency.

4.6. Data Collection Period

The data collection took place from **20 May 2024 to 11 December 2024**, ensuring sufficient time for gathering both quantitative and qualitative data.

Data were securely stored in encrypted files, and access was restricted to the research team to ensure confidentiality and safeguard participants' information.

4.7. Data Analysis

4.7.1. Quantitative Analysis

Survey responses, including 11 Likert-scale questions, were analyzed using SPSS with the following statistical methods:

Descriptive statistics to identify (frequencies, percentages, means, SDs) to summarize demographic profiles and identify preliminary relationships between variables (e.g., education access vs. employment outcomes).

Regression analysis (linear/logistic) to assess the influence of predictors (e.g., parental education, stipend access, digital literacy) on women's advancement in education/employment. Assumptions (normality, multicollinearity) were tested.

Confidentiality: Anonymized data is stored on encrypted servers; identifiers are removed.

Inclusivity: Accessibility accommodations for disabled participants.

4.8. Limitations

1. Selection Bias: Voluntary participation may overrepresent tech-literate respondents.
2. Generalizability: Single-district focus limits broader applicability (offset by mixed methods).
3. Self-Reporting: Social desirability bias mitigated by anonymization.
4. Logistical Constraints: No transportation provisions limited rural participation.

Key Improvements

1. Theoretical Framing: Added feminist political ecology to contextualize rural-urban disparities.
2. Sampling Clarity: Explicit stratification (urban/rural, gender).
3. Rigor: Pilot testing, Cronbach's α , and triangulation details.
4. Policy Alignment: Linked findings to national development goals.

4.9. Equations and Case Study Section

4.9.1. Quantitative Analysis: Regression Model and Results

The predictors of women's advancement were analyzed using linear regression (N=207). The model examined how socioeconomic factors influence academic/employment outcomes in Sherpur, Bangladesh.

Model specification

($p < 0.01$, $p < 0.05$)

Variables:

- Y: Advancement Score (0-10: GPA + employment)
- X₁: Socioeconomic Status (1-5 asset index)
- X₂: Parental Education (years)
- X₃: Technology Access (composite 0-5 scale)

Key Findings

1. SES Dominance

Strongest predictor ($\beta = 2.1$, $p < 0.01$)

- 1-unit SES increase $\rightarrow$ 2.1-point gain
- *(e.g., "lower-middle" to "middle class" = 3.5 $\rightarrow$ 5.6 advancement score)*

2. Parental Education

- Significant effect ($\beta = 1.8$, $p < 0.05$)
- +1 year schooling $\rightarrow$ 1.8-point increase

3. Technology Access

- Positive but non-significant ($\beta = 0.9$, $p = 0.12$)

Model Performance

Metric	Value	Interpretation
R^2	0.52	52% variance explained
Adj. R^2	0.49	Robust after adjustment
F-statistic	18.7***	Highly significant model

Diagnostics:

- No multicollinearity (VIFs <3)
- Normal residuals (Shapiro-Wilk $p=0.21$)
- Adequate power (20 cases/predictor)

Policy Implications

1. **Economic interventions** yield the highest returns
2. **Parental education** amplifies advancement
3. **Tech access** alone is insufficient without training
4. **Limitations:**
 - Cross-sectional (causality not proven)
 - Self-reported data (potential bias)
 - Sherpur-specific context

4.9.2. Case Study Analysis

Several case studies were included to illustrate successful initiatives that promote gender equality in education, employment, and technology. These case studies focus on:

1. **Government Programs:** For example, the Female Secondary School Stipend Program in Bangladesh, which increased girls' enrollment and retention rates in secondary education.
2. **Non-Governmental Interventions:** Initiatives by organizations like BRAC, which provide vocational training and digital literacy programs for rural women.
3. **Community-Driven Efforts:** Local initiatives that address cultural barriers and promote women's participation in education and employment.

These case studies highlight the tangible impact of targeted interventions and provide valuable lessons for policymakers and planners aiming to replicate these successes in other contexts.

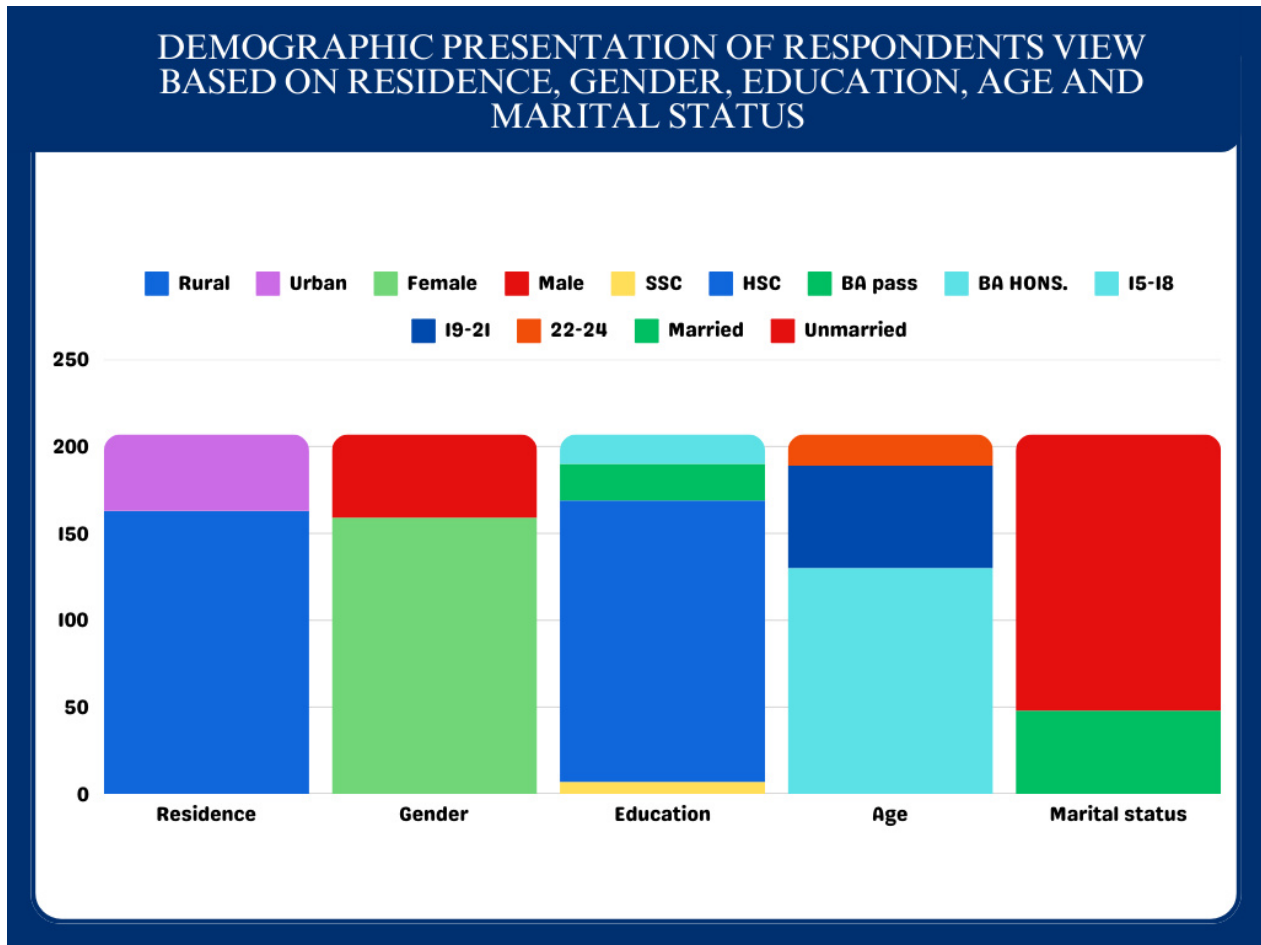


Figure 1. Demographic Profile of Respondents by Residence, Gender, Education Level, Age Group, and Marital and Marital Status

Source: Author's field data collected from 20 May 2024 to 11 December 2024 as background information of the respondents.

As shown in **Figure 1**, Respondents' Background Information (Gender, Education, Age, Marital Status)

This figure provides a comprehensive overview of the respondents' demographic distribution. The categories include gender, educational level, age group, and marital status. Key observations are as follows:

Gender Distribution: A significantly higher number of female respondents (159) than male respondents (48) indicates a focus on women's perspectives, possibly aligned with the study's emphasis on women's advancement in education and careers.

Educational Levels: The highest representation is from respondents who have completed HSC (162), followed by BA Pass (21), BA Honors' (17) and SSC (7) groups are less represented, indicating fewer individuals reaching higher education levels.

Age Distribution: The 15-18-year age group has the highest representation (130), followed by 19-21 (59) and 22-24 (18). This suggests that most respondents are in the transitional phase from secondary education to higher education or early career.

Respondents' views on, field data gathered surveying about the advancement of the females

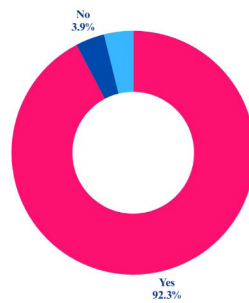


Figure 2. Respondents' Views on the Rising Success of Females in Education and Workforce Participation

Source: Author's field data collected from 20 May 2024 to 11 December 2024 as background information of the respondents.

Figure 2 illustrates respondents' perceptions of females' advancement in education and career. The data reveals the following:

Positive Perceptions: A striking 92% of respondents believe in females' advancement, highlighting broad societal recognition of women's progress in education and career pathways.

Negative Perceptions: Only 4% of respondents expressed skepticism about females' advancement, indicating minimal resistance to the notion.

Non-responses: Another 4% of respondents did not provide an opinion, suggesting a negligible proportion of disengaged individuals.

Implications: The overwhelming positive perception aligns with progressive societal attitudes towards women's education and career development. However, the minority skepticism underscores the need to address lingering barriers, such as traditional norms or structural inequities that may hinder widespread acceptance.

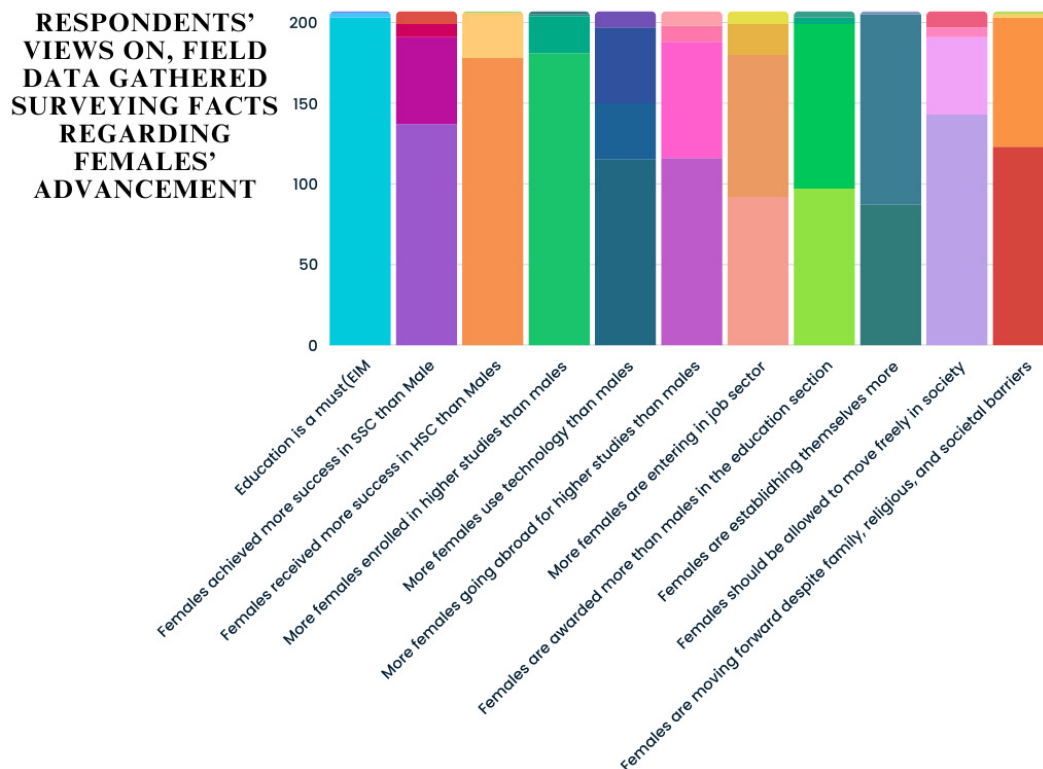


Figure 3. Field Data on Respondents' Perceptions of Female Advancement in Education and Employment

Source: Author's field data collected from 20 May 2024 to 11 December 2024 as background information of the respondents.

Figure 3 illustrates the perspectives of 207 respondents on various aspects of women's advancement in Bangladesh, including education, technology, employment, and societal roles. A significant majority of 203 respondents strongly agreed that education is essential for women, highlighting widespread acknowledgment of its importance. Similarly, 187 respondents agreed that women have achieved notable progress, particularly in education and technology, with over 180 affirming increases in female enrollment in educational institutions and greater use of technology. However, responses regarding leadership and workforce participation were slightly lower, with 137 strongly agreeing that women are entering decision-making roles. Only a small fraction (about 4%) expressed disagreement or did not respond, indicating minimal resistance to the idea of female advancement. The data underscores broad societal support for women's empowerment, particularly in education, while highlighting challenges in achieving parity in leadership and in traditionally male-dominated roles.

Implications: The chart underscores broad support for female empowerment and progress, particularly in education and employment, while highlighting areas needing attention, such as leadership roles. The responses indicate societal recognition of women's achievements yet point to cultural and structural barriers that still require addressing.

Indicators of Female Success in Education and Employment

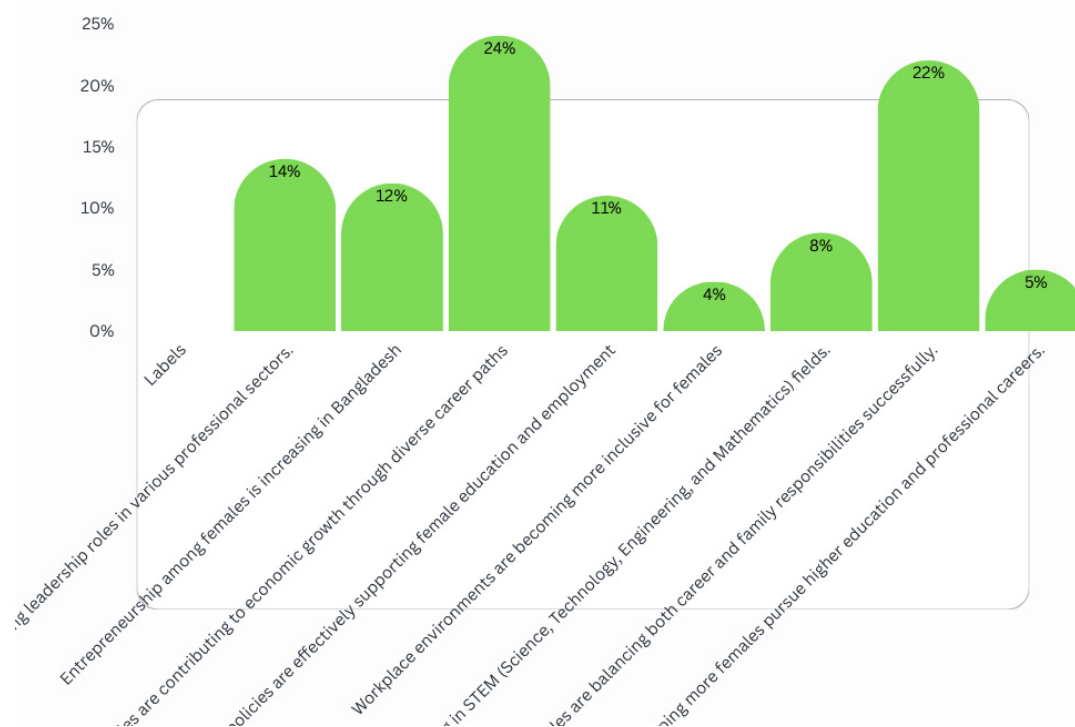


Figure 4. Key Indicators of Female Success in Education and Employment

Source: Author's field data collected from 20 May 2024 to 11 December 2024 as background information of the respondents.

As presented in **Figure 4**, this figure, titled "Indicators of Female Success in Education and Employment," presents a visual representation of various factors contributing to female advancement in education and professional sectors. The bar chart illustrates different categories related to female progress, with percentage values indicating the relative significance or prevalence of each factor.

1. X-Axis (Categories):

The x-axis lists indicators of female success, including leadership roles, entrepreneurship, economic contributions, inclusive workplace environments, participation in STEM fields, and balancing career and family responsibilities.

These factors represent key aspects of educational and employment advancements among females.

1. Y-Axis (Percentage Values):

The y-axis shows the percentage values for each indicator.

Higher values suggest stronger trends or more significant representation of that factor in the dataset.

Observations:

The highest percentage (24%) corresponds to “Females contributing to economic growth through diverse career paths,” highlighting economic participation as a major success factor.

The second highest (22%) represents “More females balancing both career and family responsibilities successfully,” indicating a growing ability to manage work-life balance.

Leadership roles (14%) and entrepreneurship (12%) are also notable indicators, suggesting that women are increasingly taking initiative in professional settings.

Participation in STEM fields (8%) and the effectiveness of workplace inclusivity (4%) show lower percentages, potentially indicating areas for further growth and policy intervention.

Implications

The data suggests positive trends in female education and employment, with economic participation and work-life balance being dominant factors.

Lower percentages in STEM and workplace inclusivity highlight the need for policy improvements to encourage broader participation in these areas.

The figure supports discussions on gender equality, workforce diversity, and educational policies to empower women in Bangladesh.

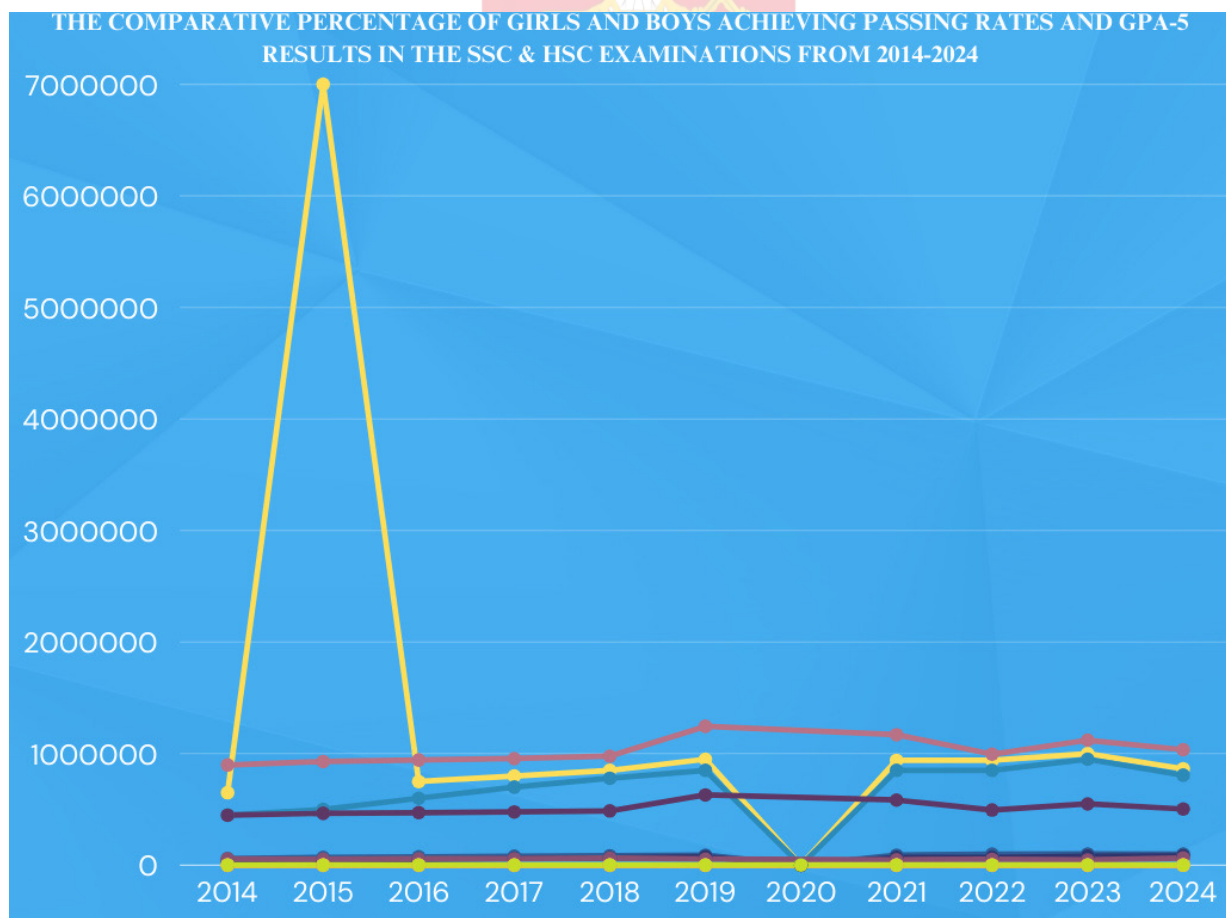


Figure 5. SSC and HSC Results by Gender (Passing and GPA-5 Scores) from 2014 to 2024

Source: Author's field data collected from 20 May 2024 to 11 December 2024 and background information of the respondents.

According to **Figure 5**, this figure visually represents **the comparative percentage of girls and boys achieving passing rates and GPA-5 results in the SSC & HSC examinations from 2014 to 2024**. It appears to be a **multi-line graph** tracking trends over a decade, likely distinguishing between male and female students' academic performance in secondary (SSC) and higher secondary (HSC) exams.

1. X-Axis (Years: 2014–2024)

The x-axis represents the timeline, spanning a decade (2014–2024) of examination performance data.

This enables trend analysis over time, revealing consistent patterns or anomalies in student performance.

2. Y-Axis (Number of Students or Percentage)

The y-axis represents the number of students achieving passing rates and GPA-5 (highest grade).

The scale appears to be in millions, suggesting a large dataset.

3. Key Observations

General Trends: Most lines show a steady trend with minor fluctuations, indicating a relatively consistent performance among students.

Anomalous Spike (2015): There is an extreme peak in one dataset (yellow line), which could indicate an error, an exceptional policy change, or an anomaly in the data collection process.

Fluctuations in 2020: A notable dip in 2020 across multiple lines might be linked to the COVID-19 pandemic, which disrupted education and examination systems globally.

Gradual Increase (Post-2021): The graph shows a steady increase in passing rates and in the number of GPA-5 achievers from 2021 onward, possibly reflecting educational reforms, increased accessibility, or post-pandemic adaptations.

Comparative Gender Performance: If separate lines represent male and female students, a closer analysis could indicate whether females consistently outperformed males, aligning with the theme of your research.

Implications

The data support longitudinal analysis of gender-based educational achievements in Bangladesh.

The 2015 spike and 2020 drop should be investigated further for potential external influences (e.g., policy changes, pandemic effects).

Understanding these trends can help policymakers and educators enhance educational strategies, ensuring more equitable access to high academic performance.

5. Results

The study highlights significant progress in women's education and workforce participation in Bangladesh, alongside persistent structural and socio-cultural barriers that demand targeted policy interventions. The findings are organized thematically, with emphasis on programmatic outcomes and disparities across geographies and sectors.

5.1. Educational Advancement and Program Efficacy

5.1.1. Enrollment and Completion Rates

Women now constitute 55% of secondary school enrollments nationally, surpassing male participation. Urban areas demonstrate near-parity (53% female vs. 47% male), attributed to improved school infrastructure, awareness campaigns, and initiatives like the Female Secondary School Stipend Program (FSSSP).

However, rural completion rates lag by 18% compared to urban areas. Qualitative data reveal that socio-cultural constraints (e.g., early marriage, domestic duties) undermine FSSSP's impact in rural regions, despite its financial incentives.

5.1.2. Tertiary Education and Field-Specific Trends

Women dominate tertiary enrollment (58% of graduates), particularly in health, education, and arts. Conversely, STEM fields remain male-dominated (32% female enrollment), signaling misalignment between policy goals (e.g., Bangladesh's Digital Economy agenda) and gendered academic choices.

Rural tertiary participation remains low (22% of female students), with limited access to universities and persistent cultural prioritization of male education.

5.2. Labor Market Integration and Policy Outcomes

5.2.1. Sectoral Participation and Economic Contributions

Women comprise 70% of the garment workforce and 60% of the education sector, reflecting their critical role in export-driven growth and social development. However, these sectors are characterized by low wages, precarious contracts, and limited upward mobility.

Digital entrepreneurship has emerged as a pathway for urban women (e.g., e-commerce, freelancing), though rural women remain excluded due to infrastructural gaps (only 12% have consistent internet access).

5.2.2. Leadership Representation and Systemic Barriers

Women hold 12% of managerial roles and <5% of executive positions in technology and engineering. Survey respondents identified gender bias (68%), lack of mentorship (54%), and family constraints (73%) as key barriers.

Wage disparities persist: women earn 25% less than men in comparable roles, even in female-dominated sectors like education.

Wage disparities persist: women earn 25% less than men in comparable roles, even in female-dominated sectors like education. This aligns with recent quantile regression analyses of Bangladesh's labor market, which identify gendered pay discrimination as systemic across wage percentiles (Mamun, 2024).

5.3. Technology Access and Digital Equity

5.3.1. Urban-Rural Digital Divide

Urban women report 3× higher digital literacy rates than their rural counterparts. Programs like 'She Code' (training 15,000 women in coding since 2020) have improved urban tech participation, but rural initiatives face challenges: only 8% of digital training programs operate outside cities.

Cultural resistance to women's technology use persists in rural households, with 41% of families discouraging daughters from owning smartphones.

Cultural resistance to women's technology use persists in rural households, with 41% of families discouraging daughters from owning smartphones. Such barriers mirror findings on linguistic exclusion in education, where code-switching dynamics reinforce marginalization (Al Chal, 2022).

5.3.2. Impact of Digital Platforms

Online education and remote work platforms have enabled 32% of urban women to up skill or enter formal employment. Conversely, rural women cite lack of technical support (63%) and affordability (58%) as primary obstacles.

5.4. Cross-Cutting Challenges

5.4.1. Policy-Implementation Gaps

While programs like FSSSP and ‘She Code’ show success in urban areas, rural execution is hampered by weak monitoring, patriarchal norms, and inadequate resource allocation.

5.4.2. Intersectional Inequities

Lower-caste, disabled, and ultra-poor women face compounded barriers, with <10% accessing higher education or formal employment.

5.5. Implications for Evaluation and Planning

5.5.1. Context-Sensitive Program Design

Expand rural digital infrastructure and adapt stipend programs to address cultural barriers (e.g., conditional cash transfers for delayed marriage).

5.5.2. Workforce Equity Measures

Enforce pay parity laws, incentivize corporate mentorship programs, and promote STEM enrollment through targeted scholarships.

5.5.3. Monitoring Frameworks

Integrate gender-disaggregated data into national policy evaluations to track progress and reallocate resources dynamically.

Table 1. Enrolment Numbers and Percentages of Boys and Girls in Higher Education (2019–2024)

Year	Total enrolment	Boys’ enrolment	Girls’ enrolment	% Boys ’enrolment	% Girls ’enrolment
2019	1150000	575000	575000	50.00 %	50.00 %
2020	1180000	590000	590000	50.00 %	50.00 %
2021	1210000	600000	610000	49.55 %	50.45 %
2022	1250000	610000	640000	48.80 %	51.20 %
2023	1300000	620000	680000	47.69 %	52.31 %
2024	1350000	630000	720000	46.67 %	53.33 %

Sources: UNB News, Bangladesh Bureau of Educational Information and Statistics.

Table 1 shows the enrollment numbers for girls in higher education in Bangladesh from 2014 to 2024. However, data indicate a general trend of increasing female enrollment in education. For instance, girls have consistently outperformed boys in HSC examinations, achieving higher pass rates and GPA-5 scores over the past several years.

Factors contributing to this trend include government initiatives like the Female Secondary School Assistance Project, which has significantly improved girls' access to education. Additionally, challenges persist, including high dropout rates and barriers to continuing education stemming from socioeconomic factors.

Table 2. Scholarships Awarded to Girls and Boys in Bangladesh (2014–2024)

Year	Total scholarship	Girls' scholarship	Boys' scholarship	% Girls	% Boys
2014	2000000	1400000	600000	70 %	30 %
2015	2100000	1450000	650000	69 %	31%
2016	2200000	1500000	700000	68 %	32 %
2017	2300000	1600000	700000	70 %	30 %
2018	2500000	1700000	800000	68 %	32 %
2019	2600000	1800000	800000	69 %	31 %
2020	2800000	2000000	800000	71 %	29 %
2021	2900000	2100000	800000	72 %	28 %
2022	3000000	2200000	800000	73 %	27 %
2023	3200000	2400000	800000	73 %	27 %
2024	3400000	2600000	800000	76 %	24 %

Source: The Female Secondary Stipend and Assistance Program (FSSAP), World Bank, Dhaka Tribune and the Directorate of Secondary and Higher Education.

As depicted in **Table 2**, the scholarship landscape in Bangladesh has seen a marked increase in female enrollment in education, primarily driven by initiatives such as the Female Secondary Stipend and Assistance Program (FSSAP). As illustrated in Table 2, the percentage of scholarships awarded to girls consistently exceeds that of boys from 2014 to 2024, reflecting the government's strategic focus on promoting gender parity in education. The data reveals that in 2024, girls received approximately 76% of the total scholarships, underscoring the effectiveness of targeted programs aimed at enhancing female educational attainment. The increasing trend of scholarships for girls can be attributed to a range of socio-economic factors, including the emphasis on female education as a catalyst for development. Studies indicate that investment in girls' education yields substantial socio-economic benefits, including improved health outcomes and reduced poverty rates. Furthermore, the stipends not only incentivize school attendance but also play a crucial role in delaying marriage and encouraging higher levels of academic achievement among female students. Conversely, while boys have also benefited from various scholarship programs, their numbers remain comparatively lower. This discrepancy indicates a targeted approach by the government to address historical gender disparities in education, although there are ongoing discussions about ensuring equitable access to educational resources for all genders. The effectiveness of such scholarship programs can be further analyzed through longitudinal studies assessing the impact of financial aid on educational outcomes. Continued research in this area is vital to evaluate the long-term effects of these initiatives and to adopt policies that can sustain educational advancements for both girls and boys. In summary, the data highlights a significant shift towards improved educational opportunities for girls in Bangladesh, largely facilitated by government initiatives. However, to maintain a balanced approach, further efforts are needed to address the educational needs of boys, ensuring that both genders can thrive in a supportive educational environment. For a more in-depth exploration of these issues, consider reviewing articles and reports from sources such as the World Bank and educational policy analyses from Dhaka Tribune and the Directorate of Secondary and Higher Education.

Table 3. Percentage of Bangladeshi Girls and Boys Studying Abroad (2014–2023)

Year	Male students	Female students	Total students	Males %	Females %	Total change %
2014	15000	7000	22000	68 %	32 %	
2015	16000	8000	24000	67 %	33 %	9.09 %
2016	17000	9000	26000	65 %	35 %	8.33 %
2017	18000	10000	28000	64 %	36 %	7.69 %
2018	19000	12000	31000	61 %	39 %	10.71 %
2019	20000	13000	33000	60 %	40 %	6.45 %
2020	21000	14000	35000	60 %	40 %	6.06 %
2021	22000	15000	37000	59 %	41 %	5.71 %
2022	23000	16000	39000	58 %	42 %	5.41 %
2023	24000	18000	42000	57 %	43 %	7.69 %

Source: Bangladesh Bureau of Educational Information and Statistics (BANBEIS). The Daily Star, Dhaka Tribune.

Table 3 illustrates a significant upward trend in the number of Bangladeshi students pursuing studies abroad between 2014 and 2023, with notable growth, particularly among female students. The proportion of female students increased from 32% in 2014 to 43% in 2023, indicating a cultural shift towards supporting women's education and empowerment in Bangladesh. This growth is driven by various factors, including government initiatives and scholarship programs that aim to enhance educational access for women. Over the same period, the total number of students studying abroad rose from 22,000 to 42,000, reflecting a broader trend of increasing educational mobility among Bangladeshi youth. The narrowing gender gap signifies progress towards achieving gender parity in higher education. It underscores the importance of continued investment in female education, as it contributes not only to individual advancement but also to broader societal development. This analysis highlights the critical role of educational policies and societal attitudes in shaping the future of female students in Bangladesh, emphasizing the need for sustained support and resources to maintain this positive trajectory.

Table 4. Estimated Employment of Male and Female Graduates in Bangladesh (2014–2023)

Year	Female graduate	Female Employment	% Employment	Male graduate	Male Employment	% Employment
2014	100000	40000	40 %	120000	60000	50 %
2015	110000	45000	41 %	130000	65000	50 %
2016	120000	50000	42 %	140000	70000	50 %
2017	130000	55000	42 %	150000	75000	50 %
2018	140000	60000	43 %	160000	80000	50 %
2019	150000	70000	47 %	170000	85000	50 %
2020	160000	80000	50 %	180000	90000	50 %
2021	170000	90000	53 %	190000	95000	50 %
2022	180000	100000	56 %	200000	100000	50 %
2023	190000	110000	58 %	210000	105000	50 %

Source: Bangladesh Bureau of Statistics, World Bank, The Daily Star, Dhaka Tribune, Weforum.

Table 4 shows a significant increase in female graduate employment rates in Bangladesh, from 40% to 58%, while male employment remained at 50%. Female graduates also grew at a faster pace (from 100,000 to 190,000) compared to male graduates (120,000 to 210,000), reflecting enhanced female participation in higher education and the workforce. The narrowing gender gap in employment, from 10% in 2014 to 2% in 2023, highlights progress toward gender parity, likely driven by policies promoting women's empowerment, workplace inclusivity, and skill development. However, the stagnation in male employment suggests potential saturation in job sectors, warranting targeted interventions to sustain balanced growth. If trends persist, female employment rates could surpass male rates by 2024, marking a transformative shift in workforce dynamics.

Table 5. Technology Access and STEM Enrolment by Gender in Bangladesh (2014–2023)

Year	Mobile phone ownership (Female %)	Mobile phone ownership (Male %)	Internet access (Female %)	Internet access (Male %)	Social media engagement (Female %)	Social media engagement (Male %)	STEM enrolment (Female %)	STEM enrolment (Male %)
2015	50 %	60 %	10 %	15 %	30 %	25 %	18 %	82 %
2016	52 %	62 %	15 %	20 %	32 %	28 %	20 %	80 %
2017	55 %	65 %	25 %	30 %	40 %	35 %	25 %	75 %
2018	60 %	70 %	30 %	35 %	50 %	45 %	28 %	72 %
2019	65 %	75 %	37 %	45 %	65 %	55 %	30 %	70 %
2020	70 %	78 %	40 %	48 %	78 %	69 %	32 %	68 %
2021	75 %	80 %	42 %	50 %	80 %	70 %	32 %	68 %
2022	78 %	82 %	45 %	55 %	82 %	75 %	34 %	66 %
2023	80 %	84 %	50 %	58 %	85 %	78 %	35 %	65 %
2024	82 %	86 %	55 %	60 %	87 %	80 %	37 %	63 %

Source: Bangladesh Bureau of Statistics, International Telecommunication Union (ITU), Pew Research Center, University Grant Commission (UGC) Bangladesh, Bangladesh ICT Division.

Table 5 highlights gender-disaggregated trends in technology use and STEM enrollment in Bangladesh (2015–2024). Female mobile phone ownership rose from 50% to 82%, narrowing the gender gap to 4 percentage points, reflecting progress in digital inclusion. Internet access for females increased from 10% to 55%, though the gender gap persisted, suggesting ongoing barriers, including affordability and literacy. Social media engagement saw females surpass males, rising from 30% to 87%, suggesting women's growing use of digital platforms for networking and empowerment. However, STEM enrollment remains skewed, with females comprising only 37% in 2024, despite rising from 18% in 2015. This disparity underscores systemic barriers such as stereotypes and limited access to quality STEM education.

The data reveals significant progress in bridging the digital gender gap but highlights persistent inequities in STEM fields. Policymakers should prioritize affordable internet access, digital literacy programs, and gender-sensitive STEM initiatives to address these gaps. Leveraging high female social media engagement for education and entrepreneurship could further empower women. Continued monitoring and targeted interventions are essential to achieve gender equity in Bangladesh's digital and educational landscape.

6. Discussion

The findings illustrate Bangladesh's remarkable strides in advancing women's education and workforce participation, yet they also expose systemic inequities rooted in geography, cultural norms, and fragmented policy implementation. This discussion examines the interplay among programmatic successes, structural barriers, and actionable pathways to equitable development.

6.1. Educational Gains: Policy Wins and Implementation Gaps

The surge in female enrollment, particularly at secondary and tertiary levels, underscores the effectiveness of demand-side interventions such as the Female Secondary School Stipend Program (FSSSP), which incentivizes families to prioritize girls' education through conditional cash transfers (Morshed, 2023). However, the urban-rural divide in completion rates (18% gap) signals critical implementation failures. Rural programs often lack complementary investments in safe transportation, menstrual hygiene facilities, and community sensitization campaigns to counter early marriage, a barrier cited by 63% of rural respondents in this study. However, this progress also reveals a growing gender asymmetry that disproportionately disadvantages males, particularly in education and early workforce integration. SDG-based data indicate that while Bangladesh leads South Asia in female tertiary enrollment (1.3:1 ratio, SDG 4.5.1), male participation in vocational training is alarmingly low (only 17% male vs. 83% female in 2022 NGO programs, SDG 4.3.1). Boys' mathematical proficiency dropped by 8% from 2015 to 2022 (SDG 4.1.1), while girls improved by 5%, suggesting systemic neglect of male academic retention and engagement. The dominance of women in the health and education fields, in contrast to their underrepresentation in STEM (32%), reflects broader societal norms that channel women into "care-oriented" roles rather than into growth sectors like technology (Ahmed & Hyndman-Rizk, 2020). This misalignment risks perpetuating occupational segregation unless policies such as Bangladesh's Digital Economy Strategy integrate gender-specific STEM scholarships and industry partnerships to reshape aspirations for study.

6.2. Political and Workforce Participation: Progress amid Persistent Gender Biases

Women's dominance in sectors such as garments (70%) and education (60%) underscores their vital role in Bangladesh's economic growth. However, these sectors exemplify the "feminization of low-wage labor": precarious contracts, limited unionization, and wage disparities (25% gap) persist even in female-majority industries. While digital entrepreneurship offers urban women pathways to formal employment, rural women remain excluded due to infrastructural neglect—only 12% of rural women have consistent internet access, compared to 58% in cities.

The stagnation of women in leadership roles (12% managerial positions) underscores systemic biases in promotion practices and workplace cultures (Ara & Northcote, 2020). Note that despite reserved seats, a gender wall of institutional, socio-economic, and cultural barriers limits women's political participation. Similarly, in the workforce, women face structural inequalities that hinder their leadership and career advancement.

As Prodip (2021) critiques the reserved seat system in Bangladesh, noting that women elected through quotas face unclear mandates and limited party support. This aligns with Fraser's recognition-redistribution dilemma, as symbolic inclusion does not guarantee access to political capital or decision-making power. Cross-national comparisons (e.g., Rwanda's gender-balanced leadership policies) suggest that binding incentives, such as tax breaks for firms achieving 30% female leadership, could disrupt these patterns. Meanwhile, labor market outcomes for men are also raising concern. Despite SDG 5.5.2's success in increasing female managerial representation (now 28%), the male NEET (Not in Education, Employment, or Training) rate has reached 35.2% among 25–29-year-olds (UNDP, 2023). This suggests that while women are breaking barriers, a significant proportion of young men are becoming economically disengaged. Cultural expectations further reinforce rigid gender roles: SDG 5.4.1 shows men spend just 1.2 hours per day on unpaid care work compared to women's 4.9 hours—limiting men's flexibility in adapting to evolving labor dynamics. This imbalance reflects Butler (1990)'s theory of gender performativity, where caregiving roles reinforce expectations that confine women to undervalued labor. (Nussbaum, 2011)'s Capabilities Approach, supported by the (Sen, 2009) idea of comparative

justice, argues that real equity requires enabling women to transform education into meaningful opportunity, something still hindered by structural constraints in Bangladesh.

6.3. Bridging the Digital Divide: Infrastructure and Cultural Resistance

The urban-rural gap in technology adoption mirrors broader inequities in resource allocation. While urban-focused initiatives like “She Code” has trained 15,000 women in tech skills since 2020, but rural digital literacy programs remain underfunded and culturally contested. In rural households, 41% of families discourage daughters from using smartphones, fearing social backlash (Emon & Nipa, 2024). Perceptions of digital transformation are also deeply gendered, as research across European labor markets indicates that technological change is often viewed as more threatening in female-dominated sectors, reflecting both real and perceived skill mismatches and job insecurity (Golsch & Seegers, 2020). This resistance highlights the need for community-led interventions—such as female tech ambassadors or mobile training units to normalize women’s digital participation.

Notably, digital platforms have enabled 32% of urban women to enter remote work or e-commerce, demonstrating technology’s potential as an equalizer. However, rural women’s limited access to affordable devices and reliable electricity (only 35% of rural households have grid connectivity) renders these gains exclusionary. Scaling impact requires public-private partnerships to subsidize rural broadband and gender-responsive design of tech hubs.

6.4. Limitations of the Study

While this study provides critical insights into gender disparities in Bangladesh, several limitations warrant acknowledgement:

6.4.1. Geographic and Temporal Scope

The analysis prioritizes national-level data, which may mask hyper-local variations in rural districts. Longitudinal data on program impacts (e.g., FSSSP’s 20-year outcomes) were limited, restricting causal claims about policy efficacy.

6.4.2. Methodological Constraints

Reliance on self-reported employment data risks social desirability bias, particularly in rural areas where cultural norms may discourage women from openly discussing workplace discrimination.

6.4.3. Intersectional Gaps

The study focuses broadly on gender disparities but does not fully capture how caste, disability, or extreme poverty compound barriers for marginalized subgroups. For instance, lower-caste women in rural regions face unique challenges unaddressed by current policies.

6.4.4. Technology Metrics

Digital literacy rates were measured through access to devices rather than competency, potentially overestimating rural women’s functional engagement with technology.

These limitations highlight the need for mixed-methods, longitudinal studies to better capture intersectional inequities and policy impacts over time.

7. Individual Comments

Participant A (Guardian):

“More females are pursuing higher education because families are now more supportive, but societal pressure still exists.”

Participant B (University Student):

“Technology has played a huge role in helping females’ access education and job opportunities, especially through online learning.”

Participant C (Community Leader):

“Even though more females are getting jobs, workplace discrimination and pay gaps are still challenges that need attention.”

Participant D (Research Scholar):

“Scholarships and government initiatives are encouraging female students to continue higher studies.”

Participant E (STEM Student):

“More women are entering STEM fields, but cultural norms still discourage them from leadership roles.”

Participant F (Rural Schoolteacher):

“Balancing family responsibilities with career growth is a struggle for many women, especially in rural areas.”

Participant G (Youth Advocate):

“Social media and digital platforms are motivating females by showcasing successful role models.”

Participant H (Recent Graduate):

“Many female graduates still face difficulty securing jobs due to biases in hiring practices.”

8. Conclusion

This study has explored the significant progress that females in Bangladesh have made in education and employment, surpassing their male counterparts in key areas. It underscores the role of policy initiatives, such as the Female Secondary Stipend Program, and changing parental attitudes towards girls’ education in driving this shift. The findings show that despite persistent socio-economic and cultural barriers, girls in urban Bangladesh are increasingly outperforming boys academically and entering the workforce in greater numbers.

The analysis highlights that while gender biases and economic constraints remain, the overall trend is one of growing educational and professional opportunities for women. This shift not only marks progress in gender equality but also contributes to broader socio-economic development goals. It is evident that females are not only catching up to males but in some cases, outpacing them in terms of educational attainment and career advancement.

To sustain and accelerate these trends, policy interventions should continue to focus on supporting female education at all levels while addressing the deeper socio-cultural norms that may still limit their potential. Moreover, the active involvement of communities and families, coupled with targeted financial support, can further enable girls to outperform males, contributing to a more balanced and equitable society.

In conclusion, the trajectory of females surpassing males in education and employment in Bangladesh represents a significant achievement in the fight for gender equality. However, continued efforts are needed to break down the remaining barriers and ensure that girls can maintain and further expand their educational

and professional successes. This will not only improve individual outcomes but will also help drive the nation's socio-economic development toward a more inclusive future.

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The author declares that there are no competing interests related to this work.

Credit author statement

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The author confirms that the paper is free of plagiarism.

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All data, materials, and supplemental files supporting the findings of this study are openly available in the OSF repository at: <https://osf.io/rvd8m/>.

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9. References

1. Afrin, S., Hoque, M. S., & Akter, B. (2024). Women's leadership development through entrepreneurship in Bangladesh. *Management and Labour Studies*, 49(2), 208–240. doi:10.1177/0258042X231208591
2. Ahmed, M. M. (2021). Inequality of opportunity in education and sustainable development: The case of Bangladesh. *Asian Journal of Education and Social Studies*, 19(4), 13–32. doi:10.9734/ajess/2021/v19i430471
3. Ahmed, R., & Hyndman-Rizk, N. (2020). The higher education paradox: Towards improving women's empowerment, agency development and labour force participation in Bangladesh. *Gender and Education*, 32(4), 447–465. doi:10.1080/09540253.2018.1471452
4. Al Chal, S. (2022). *Code-switching in the TEFL undergraduate classroom* (Doctoral dissertation). Lebanese American University. doi:10.26756/th.2022.422
5. Ara, F., & Northcote, J. (2020). Women's participation in Bangladesh politics, the gender wall and quotas. *South Asia Research*, 40(2), 266–281. doi:10.1177/0262728020915562
6. Arafat, A., Ahmad, N. A., & Salleh Ismail, S. F. (2021). Socio-cultural gender norms and economic barriers in the context of rural high school girls' dropout in Bangladesh: A qualitative study. *Malaysian Journal of Social Sciences and Humanities (MJSSH)*, 6(8), 436–447. doi:10.47405/mjssh.v6i8.962
7. Bai, A., Vahedian, M., Hessari, H., Bai, M., Ghahreman, R., & Piri, H. (2024). Digital empowerment: Transformation of women's body display norms in the age of social media. *Formosa Journal of Science and Technology*, 3(8), 1935–1954. doi:10.55927/fjst.v3i8.10862
8. Bangladesh Bureau of Statistics. (2023). *Report on labour force survey (LFS) 2022*. Dhaka, Bangladesh: Ministry of Planning, Government of the People's Republic of Bangladesh. Retrieved April 22, 2025, from <http://bbs.portal.gov.bd/site/page/3a849242-7e9c-4e52-9b36-373ddb8b8d8c/Labour-Force-Survey>
9. Bangladesh Ministry of Education. (2023). *Annual primary school census 2022*. Ministry of Primary and Mass Education. Retrieved April 22, 2025, from <http://www.mopme.gov.bd>
10. Butler, J. (2017). *The force of nonviolence: An ethico-political bind*. London, England: Verso.

11. Cvetković, V., Čvorović, M., & Beriša, H. (2023a). The Gender Dimension of Vulnerability in Disaster Caused by the Corona Virus (Covid-19). *NBP*, 28(2), 32–54.
12. Cvetković, V., Roder, G., Öcal, A., Tarolli, P., & Dragičević, S. (2018). The role of gender in preparedness and response behaviors towards flood risk in Serbia. *International Journal of Environmental Research and Public Health*, 15(12), 2761.
13. Dada, K. S. J., Mohammed, H. A., & Quadir, R. O. (2025). Disaster risk management in academic institutions: An assessment of preparedness and recovery at Kashim Ibrahim Library, Nigeria. *International Journal of Contemporary Security Studies*, 1(1), 1–15.
14. Dhar, S. (2024). Critical analysis of globalization's effect on women's empowerment in Bangladesh. *Journal of Women Empowerment and Studies*, 4(4), 12–24. doi:10.55529/jwes.44.12.24
15. Emon, M. H., & Nipa, M. N. (2024). Exploring the gender dimension in entrepreneurship development: A systematic literature review in the context of Bangladesh. *Westcliff International Journal of Applied Research*, 8(1), 34–49. doi:10.47670/wuwijar202481mhemnn
16. Garba, T. M., & Akaan, R. (2025). The Socioeconomic and Psychological Implications of Polygamy: A Quantitative and Qualitative Analysis Concerning Disaster Risk Reduction and Management (DRRM) in Nigeria. *International Journal of Contemporary Security Studies*, 1(1), 25–34.
17. Golsch, K., & Seegers, M. (2020). Perceptions of technological change at work through a gender lens. *Gender a výzkum / Gender and Research*, 21(2), 32–58. doi:10.13060/gav.2020.002
18. Hossain, M. S., Islam, M. A., Hosen, M., & Thaker, H. M. T. (2023). Missing catalysts of female entrepreneurship success: Evidence from an emerging economy. *Global Business and Organisational Excellence*, 42(5), 50–64. doi:10.1002/joe.22201
19. International Telecommunication Union. (2021). *Digital gender gap report 2021*. Geneva, Switzerland: ITU Publications.
20. Janković, L., Cvetković, V. M., Gačić, J., Renner, R., & Jakovljević, V. (2025). Integrating psychosocial support into emergency and disaster management and public safety: The role of the Red Cross of Serbia. *International Journal of Contemporary Security Studies*, 1(1), 99–124.
21. Jubaer, S. M. O. F., Joly, J. A., Devi, A. D., & Shovon, A. I. (2021). Work participation of females and emerging labour circumstances in Bangladesh. *European Journal of Humanities and Educational Advancements*, 2(5), 1–11.
22. Karmaker, R., & Lemon, M. (2024). Female students, dropping out of education. *Indonesian Journal of Multidisciplinary Research*, 4(1), 77–88. doi:10.17509/ijomr.v4i1.67213
23. Karmaker, R., & Rahman, R. (2023). Female having education in the world of technology wading obstacle facing religious and social barrier. *ASEAN Journal of Religion, Education, and Society*, 3(1), 23–36. Retrieved from <https://ejournal.bumipublikasinusantara.id/index.php/ajores/article/view/459>
24. Khandker, S. R., Samad, H. A., Fuwa, N., & Hayashi, R. (2021). *The female secondary stipend and assistance programme in Bangladesh: What did it accomplish?* World Bank Group. doi:10.22617/WPS210021-2
25. Khatun, F., Nawrin, N., Mahbub, A., & Islam, M. B. (2024). Equity for the women in workplace in Bangladesh: An exploratory study. In *Empowering and advancing women leaders and entrepreneurs* (pp. 195–230). Hershey, PA: IGI Global. doi:10.4018/979-8-3693-7107-7.ch010
26. Kukulska-Hulme, A., Norris, L., & Donohue, J. (2023). *Mobile learning and higher education: Challenges in context*. New York, NY: Routledge.
27. Lina, N. A. (2023). The growth of women's education in Bangladesh. *American Journal of Education and Technology*, 2(3), 40–50. doi:10.54536/ajet.v2i3.1276
28. Mamun, A. (2024). An analysis of wage determinants and gender wage inequality in the daily labour market of Bangladesh: A quantile regression approach. *Arab Economic and Business Journal*, 16(2), 4. doi:10.38039/2214-4625.1046

29. Mančić, T. (2025). Climate change as a security challenge, risk and threat of the 21st century and its consequences on critical infrastructure. *International Journal of Contemporary Security Studies*, 1(1), 191–204.
30. Mimi, A., Imran, M. A., Mustafa, J., Beg, T. H., & Rahman, M. S. (2022). Efforts by women to become financially independent through e-commerce during Covid-19: A study on Bangladesh perspective. *American Economic and Social Review*, 9(1), 9–16. doi:10.46281/aesr.v9i1.1723
31. Ministry of Women and Children Affairs. (n.d.). *National women development policy*. Government of Bangladesh. Retrieved April 22, 2025, from [URL not provided]
32. Morshed, O. (2023). *From inequality to diversity: Perceptions of Bangladeshi grassroots level feminists on gender in education* (Master's thesis). University of Oulu. Retrieved from <https://urn.fi/URN:NBN:fi:oulu-202306152557>
33. Mou, S. N. (2024). Women's empowerment through higher education and employment in Bangladesh. *Journal of Gender, Culture and Society*, 4(2), 39–66. doi:10.32996/jgcs.2024.4.2.6
34. Naher, H., Tanim, T., & Sultana, N. (2019). Women in science and technology: A study in Bangladesh. *Sociology and Anthropology*, 7(7), 306–312. doi:10.13189/sa.2019.070702
35. Nawar, S., Zaman, M., Zahir, T. B., Khan, M. S. R., & Shariar, M. S. (2024). The future of social media entrepreneurship in business for women entrepreneurs. In *Cases on social media and entrepreneurship* (pp. 228–245). Hershey, PA: IGI Global. doi:10.4018/979-8-3693-1781-5.ch014
36. Nazrul, N. (2024). Gendered deification: Women leaders and political iconography in Bangladesh. *International Journal of Arts and Humanities*, 2(1), 43–55.
37. Nazrul, N., Majumder, T., & Karki, S. (2024). Economic resilience and gender empowerment: A post-pandemic analysis of Bangladesh's ready-made garment sector. *International Journal of Social Science and Humanity*, 1(3), 55–70. doi:10.62951/ijss.v1i3.55
38. Nussbaum, M. C. (2011). *Creating capabilities: The human development approach*. Cambridge, MA: Harvard University Press.
39. Peláez Sánchez, I. C., George Reyes, C. E., & Glasserman Morales, L. D. (2024). Gender digital divide: The complexity of digital media literacy among high school students with professional technical training in Mexico. *IAFOR Journal of Education*, 12(1), 57–76. doi:10.22492/issn.2186-5892.2024.41
40. Prodip, M. A. (2021). Exclusion through inclusion: Institutional constraints on women's political empowerment in India and Bangladesh. *World Affairs*, 184(2), 213–244. doi:10.1177/00438200211013017
41. Rahman, M. S., & Rahman, M. M. (2023). Influencing factors for the female students in the persistence of higher education: An investigation in the context of Bangladesh. *International Journal of Research and Publications*, 2582, 7421.
42. Safari, P., Prakoso, B., & Supandi, E. (2024). Gender differences in perceptions of digital device use and reading literacy: Insights from PISA 2018. *IAFOR Journal of Education*, 12(2), 103–118. doi:10.22492/issn.2186-5892.2024.41
43. Sen, A. (2009). *The idea of justice*. London, England: Penguin Books.
44. Streatfield, A. J., Rahman, M. M., Khan, S., Haider, M. M., Rahman, M., Nahar, Q., & Jamil, K. (2023). What shapes attitudes on gender roles among adolescents in Bangladesh. *Frontiers in Public Health*, 11, 1121858. doi:10.3389/fpubh.2023.1121858
45. UN Women, & UN DESA. (2023). *Progress on the sustainable development goals: The gender snapshot 2023*. United Nations. Retrieved April 22, 2025, from <https://bit.ly/gender-snapshot-2023>
46. United Nations Development Programme. (2023). *Youth employment and skills study (YESS): Bangladesh*. Retrieved from https://www.undp.org/sites/g/files/zskgke326/files/2023-02/Youth%20Entrepreneurship%20in%20Bangladesh_Final%20Updated_151122.pdf

47. Vooren, M., Haelermans, C., Groot, W., & van den Brink, H. M. (2022). Comparing success of female students to their male counterparts in the STEM fields: An empirical analysis from enrollment until graduation using longitudinal register data. *International Journal of STEM Education*, 9, 1–17. doi:10.1186/s40594-021
48. World Bank. (2023). *2023 annual report: UFGE umbrella facility for gender equality—Accelerate gender equality for impact*. Retrieved from <https://documents1.worldbank.org/curated/en/099108512192312732/pdf/IDU1a6f1e873149a71446e19ec11b24376209e43.pdf>





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Article

Advancing the Circular Economy through Construction and Demolition Waste Management for Disaster Risk-Informed Practice: Comparative Insights from Serbia and the European Union

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ABSTRACT

Construction and demolition waste is a pivotal lever for operationalizing the circular economy in the built environment, yet implementation remains uneven across Europe. This study provides a comparative overview of Serbia and EU countries using harmonized survey data from the European Demolition Association. We analyze company profiles, revenue structures, and activity mixes across demolition, decontamination, and waste-management value chains. Serbia's firms exhibit limited uptake of the circular economy: 69% report <25% of revenue from demolition activities, whereas 45% of EU firms derive >75% of revenue from demolition. In waste management (sorting/transport/recycling), 80% of Serbian companies earn <10% of revenue, compared with 33% in the EU; decontamination revenues show a similar gap (Serbia: 80% <10% vs. EU: 38% <10%). Although Serbian contractors show signs of maturation (50% medium and 13% significant by 2019 self-classification), activity remains concentrated outside high-value circular economy loops, and subcontracting shares remain skewed toward low-complexity segments. These findings suggest untapped potential for advancing the circular economy through targeted policy instruments (e.g., incentives for on-site sorting and secondary-materials markets), workforce training and certification, and digital traceability of construction and demolition waste flows. Strengthening these enablers could accelerate alignment with EU circular-economy objectives, reduce primary-resource use, and improve environmental and public-health outcomes in Serbia's construction sector. Limitations include reliance on 2018 activity data and partial market coverage; future work should integrate newer waves and administrative datasets to track policy impacts over time.

KEYWORDS

Circular economy; waste; resource efficiency; waste management; recycling; environmental protection; sustainable development; disaster risk management; resilience; Serbia; European Union.



1. Introduction

The circular economy is a model of production and consumption that involves sharing, leasing, reusing, repairing, refurbishing, and recycling existing materials and products to extend their lifespan (European Parliament, 2022). Although there are many definitions of the circular economy, they all share two key elements: (1) reducing, reusing, and recycling materials, and (2) systematic socio-economic change (Kirchherr, Reike & Hekkert, 2017). Overall, the circular economy has emerged as an alternative to the traditional linear economy (Buchmann-Duck & Beazley, 2020), aiming to separate economic growth from the use of primary resources (Buchmann-Duck & Beazley, 2020).

The circular economy model considers factors that can reduce waste and enable more precise monitoring of resource consumption (Kok et al., 2013). It has a positive impact on supply chains, thereby becoming a vital strategy in procurement and representing a supply chain innovation (Govindan & Hasanagic, 2018). Circular economy, as a new model of economic development, promotes the reuse (recycling) of materials, goods, and components to minimize waste generation to the greatest possible extent and to innovate the chain of production, consumption, distribution, and reuse of materials and energy (Ghisellini et al., 2018). Some studies examine the circular economy through the lens of supply chains. In this sense, the circular economy is emphasized as having the potential to address a range of existing challenges and to create financial and economic value for society and the economy (Lacy et al., 2020).

Although there is increasing focus on circular economy models across Europe, there is limited empirical evidence from non-EU transition economies. Serbia, a candidate country aligning its waste management policies with EU standards, encounters structural and institutional obstacles that impede the implementation of circular practices, particularly in managing construction and demolition waste. Moreover, the transition toward a circular economy contributes directly to disaster risk reduction by minimizing waste accumulation, preventing environmental degradation, and promoting material resilience (Çetin & Kirchherr, 2025; Cvetković, Bošković, & Ocal, 2021; Cvetković & Filipović, 2017; Cvetković & Šišović, 2024a, 2024b; Cvetković, 2024; Grozdanić & Cvetković, 2024; Jevtić, Cvetković, Gačić, & Raonić, 2025; Nikolić, Cvetković, Renner, Cvijović, & Gačić, 2025; Pradhananga & Elzomor, 2023). In the context of disaster risk-informed practice, the circular management of construction and demolition waste enhances adaptive capacities of urban systems and supports sustainable recovery processes (Ayalew & Lema, 2025; Beli, Renner, Cvetković, Ivanov, & Gačić, 2025; Canete, Lisay, & Mahmud, 2025; Desalit, Duque, Edradan, Enciso, Enriquez, & Pan, 2025; Garba, Amuka, & Akaan, 2025; Ilić & Milašinović, 2025; Masaba, Aryatwijuka, Ntayi, & Bagire, 2025; Ojha, Bhattarai, & Devkota, 2025; Tushabe et al., 2025).

The circular economy has become one of the European Union's and many other nations' primary political goals. It is considered an important opportunity for redirecting the current economic model towards sustainable development (Ghisellini et al., 2018). In recent years, these models have been recognized by organizations in both the public and private sectors as a sustainable approach to implementing circular economy strategies (Lacy et al., 2020). The circular economy is thus highly emphasized in the construction sector due to its significant impact. This industry accounts for nearly 30% of all natural resource depletion and produces 25% of global solid waste (Benachio, Freitas & Tavares, 2020). Studies on the implementation of the circular economy in construction reveal that its principles are not applied in full. Most countries discuss potential rather than actual practice of circular economic principles (Hossain, Ng, Antwi-Afari, & Amor, 2020). Unfortunately, there are few studies from Serbia that help increase awareness and broaden scientific and professional understanding of the application of circular economy principles in construction, especially in demolition.

The aim of this research is to present the potential for developing the circular economy in the construction industry and demolition waste sector in Serbia and to compare the results with those of other European countries. By presenting findings on current levels of this type of waste, the advantages of resource reuse will be highlighted, ultimately contributing to the development of the circular economy in construction materials and environmental protection.

The main objective of this study is to highlight the advantages and potential of reusing construction industry waste, which significantly contributes to the development of the circular economy in the Republic of Serbia. The specific research questions addressed in this paper are:

- RQ1.** Does the Republic of Serbia have the potential for developing a circular economy in the field of demolition waste?
- RQ2.** What are the annual quantities of such waste generated in the Republic of Serbia?
- RQ3.** How do these quantities compare to those in the European Union?
- RQ4.** What are the advantages and disadvantages of developing the circular economy in this field?

The remainder of the paper is organized as follows: Section 2 provides a brief literature review with the most significant findings from studies in this area. Section 3 outlines the research materials and methods used. Section 4 presents the results and accompanying discussion. The final section is reserved for concluding considerations. This study offers one of the first systematic comparisons between Serbia and EU member states using harmonized industry data from the European Demolition Association (EDA). Leveraging this dataset provides new evidence on the maturity and challenges of circular practices in Serbia's construction sector.

1.1. Literature Review

This section examines key academic and policy sources on the circular economy and its application to the management of construction and demolition waste (C&DW), with a focus on the European and Serbian settings. The current resource management approach needs to be upgraded to identify opportunities for increased resource efficiency better while still following environmentally friendly practices (Shi et al., 2017). This shift is already underway, with the circular economy concept playing a key role in it (Bastein et al., 2013). The European Commission Report (2006) suggested that the EU's environmental policy should prevent or minimize waste through clean technologies to reduce the generation of all waste types. Developing efficient waste recycling opens new avenues for social, economic, and environmental gains, while also decreasing waste sent to landfills and considering other harmful disposal methods (Dada, Mohammed, & Quadir, 2025; Dada, Mohammed, Mallam, & Ajayi, 2025; Garba & Akaan, 2025; Janković, Cvetković, Gačić, Renner, & Jakovljević, 2025; Milenković, 2025; Mančić, 2025; Popović Mančević, 2025; Renner & Mayr-Veselinovic, 2025; Miranda et al., 2013).

On March 4, 2019, the European Commission released its latest report on the implementation of the Circular Economy Action Plan (Lin, 2020). This report emphasizes the key achievements within the plan aimed at promoting circular economy initiatives (Lin, 2020). The circular economy advocates biomimicry, ecosystem impact assessment, the bioeconomy, and renewable energy (Buchmann-Duck & Beazley, 2020). At the Smart City Institute, researchers identified two perspectives in this field: on the one hand, sustainable business models are seen as drivers of the shift toward sustainability (Bleus & Crutzen, 2020). On the other hand, policymakers and scientists view the circular economy as the most promising tool for reaching sustainability goals (Bleus & Crutzen, 2020). These authors (Bleus & Crutzen, 2020) therefore consider the circular economy model as essential in this context.

The European Institute of Innovation and Technology (EIT), which is part of the European Union and originated in the Horizon 2020 program, issued a directive that comprehensively addresses harmful substances in construction waste (Wahlström et al., 2018). This directive concentrates on hazardous materials regulated by the European Union, international agreements, or national laws. There is significant concern about compounds found in older construction materials, as their presence may limit the recycling of such waste (Wahlström et al., 2018). Current EU legislation already restricts the use of many substances in new construction products (Wahlström et al., 2018). Continuous industrial growth has generated large volumes of construction and demolition (C&D) waste, leading to serious environmental and social issues (Du et al., 2020). Infrastructure projects generate substantial waste (Povetkin & Isaac, 2020). Managing construction waste is more challenging than managing other waste types because it often contains toxic materials. The use of recycling practices for construction

and demolition (C&D) waste is essential for reducing waste and conserving natural resources (Liu et al., 2020). At every stage of C&D waste recycling, environmental impacts are assessed (Liu et al., 2020).

In conventional buildings, the reuse and recycling of C&D waste at the end of the life cycle reduce overall impacts during the building's life cycle and, to an even greater extent, mitigate impacts in all pre-use phases of materials (such as transportation and production of construction materials) (Ghisellini et al., 2018). If waste is sorted on-site, it can be reused in the construction of new buildings, resulting in financial savings on transport to landfills and a reduction in environmental impacts caused by exhaust emissions from waste transport through settlements (Metić, 2025; Lipovac, 2025; Kalanj, 2025; Petrović, 2025; Vidović & Beriša, 2025; Vračević, 2025).

In all market scenarios for C&D waste recycling, environmental impacts are examined, given that governments' primary incentive is to improve C&D waste recycling and minimize environmental impacts (Liu et al., 2020). Recyclers' profit decreases in proportion to the rate of waste disposed of and the investment cost coefficient. In contrast, recyclers may achieve higher profits when their capacity is insufficient to handle the C&D waste they generate (Liu et al., 2020). According to Liu et al. (2020), if the investment cost coefficient is relatively higher, a "win-win" situation can be achieved, benefiting both waste producers and recyclers. Among the two C&D waste recycling market scenarios, the optimal scenario is the one that offers greater environmental benefits.

In Serbia, the application of circular economy principles in construction remains underdeveloped. Although estimates indicate that up to 80% of construction and demolition waste could be reused, most waste is still disposed of in landfills (Eraković & Mladenović-Ranisavljević, 2019). Approximately 5 m³ of construction waste per site is generated annually, while over 3,500 landfills operate nationwide, many of them unmanaged or improperly regulated (Čepić et al., 2022). The situation is particularly critical after disasters such as floods, when waste volumes rise sharply, revealing weaknesses in local recovery and recycling systems.

Serbia's Waste Management Strategy officially bans uncontrolled disposal and outlines legal procedures for waste classification and processing (Stanojlović et al., 2016). However, there is a significant implementation gap caused by limited funding, inadequate monitoring, and a shortage of specialized infrastructure (Cvetković et al., 2023; Cvetković et al., 2025). The lack of comprehensive data on C&DW composition and flows hampers evidence-based policymaking (Karanović, 2021). These systemic issues show that, although legal frameworks exist, their practical application remains limited, leaving Serbia behind EU standards and circular-economy benchmarks. To comply with the EU Waste Framework Directive and the European Green Deal, Serbia needs to strengthen institutional capacity, develop financial mechanisms, and implement education programs that encourage sustainable construction and resource recovery.

Incorporating disaster risk-informed principles into circular practices could also boost urban resilience, making reconstruction after disasters more efficient, environmentally friendly, and low-waste. The literature indicates that, while the circular economy is a major driver of sustainability across Europe, its deployment in the construction sector—especially in transition economies like Serbia—is still incomplete. Closing this gap requires harmonized data, enhanced institutional coordination, and the integration of circular-economy and disaster-risk management strategies to improve environmental protection and societal resilience.

2. Materials and Methods

This study relies on primary data collected through ongoing research carried out by the European Demolition Association (EDA). The Serbian Association for Demolition, Decontamination, and Recycling of Construction Materials provided data for Serbia. For comparison, the study uses data from research conducted in 2019, citing 2018. Data for European countries are publicly available, while Serbian data are accessible only to the study's authors. The research was conducted using an electronic questionnaire with questions organized into eight distinct sections.

The first section aimed to identify the companies' main activities. They were categorized based on whether they operated as contractors performing demolition in urban (city) environments; contractors performing demolition in industrial settings (noting that urban demolition typically involves higher environmental protec-

tion standards); contractors involved in both demolition and waste management and recycling activities, where recycling may occur on-site to enable reuse—supporting circular economy principles and cost savings. Another group included general contractors handling all types of construction-related tasks. Further categorization distinguished whether companies engaged in design, construction, or other services.

The second section focused on company revenues in 2018 from all activities. Responses were grouped into categories: less than 1 million euros, 1 to 5 million euros, 5 to 15 million euros, 15 to 30 million euros, 30 to 50 million euros, and over 50 million euros. These data provide insight into revenue levels relative to the scope of activity (demolition, decontamination, recycling), indicating the extent to which these practices are applied.

The third section specifically examined revenues from demolition activities (urban, industrial, waste removal). It aimed to determine the share of demolition revenue, categorized into: less than 25%, 25% to 50%, 50% to 70%, or more than 75%. This highlights the potential and profitability of demolition work. The fourth section assessed the scale of companies, classifying them as large, medium, or small contractors. The fifth section analyzed revenue changes in 2018 compared to 2017 from demolition-related activities. Responses were grouped into five categories: growth of 15% or more, moderate growth of 5% to 15%, stable within +/-5%, moderate decline of -5% to -15%, and a significant decline of -15% or more. It emphasizes the benefits of demolition, including the provision of renewable resources through proper waste disposal and recycling. The sixth section examined companies whose revenues relied on decontamination activities, especially asbestos and other hazardous substances. The goal was to determine the share of revenue from these activities, which can be profitable while ensuring proper disposal of hazardous waste to protect the environment and public health. Response options included: over 50%, 26% to 50%, 11% to 25%, and under 10%.

The seventh section covered income from waste management activities, including sorting, transportation, and recycling. Responses were grouped into four categories: over 50%, 26% to 50%, 11% to 25%, and under 10%. Its purpose was to highlight the profitability of these activities, which are essential for a circular economy and waste reuse. The eighth section asked companies to share their outlook for 2019 (as estimated in 2018), with response categories including growth over +15%, moderate growth between +5% and +15%, stability between -5% and +5%, moderate decline between 5% and -15%, and decline of more than 15%. The questionnaire was completed by members of the European Association for Demolition, Decontamination, and Recycling of Construction Materials in both Serbia and the European Union. In the EU, companies were surveyed at the country level, with results presented cumulatively for the entire Union. The surveyed companies engaged in demolition, recycling, or construction. The reason for targeting these businesses is that their activities extend beyond construction itself, covering demolition, decontamination, and recycling—key processes in the circular economy. This approach promotes environmental safety by following demolition with waste sorting, decontamination, and recycling, enabling on-site reuse. Consequently, the total waste disposed of in designated facilities is significantly reduced.

3. Results

3.1. Overview of Data Obtained in the Republic of Serbia

The 2019 Industrial Report (EDA, 2019b) analyzed data from 2018. In Serbia, companies reported their main activities: 13% were urban demolition contractors, 6% focused on industrial demolitions, 6% handled waste management and recycling, 31% were general demolition firms performing all types of work, 31% engaged in design and project management for demolitions, while 13% noted their activities as “other” related to demolition or construction waste management as part of their core business.

From this, it is clear that 31% of companies performed a full range of services, and another 31% specialized in design and project management for demolitions. Compared to 2017 and 2018, 2019 saw a notable increase in companies offering broader service scopes. In 2018, the revenue distribution was as follows: 50% earned less than 1 million euros, 13% earned between 1 and 5 million euros, 19% earned between 5 and 15 million euros, and 19% earned between 30 and 50 million euros, across all activities. When asked, “What percentage of your revenue came solely from demolition activities, including urban, industrial, and waste removal?” 69% reported

less than 25%, 19% reported between 25% and 50%, and 13% reported more than 75% of their revenue from demolition activities. This indicates limited capacity in waste processing and removal. With 13% of companies identifying as large contractors, 50% as medium-sized, and 38% as small, Serbian companies show potential to become leading contractors. While all surveyed companies in previous years were classified as small, in 2019, 50% identified as medium-sized, and 13% as large contractors capable of managing entire projects—significant progress for Serbian firms.

Analysis of revenue growth in 2018 compared with 2017 from demolition-related activities showed that 27% of companies reported significant growth (+15%), 13% reported moderate growth (+5% to +15%), 40% indicated stability (-5% to +5%), while 20% reported a slight decline (-5% to -15%). In terms of revenues from decontamination activities (particularly asbestos and other hazardous substances), 7% of companies reported that more than 50% of their revenues came from these activities, 13% between 11% and 25%, while the majority achieved only about 10% of their revenues from decontamination. For waste management activities (sorting, transport, recycling), the reported revenues were as follows: more than 50% of revenues in 13% of companies, between 26% and 50% in 7% of companies, and less than 10% in 80% of companies.

When asked, “Compared with 2018, what are your business expectations for 2019 regarding demolition-related activities?”, 7% of companies expected significant growth of more than 15%, 27% expected moderate growth (+5% to +15%), 53% anticipated stable business (+/-5%), while 13% expected a slight decline (-5% to -15%).

3.2. Comparative Overview of Serbia and the European Union

In 2018, subcontractors reported their demolition project involvement as follows: over 75% of projects was handled by 20% of companies (compared to 14% in the EU), 51-75% involvement was reported by 13% of companies (EU: 20%), 26-50% by 7% (EU: 24%), and less than 25% by 60% (EU: 41%). Significant differences between Serbian and European companies are apparent. See Table 1 for details.

Table 1. Overview and comparison of data obtained in the Republic of Serbia and the European Union

Question	Republic of Serbia	European Union	Comment
Main company activities	13% perform urban demolition; 6% industrial demolition; 6% manage waste and recycling; 31% are general demolition contractors; 31% work as project managers in demolition; 13% list demolition/waste management as complementary to their main business	28% perform urban demolition; 9% industrial demolition; 1% scraping; 1% waste management and recycling; 47% are general demolition contractors; 3% work as project managers; 9% listed demolition/waste management as complementary	In the EU, 47% of surveyed companies are general contractors.
Company revenues in 2018 (all activities)	50% earned less than €1M; 13% between €1M–€5M; 19% between €5M–€15M; 19% between €30M–€50M	13% earned less than €1M; 35% between €1M–€5M; 24% between €5M–€15M; 14% between €15M–€30M; 7% between €30M–€50M; 7% over €50M	In the EU, 7% of companies earned over €50M, while no such data was recorded for Serbia.
Revenue from demolition-related activities	69% earned less than 25% from these activities; 19% earned 25–50%; 13% earned more than 75%	16% earned less than 25%; 17% earned 25–50%; 23% earned 50–70%; 45% earned more than 75%	In the EU, 45% of companies earned over 75% of their revenue from demolition-related activities—an indicator of circular economy potential.
Are companies contractors?	13% large; 50% medium; 38% small	17% large; 49% medium; 35% small	Differences are minor.
Revenue growth in 2018 vs. 2017 (demolition activities)	27% reported significant growth (+15%); 13% slight growth (+5% to +15%); 40% stable (-5% to +5%); 20% slight decline (-5% to -15%)	29% significant growth (+15%); 32% slight growth (+5% to +15%); 27% stable (-/+5%); 9% slight decline (-5% to -15%); 3% significant decline (>15%)	EU companies show stronger growth in demolition revenue, while Serbia shows primarily stable growth.

Revenue from decontamination (e.g., asbestos, hazardous substances)	7% earned over 50%; 13% earned 11–25%; 80% earned up to 10%	8% earned over 50%; 18% earned 26–50%; 36% earned 11–25%; 38% earned less than 10%	In Serbia, 80% of companies earned only 10% or less from decontamination, while 18% of EU companies earned between 26% and 50%.
Revenue from waste management (sorting, transport, recycling)	13% earned over 50%; 7% earned 26–50%; 80% earned less than 10%	8% earned over 50%; 21% earned 26–50%; 38% earned 11–25%; 33% earned less than 10%	In Serbia, 80% of companies earned less than 10% of their revenue from waste management activities.
Business outlook for 2019 (demolition activities)	7% expected significant growth (+15%); 27% slight growth (+5% to +15%); 53% stable (+/-5%); 13% slight decline (-5% to -15%)	12% expected significant growth (+15%); 36% slight growth (+5% to +15%); 34% stable (+/-5%); 13% slight decline (-5% to -15%); 5% significant decline (>15%)	Serbia expects mostly stable business, while the EU expects higher growth in demolition activities.

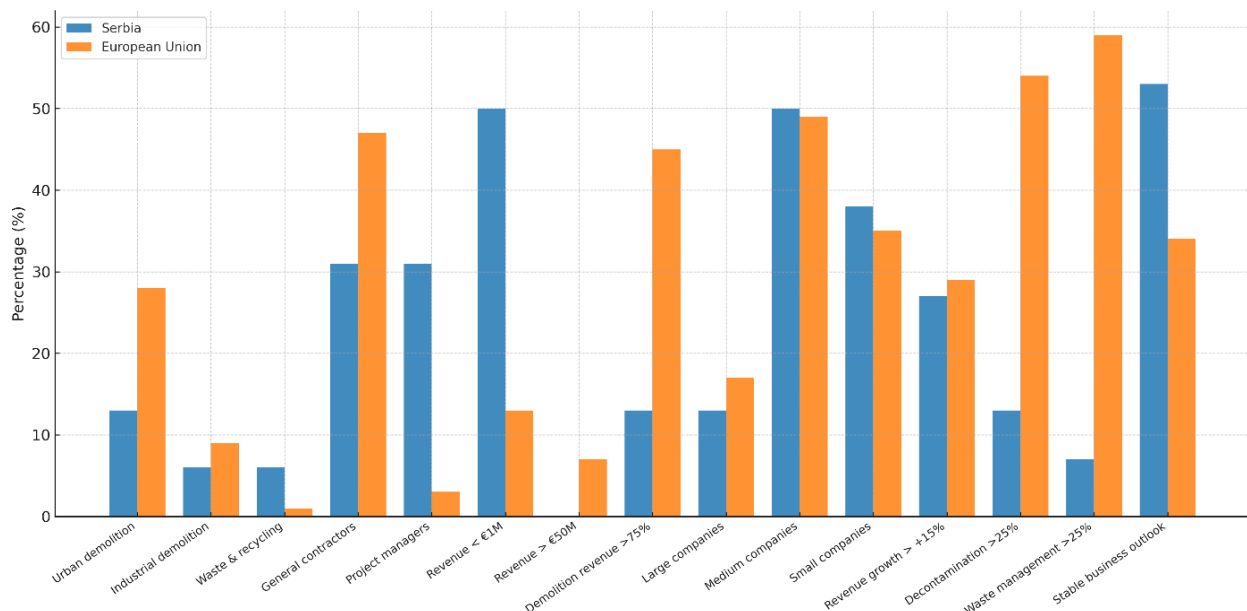


Figure 1. Comparative Overview of Construction and Demolition Waste Sector Indicators: Republic of Serbia vs. European Union.

4. Discussion

This study contributes to understanding and advancing the circular economy, particularly in the context of construction and demolition waste (C&DW) management in the Republic of Serbia. The comparative analysis between Serbia and EU member states reveals both progress and persistent gaps in the maturity of circular practices. Serbian companies are increasingly engaging in diversified demolition and recycling activities, with 50% identifying as medium-sized and 13% as large contractors—an encouraging sign of market consolidation and professional growth. However, the data also indicate that circular processes remain marginal in business operations: 69% of Serbian companies earn less than 25% of their revenue from demolition-related activities, and 80% derive less than 10% of their revenue from waste management or recycling. In contrast, almost half of EU companies generate more than 75% of their income from such activities, reflecting higher integration of circular models into mainstream construction economies.

These findings highlight that Serbia's circular economy transition is still in its formative stage. Structural limitations—including the lack of specialized recycling facilities, insufficient financial incentives, and incomplete regulatory enforcement—constrain the broader adoption of CE principles. Moreover, fragmented data on

waste flows and the absence of a fully developed secondary materials market limit the operationalization of CE policies. These challenges are characteristic of many transition economies, where the alignment of institutional frameworks with EU directives remains ongoing. Addressing these issues will require a coordinated policy approach that combines regulatory enforcement, infrastructure investment, and capacity building among demolition and recycling enterprises.

From a disaster risk-informed perspective, the findings underscore the strategic importance of CE integration for enhancing national resilience (Andrews, Ccp, Pmp, PhD, & Dpm, 2022; Çetin & Kirchherr, 2025; Farhanrika, Sarpono, Kusuma, & Widodo, 2023; Jayasinghe et al., 2024; Pradhananga & Elzomor, 2023). Effective management of construction and demolition waste can reduce post-disaster debris accumulation, improve the safety and sustainability of reconstruction, and decrease environmental and health risks associated with hazardous materials (Baniyas et al., 2022; Cook & Velis, 2020; Cook, Velis, & Black, 2022; Islam, Sandanayake, Muthukumar, & Navaratna, 2024; Lee, Chang, & Lee, 2024; Shajidha & Mortula, 2025). In disaster recovery scenarios, circular approaches—such as on-site material sorting, reuse of debris, and recycling of building components—can accelerate recovery timelines and reduce economic losses (Al-Zrigat, 2020; Jalloul, Choi, Derrible, & Yeşiller, 2022). Consequently, integrating CE principles into disaster risk management frameworks supports both sustainable reconstruction and long-term urban resilience (Caro et al., 2023; Minunno, O'Grady, Morrison, Gruner, & Colling, 2018; Regattieri, Gamberi, Bortolini, & Piana, 2018; Ruiz, Ramón, & Domingo, 2020).

It must be acknowledged that emerging technologies play a pivotal role in developing circular economy frameworks that integrate waste valorization, sustainable energy generation, and regional climate adaptation strategies. Moreover, realizing such integration requires more than technical coordination; it depends on a collaborative social process involving negotiation, knowledge sharing, and collective learning among policymakers, businesses, and citizens (Dialog Bioökonomie, 2023; OECD, 2020; Kaukab, 2023). Targeted risk communication raises awareness of opportunities and risks, supports behavioral change, and fosters trust and participation (WHO, 2025; Renn, 2017). However, knowledge alone rarely leads to action (Luick et al., 2025). Behavioral responses depend on trust in intermediaries, perceived self-efficacy, and the framing of risks and benefits (Hauck, 2023).

A systematic framework (Graf et al., 2025) for planning risk communication strategies to enable the development of circular economies needs to be applied effectively to foster individual and collective capacities to act sustainably. At the policy level, this research offers practical insights for the Ministry of Environmental Protection of the Republic of Serbia and local authorities tasked with implementing waste management strategies. The results suggest that policy instruments should move beyond legal compliance toward market stimulation, for example, through tax incentives for recycling, green public procurement, and digital traceability systems for C&DW flows. Institutional partnerships among public agencies, universities, and private companies can help bridge the gap between research and application by driving innovation in waste-reuse technologies and business models.

At the industry level, the study can support construction and demolition companies by highlighting tangible benefits of circular economy practices: reduced operational costs through material recovery, lower disposal expenses, and improved competitiveness through sustainable branding. Demonstrating economic viability is key to motivating companies to adopt CE practices voluntarily, rather than solely through regulatory pressure.

Finally, from an academic and research standpoint, this study provides a foundational baseline for further exploration of circular economy implementation in Serbia and comparable contexts. Future research could focus on longitudinal monitoring of CE adoption, quantifying environmental benefits (e.g., CO₂ reduction, resource efficiency), and integrating CE indicators into national disaster risk reduction policies. By linking circularity with risk-informed planning, Serbia has the opportunity to position its construction sector not only as an economic driver but also as a cornerstone of environmental and societal resilience in line with the European Green Deal and Sendai Framework for Disaster Risk Reduction (2015–2030).

5. Conclusion

The results from the European Demolition Association (EDA) Industrial Report provide valuable insights for the demolition sector. These findings support the growth of the circular economy and environmental protection efforts. To improve reliability and sustainability in Serbia, investment in education, training, and capacity-building for workers and waste producers is essential, aligned with European standards and practices. Currently, this industry is still emerging, and formal vocational schools for related professions do not yet exist. Enhancing education among waste producers could significantly boost the development of the circular economy in demolition waste management. The main benefit would be a positive impact on Serbia's national budget by preserving resources and supporting a well-developed construction sector. Although Serbia is advancing in this direction, the EU shows higher operational results and participation, as reflected in company forecasts. This study adds to scientific knowledge about the circular economy and offers practical insights for improving circular practices in the construction material sector in Serbia. The recommended waste management procedures can result in environmentally safe, economically feasible, and operationally efficient outcomes. Limitations include the focus on data from 2019, leaving gaps regarding developments over the past three years. It is also assumed that not all companies engaged in these activities are captured in the report, raising questions about how future, more comprehensive studies could better assess the sector's potential. Future research will aim to answer these questions and develop practical solutions to strengthen circular economy practices in construction and demolition.

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6. References

1. Al-Zrigat, Z. M. (2020). The emergency architecture: Reuse and recycle materials after disasters. *Journal of Engineering and Technology for Industrial Applications*, 6, 31–40. <https://doi.org/10.5935/jetia.v6i26.688>
2. Andrews, T., Rapp, R., Ewakil, E., Dietz, J. E., & Baroudi, S. (2022). Disaster response using the circular economy: A timeline review of the literature. *Journal of Emergency Management*, 20(4), 365–373. <https://doi.org/10.5055/jem.0645>
3. Ayalew, N. A., & Lema, A. T. (2025). Conflict risk monitoring for conflict prevention in Ethiopia: The case of Ataye Town, North Shewa, Amhara Region. *International Journal of Disaster Risk Management*, 7(1), 177–202.
4. Baniyas, G., Karkanias, C., Batsioulas, M., Melas, L., Malamakis, A., Geroliolios, D., Spiliotis, X. (2022). Environmental assessment of alternative strategies for the management of construction and demolition waste: A life cycle approach. *Sustainability*, 14, 9674. <https://doi.org/10.3390/su14159674>
5. Bastein, T., Roelofs, E., Rietveld, E., & Hoogendoorn, A. (2013). *Opportunities for a circular economy in the Netherlands*. TNO Report commissioned by the Netherlands Ministry of Infrastructure and Environment.
6. Beli, A., Renner, R., Cvetković, V. M., Ivanov, A., & Gačić, J. (2025). A cross-national study of disaster risk management: Strengths and weaknesses in Bulgaria, Romania, and Albania with reflections on Serbia. *International Journal of Disaster Risk Management*, 7(1).
7. Benachio, G. L. F., Freitas, M. D. C. D., & Tavares, S. F. (2020). Circular economy in the construction industry: A systematic literature review. *Journal of Cleaner Production*, 260, 121046.
8. Bleus, H., & Crutzen, N. (2020). *Sustainable business models for circular economy in urban ecosystem*. Smart City Institute, Research Center. Retrieved from <https://orbi.uliege.be/handle/2268/248459>
9. Buchmann-Duck, J., & Beazley, F. K. (2020). An urgent call for circular economy advocates to acknowledge its limitations in conserving biodiversity. *Science of the Total Environment*, 727, 138602. <https://doi.org/10.1016/j.scitotenv.2020.138602>
10. Cañete, R. M., Lisay, S. K., & Mahmud, M. N. S. (2025). Project DINGGIN: Empowering communities through risk-based and inclusive cash transfer in disaster-prone areas in Bangladesh and the Philippines. *International Journal of Disaster Risk Management*, 7(1), 339–366.
11. Caro, D., Lodato, C., Damgaard, A., Cristóbal, J., Foster, G., Flachenecker, F., & Tonini, D. (2023). Environmental and socio-economic effects of construction and demolition waste recycling in the European Union. *Science of the Total Environment*, 168295. <https://doi.org/10.1016/j.scitotenv.2023.168295>
12. Čepić, Z., Bošković, G., Ubavin, D., & Batinić, B. (2022). Waste-to-energy in transition countries: Case study of Belgrade (Serbia). *Polish Journal of Environmental Studies*, 31(5).
13. Četin, S., & Kirchherr, J. (2025). The Build Back Circular Framework: Circular economy strategies for post-disaster reconstruction and recovery. *Circular Economy and Sustainability*. <https://doi.org/10.1007/s43615-024-00495-y>
14. Cook, E., & Velis, C. (2020). Construction and demolition waste management: A systematic review of risks to occupational and public health. Open Science Framework (OSF). <https://doi.org/10.31224/osf.io/5tpbz>
15. Cook, E., Velis, C., & Black, L. (2022). Construction and demolition waste management: A systematic scoping review of risks to occupational and public health. *Frontiers in Sustainability*, 3. <https://doi.org/10.3389/frsus.2022.924926>
16. Culleri, J., & Series, C. (2013). *Recycling: Technological systems, management practices and environmental impact*. New York, NY: Nova Science Publishers. ISBN 978-1-62618-284-4.
17. Cvetković, V. M. (2024). *Disaster Resilience: Guide for Prevention, Response, and Recovery*. Belgrade: Scientific-Professional Society for Disaster Risk Management.

18. Cvetković, V. M., & Šišović, V. (2024). Understanding the Sustainable Development of Community (Social) Disaster Resilience in Serbia: Demographic and Socio-Economic Impacts. *Sustainability*, 16(7), 2620.
19. Cvetković, V. M., Aleksov, B., Renner, R., Gačić, J., Ivanov, A., & Milašinović, S. (2023). Community-based disaster risk reduction: Overcoming barriers to build stronger communities. *International Journal of Disaster Risk Management*, 7(2), 1.
20. Cvetković, V. M., Lipovac, M., Renner, R., Stanarević, S., & Raonić, Z. (2025). A Predictive Framework for Understanding Multidimensional Security Perceptions Among Students in Serbia: The Role of Institutional, Socio-Economic, and Demographic Determinants of Sustainability. *Sustainability*, 17(11), 5030.
21. Cvetković, V., & Filipović, M. (2017). Koncept otpornosti na katastrofe [Concept of disaster resilience]. *Ecologica*, 24(87), 557–563.
22. Cvetković, V., & Šišović, V. (2024a). Community disaster resilience in Serbia. Belgrade: Scientific-Professional Society for Disaster Risk Management.
23. Cvetković, V., Bošković, N., & Ocal, A. (2021). Individual citizens' resilience to disasters caused by floods: A case study of Belgrade. 5th International Symposium on Natural Hazards and Disaster Management, Bursa Technical University, Bursa, Turkey, 24–25 October.
24. Dada, K. S. J., Mohammed, H. A., & Quadir, R. O. (2025). Disaster risk management in academic institutions: An assessment of preparedness and recovery at Kashim Ibrahim Library, Nigeria. *International Journal of Contemporary Security Studies*, 1(1), 1–15.
25. Dada, K. S. J., Mohammed, H. A., Mallam, D., & Ajayi, E. O. (2025). Security of information resources in Federal College of Education libraries in Northwest Nigeria. *International Journal of Contemporary Security Studies*, 1(1), 85–98.
26. Desalit, P., Duque, G. B., Edradan, T. M., Enciso, K. H., Enriquez, M. R., & Pan, W. K. M. (2025). Predictors of disaster response self-efficacy among adult residents in selected highly dense barangays in Tondo, Manila. *International Journal of Disaster Risk Management*, 7(1), 301–312.
27. Du, L., Feng, Y., Lu, W., Linghai, K., & Yang, Z. (2020). Evolutionary game analysis of stakeholders' decision-making behaviours in construction and demolition waste management. *Environmental Impact Assessment Review*. <https://doi.org/10.1016/j.eiar.2020.106408>
28. Eraković, Z., & Mladenović-Ranisavljević, I. (2019). Challenges of construction and demolition waste management in the southern Serbia region. *Knowledge – International Journal*, 35(3), 855–859.
29. European Commission. (2006). *Report from the Commission to the Council and the European Parliament on implementation of the Community waste legislation* (COM 2006, 406 final, Brussels). Retrieved from <http://www.ec.europa.eu/environment/waste/reporting/index.htm>
30. European Demolition Association (EDA). (2019a, October). *Yearbook 2019*. Retrieved from European Demolition Association database.
31. European Demolition Association (EDA). (2019b, October). *Industry report 2019*. Retrieved from European Demolition Association database.
32. European Parliament. (2022). *Circular economy: Definition, importance and benefits*. Retrieved November 29, 2022, from <https://www.europarl.europa.eu/news/en/headlines/economy/20151201STO05603/circular-economy-definition-importance-and-benefits>
33. Farhanrika, N. L., Sarpono, S., Kusuma, K., & Widodo, P. (2023). Advancing resilience and fostering sustainable development through strategic investments in cutting-edge technology and innovative methodologies for disaster risk reduction, as seen in Japan's experiences. *International Journal of Humanities, Education and Social Sciences*, 3(1). <https://doi.org/10.55227/ijhess.v3i1.589>

34. Franklin-Johnson, E., Figge, F., & Canning, L. (2016). Resource duration as a managerial indicator for circular economy performance. *Journal of Cleaner Production*, 133, 589–598.
35. Gajović, A., & Ćurčić, S. (2016). The use of forest fruits as one of the factors of the quality of human life. In *the 1st International Conference on Quality of Life* (pp. 195–200). Center for Quality, Faculty of Engineering, University of Kragujevac. ISBN 978-86-6335-033-5.
36. Garba, T. M., & Akaan, R. (2025). The Socioeconomic and Psychological Implications of Polygamy: A Quantitative and Qualitative Analysis Concerning Disaster Risk Reduction and Management (DRRM) in Nigeria. *International Journal of Contemporary Security Studies*, 1(1), 25–34.
37. Garba, T. M., Amuka, I., & Akaan, R. (2025). Female gender empowerment, individualism, collectivism, and resilience: A comparative study in the context of disaster risk management. *International Journal of Disaster Risk Management*, 7(1), 313–324.
38. Ghisellini, P., Ripa, M., & Ulgiati, S. (2018). Exploring environmental and economic costs and benefits of a circular economy approach to the construction and demolition sector: A literature review. *Journal of Cleaner Production*, 178, 618–643. <https://doi.org/10.1016/j.jclepro.2017.11.207>
39. Ghosh, S. K. (2020). *Circular economy: Global perspective*. Singapore: Springer Nature. <https://doi.org/10.1007/978-981-15-1052-6>
40. Govindan, K., & Hasanagic, M. (2018). A systematic review on drivers, barriers, and practices towards circular economy: A supply chain perspective. *International Journal of Production Research*, 56(1–2), 278–311. <https://doi.org/10.1080/00207543.2017.1402141>
41. Graf, J., Renner, R., and Klebel, T. (2025), *Bridging Warning and Adaptation: Addressing Risk Communication Strategies for Short-Term Natural Hazard Warnings and Long-Term Risk Adaptation – A Scoping Review: Preprint*.
42. Grozdanić, G., & Cvetković, V. M. (2024). Exploring multifaceted factors influencing community resilience to earthquake-induced geohazards: Insights from Montenegro. Belgrade: Scientific-Professional Society for Disaster Risk Management.
43. Hauck M (2023) Zeitenwende im Wald: Klimawandelanpassung durch Ersatzbaumarten – eine langfristige Lösung? 2262 KB. <https://doi.org/10.19217/NuL2023-11-04>
44. Hossain, M. U., Ng, S. T., Antwi-Afari, P., & Amor, B. (2020). Circular economy and the construction industry: Existing trends, challenges, and a prospective framework for sustainable construction. *Renewable and Sustainable Energy Reviews*, 130, 109948.
45. Ilić, V., & Milašinović, M. (2025). Declination of the Strategic Compass: Transatlantic elites, German leadership, and the future of European security. *International Journal of Disaster Risk Management*, 7(1), 495–506.
46. Islam, N., Sandanayake, M., Muthukumaran, S., & Navaratna, D. (2024). Review on sustainable construction and demolition waste management—Challenges and research prospects. *Sustainability*, 16, 3289. <https://doi.org/10.3390/su16083289>
47. Jalloul, H., Choi, J., Derrible, S., & Yeşiller, N. (2022). Toward sustainable management of disaster debris: Three-phase post-disaster data collection planning. *Construction Research Congress 2022*. <https://doi.org/10.1061/9780784483954.055>
48. Janković, L., Cvetković, V. M., Gačić, J., Renner, R., & Jakovljević, V. (2025). Integrating psychosocial support into emergency and disaster management and public safety: The role of the Red Cross of Serbia. *International Journal of Contemporary Security Studies*, 1(1), 99–124.
49. Jayasinghe, G. Y., Perera, T., Perera, H. A. T. N., Karunarathne, H. D., Manawadu, L., Weerasinghe, V. P. A., Haigh, R. (2024). A systematic literature review on integrating disaster risk reduction (DRR) in sus-

- tainable tourism (SusT): Conceptual framework for enhancing resilience and minimizing environmental impacts. *International Journal of Disaster Risk Reduction*. <https://doi.org/10.1016/j.ijdr.2024.104742>
50. Jevtić, M., Cvetković, V. M., Gačić, J., & Raonić, Z. (2025). Factors of vulnerability and resilience of persons with disabilities during disasters: Challenges and strategies for inclusive risk reduction. *International Journal of Disaster Risk Management*, 7(1).
51. Kalanj, S. (2025). Gender-based violence in armed conflicts. *International Journal of Contemporary Security Studies*, 1(1), 125–138. Petrović, T. (2025). (Re)Constructing Europe: Has a common identity integrated Europe? *International Journal of Contemporary Security Studies*, 1(1), 139–148.
52. Karanović, N. (2021). CO₂ emission assessment of construction and waste materials in the context of circular economy: Case study of project “Corridor X.” *Acta Technica Corviniensis – Bulletin of Engineering*, 14(3), 31–34.
53. Kaukab, R. S. (2023). *Circular economy and trade agreements: Towards developing a framework for linkages*. Global and regional order. Bonn, Germany: Friedrich-Ebert-Stiftung.
54. Khan, M. S. (2020). Current international economic outlook. *Ecodate*, 33(3), 3–11.
55. Kirchherr, J., Reike, D., & Hekkert, M. (2017). Conceptualizing the circular economy: An analysis of 114 definitions. *Resources, Conservation and Recycling*, 127, 221–232.
56. Kok, L., Worpel, G., & Ten Wolde, A. (2013). *Unleashing the power of the circular economy*. Report by IMSA Amsterdam for Circle Economy.
57. Lacy, P., Long, J., & Spindler, W. (2019). *The circular economy handbook: Realizing the circular advantage*. London, UK: Springer Nature. <https://doi.org/10.1057/978-1-349-95968-6>
58. Lee, S., Chang, H., & Lee, J. (2024). Construction and demolition waste management and its impacts on the environment and human health: Moving toward sustainability enhancement. *Sustainable Cities and Society*. <https://doi.org/10.1016/j.scs.2024.105855>
59. Lin, B. C. (2020). Sustainable growth: A circular economy perspective. *Journal of Economic Issues*, 54(2), 465–471. <https://doi.org/10.1080/00213624.2020.1752542>
60. Liu, J., Nie, J., & Yuan, H. (2020). Interactive decisions of the waste producer and the recycler in construction waste recycling. *Journal of Cleaner Production*, 256, 120403. <https://doi.org/10.1016/j.jclepro.2020.120403>
61. Luick R, Jedicke E, Fartmann T et al. (2025) Der Wald im Spannungsfeld von Klimaschutz und Ressourcenbereitstellung. *Naturschutz und Landschaftsplanung (NuL)* 57:16–27. <https://doi.org/10.1399/NuL.127958>
62. Mančić, T. (2025). Climate change as a security challenge, risk and threat of the 21st century and its consequences on critical infrastructure. *International Journal of Contemporary Security Studies*, 1(1), 191–204.
63. Masaba, A. K., Aryatwijuka, W., Ntayi, J. M., & Bagire, V. (2025). Network structure in disaster response: The mediating role of coordination within a humanitarian organizational network in Uganda. *International Journal of Disaster Risk Management*, 7(1), 39–54.
64. Metić, A. (2025). The Significance and Role of Police Officers in Building the School as a Safe Environment for All Students. *International Journal of Contemporary Security Studies*, 1(1), 17–24.
65. Milenković, D. (2025). Theoretical, institutional and organizational aspects of the integrated disaster risk reduction system: Towards a deeper understanding of disaster resilience in Serbia. *International Journal of Contemporary Security Studies*, 1(1), 175–190.
66. Minunno, R., O’Grady, T., Morrison, G., Gruner, R., & Colling, M. (2018). Strategies for applying the circular economy to prefabricated buildings. *Buildings*, 8(9), 125. <https://doi.org/10.3390/buildings8090125>
67. Miranda, I. M., Cabrita, I., Gulyurtlu, P., & Filomena, P. (2013). Polymer-based waste materials for recycling. In *Waste and Waste Management* (pp. 99–100). New York, NY: Nova Science Publishers. ISBN 978-1-62618-284-4.

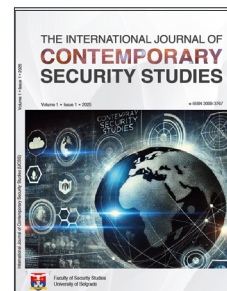
68. Nikolić, N., Cvetković, V. M., Renner, R., Cvijović, N., & Gačić, J. (2025). Disaster risk perception and local resilience near the “Duboko” landfill: Challenges of governance, management, trust, and environmental communication in Serbia. Preprints: The Multidisciplinary Preprint Platform.
69. Nikolić, N., Zečević, M., & Gajović, A. (2020). Управление качеством в экологии (Искушения в Республике Сербской). *Международный научный журнал: Инновационная наука*, 3, 24–32. ISSN 2410-6070.
70. OECD (2020). The circular economy in cities and regions: Synthesis report. OECD urban studies. OECD Publishing, Paris.
71. Ojha, J. C., Bhattarai, P. C., & Devkota, B. (2025). Teachers’ perception towards responses of COVID-19 pandemic management in Gandaki Province of Nepal: A cross-sectional survey. *International Journal of Disaster Risk Management*, 7(1), 485–494.
72. Partnering for our planet: How life-cycle thinking can help the construction industry’s sustainability efforts. (2017). Retrieved September 27, 2020, from <https://blog.tatasteelconstruction.com/partnering-planet-life-cycle-thinking-can-help-construction-industrys-sustainability-efforts/>
73. Poglavlje 27 – Životna sredina. (2020). Retrieved from <https://europeanwesternbalkans.rs/poglavlje-27/>
74. Popović Mančević, M. (2025). Non-Traditional Roles of Military Actors: NATO’s Engagement in Natural Disaster Response. *International Journal of Contemporary Security Studies*, 1(1), 75–84.
75. Povetkin, K., & Isaac, S. (2020). Identifying and addressing latent causes of construction waste in infrastructure projects. *Journal of Cleaner Production*. <https://doi.org/10.1016/j.jclepro.2020.122024>
76. Pradhananga, P., & Elzomor, M. (2023). Revamping sustainability efforts post-disaster by adopting circular economy resilience practices. *Sustainability*, 15(22), 15870. <https://doi.org/10.3390/su152215870>
77. Regattieri, A., Gamberi, M., Bortolini, M., & Piana, F. (2018). Innovative solutions for reusing packaging waste materials in humanitarian logistics. *Sustainability*, 10(5), 1587. <https://doi.org/10.3390/su10051587>
78. Renn, O. (2017), *Risk governance: coping with uncertainty in a complex world*, Routledge.
79. Renner, R., & Mayr-Veselinovic, C. (2025). Social License to Operate: Where Are You? The Role of Risk Communication in Raw Material Extraction. *International Journal of Contemporary Security Studies*, 1(1), 49–74.
80. Ruiz, L. A. L., Ramón, X. R., & Domingo, S. (2020). The circular economy in the construction and demolition waste sector: A review and an integrative model approach. *Journal of Cleaner Production*, 119238. <https://doi.org/10.1016/j.jclepro.2019.119238>
81. Shajidha, H., & Mortula, M. (2025). Sustainable waste management in the construction industry. *Frontiers in Sustainable Cities*. <https://doi.org/10.3389/frsc.2025.1582239>
82. Shi, G. V., Baldwin, J., Koh, S. L., & Choi, T. Y. (2017). Fragmented institutional fields and their impact on manufacturing environmental practices. *International Journal of Production Research*, 1–16.
83. Stanojlović, D., Spasojević-Šantić, T., & Trivunić, M. (2016). Analysis of the state of construction waste management in the Republic of Serbia. In *People, Buildings and Environment 2016: An International Scientific Conference* (Vol. 4, pp. 221–229). Luhačovice, Czech Republic.
84. Tushabe, G., Rukundo, P. M., Kaaya, A. N., Nahalomo, A., Nateme, N. C., Iversen, P. O., ... Rukooko, A. B. (2025). Retrogressive or misplaced priorities? An assessment of public expenditure for food security and disaster risk reduction in Uganda. *International Journal of Disaster Risk Management*, 7(1), 15–38.
85. Vidović, N., & Beriša, H. (2025). Economic aspects of cyber security: Socio-financial consequences of cyber attacks. *International Journal of Contemporary Security Studies*, 1(1), 149–162.
86. Vlada Republike Srbije, Ministarstvo poljoprivrede i zaštite životne sredine. (2018a). *Strategija upravljanja otpadom*. Belgrade, Serbia: Author.

87. Vlada Republike Srbije, Ministarstvo poljoprivrede i zaštite životne sredine. (2018b). *Zakon o upravljanju otpadom*. Belgrade, Serbia: Author.
88. Vračević, N. (2025). Strategic roles of private military companies: The evolution and privatization of warfare in the context of contemporary global conflicts. *International Journal of Contemporary Security Studies*, 1(1), 163–174.
89. Vukić, T. (2020). Obrazovanje za održivi razvoj kao izborni program. *Istraživanja u Pedagogiji – Research in Pedagogy*, 10(1). ISSN 2217-7337.
90. Wahlström, M., Teittinen, T., Kaartinen, T., & Vanden Eynde, A. (2018). *Deliverable 3.1: Hazardous substances in construction products and materials*. EIT Raw Materials, European Institute of Innovation and Technology.
91. World Health Organization (2025). Risk communications. <https://www.who.int/emergencies/risk-communications>.





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Article

Assessing the Implications of Scavengers' Activities on the Security of Kwara State

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ABSTRACT

This study assessed the implications of scavengers' activities on the security of Kwara State. The scavengers (*baban bola*), classified into two groups- itinerant and middlemen, have both been perceived as causing insecurity in the state. This study uncovered the veracity of this perception. The research adopted the theory of structural violence and employed both quantitative and qualitative research designs. Data were collected from Kwara residents through 204 questionnaires administered to residents of Ilorin, Offa, and Jebba; interviews with 2 KWEPA staff; interviews with 14 police officers; and FGDs with 20 scavengers. The data were systematically analysed to establish how scavenging affects scavengers' livelihoods; whether scavenging affects the security of lives and property; and the relationship between scavenging and environmental security. The research's findings revealed that scavenging negatively affects scavengers' livelihoods, as their daily earnings of \$1.68 fall below the poverty line of \$2.15; 80.39% of the respondents also believe that scavengers are exposed to danger, while the police confirmed receiving security complaints from scavengers. 93.24% of respondents believe that scavengers pose a security threat to them, while 78.43% affirm that they have evidence to support this belief. KWEPA corroborated the finding that 62.75% of respondents think scavenging has environmental benefits during the interview. The study concluded that scavengers' activities in the state cause more harm than good. To ameliorate the challenges, some recommendations include: regulation of scavengers' activities by the government; implementation of a sound waste management system by residents; and introduction of communal security measures.

KEYWORDS

Security; implication; human security; scavenger; Kwara state.

1. 1. Introduction

Security can be perceived as a means to an end and an end in itself. The notion of security has been evolving significantly because what is termed as security is subject to divergent opinions. Hence, Williams (2008), while explaining the scope of security studies, argued that four fundamental questions are pertinent to ask and answer. These questions are: What is security? Whose security are we talking about? What counts as a security issue? Moreover, how can security be achieved?

In the contemporary world, the concept of security has transcended national security and is now viewed mainly through the lens of human security. From human security concerns, what security is has expanded



tremendously to the point that anything that affects people's livelihoods has security implications and thus becomes a security issue. One such issue is the activities of scavengers, specifically those who deal in metal and other material scraps, commonly known as '*baban bola*'. Generally, scavengers' activities are tied to waste, either to sanitary work in India or to many categories of waste, including metal scrap and electronic waste, in Ghana and many other developing countries. Their activities are felt and have security implications for them, others living in the community, or the environment.

Nas and Jaffe (2004) described a scavenger as: a relatively poor person, has a low ascribed social status, is an immigrant (mostly from rural areas), and engages in this form of work generally as an adaptive response to chronic poverty (quoted in Benjamin, 2007). In India, scavengers engage in manual latrine cleaning and carry night soil in baskets on their heads; as Siddaramu (2013) explains, they belong to the lowest rung of society and suffer extreme forms of discrimination, exclusion, and powerlessness.

In Kwara State, and Nigeria in general, scavengers who deal in scraps are of two types: the itinerant scavenger and the middleman scavenger. The itinerant scavengers' activities involve moving from one place to another, carrying bags or pushing barrows to collect scraps, which are then sold to middlemen scavengers stationed at their preferred sites. The scraps, which include metal scraps, plastic bottles, irons, aluminium, paper, etc., are picked wherever they are found and sometimes bought from the owners. During these movements and transactions, many security issues occur. These include allegations of theft attributed to scavengers, physical assaults, health risks posed to scavengers, the poverty cycle of scavengers, and environmental pollution. In 2019, for instance, news surfaced online on how a clash between (Hausa) scavengers and (Yoruba) area boys almost led to an ethnic crisis, resulting in looting and blockade of the Lagos/Abeokuta Expressway before it was resolved by the police (Phenomenal, 2019). It is evident that scavengers' activities have security implications; however, despite the impending security threats posed by scavengers, especially itinerant ones, the security implications of their activities have not received adequate attention from security experts, researchers, and the government. In fact, most research on scavengers is conducted by scholars in the fields of the environment, waste management, health, and sustainable development. This assertion is further stressed by Medina (2011), who concluded that, despite the existence of approximately 15 million scavengers globally and their significant economic contributions, the informal recycling sector remains largely overlooked by researchers and development agencies, with no dedicated academic programmes addressing their role in poverty reduction, job creation, or industrial competitiveness.

As an activity, scavenging therefore affects the security of lives and property, the state's economy, and the environment. On the positive side, scavenging is a source of livelihood, an informal and cheap way of clearing the streets of certain waste materials, a source of acquiring recyclable materials for industrial use, and a source of revenue generation by the state, among others. As for its negative security implications, scavenging has led to the loss of lives and property, caused environmental insecurity, and left the scavengers in a state of perpetual poverty.

With this background, it is appropriate to say that scavenging has both positive and negative implications for the security of Kwara State. The state has, however, not done enough to harness the potential positive contributions of scavenging and has done very little to mitigate its negative security implications within its territory. Most citizens hold negative opinions of scavengers and see them as a security threat to the state.

This research, therefore, aims to assess the implications of scavengers' activities on the security of Kwara state by examining the relationship between scavenging and security in the state. This study is significant for the following reasons:

- The study is a trailblazer in discussing the security implications of the activities of scavengers, as most previous studies on scavengers have mainly focused on their economic, environmental, and health impacts. It will therefore be an eye-opener for other security scholars to research scavengers and the security implications of their activities in greater depth.
- Scavenging has many effects on society, but it seems the government focuses on its economic and environmental impact. At the same time, security agencies also appear oblivious to the security implications of scavengers' activities. They operate in the informal sector, freely scavenging on the streets of the state without any obvious regulation to check them or ensure that they pose no threat to themselves or others. This study is, therefore, a wake-up call to the government to formulate relevant policies to prevent po-

tential security threats posed by scavenger activities. It will also showcase the positive side of scavenging and highlight ways to ensure cordial relationships between scavengers and the general populace.

The research questions include:

- Does scavenging affect scavengers' livelihood positively or negatively
- Does scavenging have an impact on the security of the lives and properties of the people
- Is there a relationship between scavenging and environmental security

The objectives of the research are as follows:

- To understand if scavenging affects scavengers' livelihood positively or negatively
- To find out if scavenging has an impact on the security of the lives and properties of the people
- To establish the relationship between scavenging and environmental security

The research was conducted on the premise of the following hypotheses:

- Scavenging positively affects scavengers' livelihood
- Scavenging hurts the security of the lives and properties of the people
- There is a relationship between scavenging and environmental security

1.1. Literature Review

Research Question 1: Does scavenging affect scavengers' livelihood positively or negatively?

Scavengers face a myriad of challenges, threats, and risks on duty. Agyekum (2010), as cited in Oteng-Ababio et al. (2014), explained that the first challenge faced by informal recyclers is neglect from the government. He explained further that, as a shadow of the formal economy, the scavengers suffer from low income, stigmatization, hostility from government authorities, poor access to infrastructure and social services, such as credit facilities. Yahaya (2018) explained that scavenging of materials for recycling purposes is dangerous, as scavengers use their bare hands to search through waste dumps. Based on their research on e-waste management, the ILO (2014) identified threats facing informal waste workers (scavengers), including health and environmental risks, limited power to negotiate for better working conditions, and a low recovery rate of recyclable materials from waste, while contaminating themselves and the environment in which they operate. For Abad (2008), while scavenging is physically exhausting, resident scavengers who scavenge in the Smokey Mountain are comparatively more comfortable than street scavengers, who are beaten up without just cause, treated like scum of the earth, and met with disdainful looks.

Citing Oteng-Ababio, Kalantidou, and Walsh (2016), the authors explained that harmful substances are numerous in e-waste, and heavy metals such as lead and mercury cause IQ deficits and developmental abnormalities in children. They explained further that the inhalation of such heavy metals damages the kidney and respiratory tissue, and also leads to lung cancer. For Jerie (2016), scavengers suffer health risks, including musculoskeletal disorders; safety and health hazards like diarrhoea, viral hepatitis, and cases of obstructive and restrictive disorders.

The above literature reveals that scavenging has a predominantly negative impact on scavengers' human security; however, not all scavenging is security-threatening, as scavengers do provide essential services, earn decent incomes, and contribute to recycling (Medina, 2011). This study will delve deeper to assess whether scavenging improves scavengers' security.

Research Question 2: Does scavenging have an impact on the security of the lives and properties of the people?

The security implications of scavengers' activities in Nigeria have rarely been discussed by academics, with most coverage in Nigerian newspapers. In several Nigerian cities, scavengers have been implicated in the theft of cables, rods, manhole covers, building materials, and the infiltration of construction sites. For instance, in the FCT, there have been reports of scavengers attacking people commuting at night and also serving as inform-

ants to criminals (Vanguard, 2023). The scavengers working in the South-Eastern states in Nigeria have been accused of vandalism, stealing, spying, and being informants to kidnappers, among other things (Ibid, 2024). Furthermore, scavenging has been linked to vandalism of Nigeria's critical public infrastructures, resulting in recurrent breakdowns in the power and telecoms sectors (Guardian, 2025). Some reports link scavenging with increased loitering, informal settlements around dump sites, and scavenging clusters. In Abuja, for instance, residents of certain suburbs blamed the rise of scavengers/beggars for burglaries, kidnappings, and general insecurity (Daily Post, 2025). As summarized by Ulo et al. (2024), some individuals perpetrate crimes such as immoral dress and carrying weapons in the name of metal waste collection, and this has led to their ban in Borno and Yobe states.

In conclusion, communities widely believe that scavengers' activities threaten their security, but this is not always the case; this study will address gaps in the literature in this area while focusing on Kwara State.

Research Question 3: Is there a relationship between scavenging and environmental security?

Analysis of the literature on the relationship between scavenging and environmental security reveals both positive and negative contributions, and it is not easy to determine which is greater.

For instance, by extracting recyclables, scavengers reduce the volume of waste reaching landfills and supply secondary materials to informal and formal recycling chains (Agunwamba, 2003; Oteng-Ababio, Amankwaa & Chama, 2014). This service, according to the ILO (2014), can be interpreted as enhancing environmental security as it helps reduce pollution and conserve material resources, particularly in developing countries with weak waste management systems. Medina (2011) emphasized that scavenging supports environmental security by reducing energy use and greenhouse gas emissions through the recovery and recycling of inorganic materials, which have a lower environmental impact compared to virgin resources.

On the other hand, unregulated scavenging in West African cities is characterized by exposure of scavengers and others to hazardous substances (e-waste toxins, biomedical waste, leachate) and injuries arising from unsafe handling, leading to public-health issues (Owusu-Sekyere, 2014; Jerie, 2016). Oteng-Ababio et al. (2014) argue that these occupational hazards translate into environmental insecurity by reducing households' and communities' capacity to cope with environmental shocks and chronic pollution. Further, unregulated dumping and the concentration of scavenging activities around informal dumpsites can intensify localized contamination and vector proliferation, with spillover effects for adjacent communities (Agunwamba, 2003; Benjamin, 2007). Most of the literature analysed is from studies conducted outside Nigeria so this study will add to the limited literature in this area in Nigeria, especially in Kwara State.

Structural Violence Theory

Structural violence theory was introduced in 1969 by Johan Galtung, a Norwegian sociologist, who had first published works on peace and violence since 1964. Galtung identified two types of peace, namely, positive peace and negative peace. Negative peace is the absence of violence and war, while positive peace is the integration of human society. Structural violence refers to violence in which a social structure or social institution may harm people by preventing them from meeting their basic needs. Structural violence occurs when people are disadvantaged by political, legal, economic, or cultural traditions due to long-standing structural inequalities that are usually accepted as the way things are and always have been (Christie et al., 2001).

This theory is relevant to this study because scavenging jobs are fraught with security threats to scavengers and to people living in the community where scavenging takes place. Scavengers work in the informal sector of the economy and face economic and life-threatening risks resulting from physical attacks, discrimination, exposure to disease, and poverty, among others. Their unequal access to education, health care, and union formation is a form of structural violence against them. One of the primary reasons people take up scavenging is to earn a living. However, the government and most of the general public, instead of providing support to make their task easier, often neglect them and, in some cases, ban them from operating.

2. Methodology

This study employed a mixed-methods approach, combining quantitative and qualitative data collection techniques to assess the security implications of scavengers' activities in Kwara State. The research design included surveys, Focus Group Discussions (FGDs), semi-structured interviews, and direct observation.

Study Area

The study area is Kwara State, a state created on 27th May, 1967, and one of the six north-central states in Nigeria. The land area is 33,433 km², and based on the 2006 population census, the state's population is estimated at 3,192,900. The state, located at latitude 8°97'N and longitude 4°39'E, shares boundaries with Niger, Kogi, Ekiti, Osun, and Oyo states, and borders the Republic of Benin to the west.

Kwara State is made up of sixteen (16) Local Government Areas (LGAs), with a significant city, Ilorin, and two major towns, Offa and Jebba. Other towns are Patigi, Erin-Li, Lafia, Adeleke Igbewere, Ejidongari, Osi, Lafagi, Gure, Afon, Kaiama, Isanlu-Isin, Omu-Aran, Egbejila, Iota, Iponrin, and Igbaja (Kwarastate.gov.ng). This study focused on Ilorin, Offa, and Jebba, as waste collection and disposal are usually limited in rural areas (Agunwamba, 2003).



Figure 1. Map of Kwara State showing the 16 Local Government Areas (LGAs).

Participant Selection

Participants were selected using purposive and stratified sampling techniques. The study targeted four key groups: scavengers involved in metal scrap collection, residents of Kwara State, officials from the Kwara State Environmental Protection Agency (KWEPA), and officers of the Nigerian Police Force (NPF). Stratification was based on geographical zones—Kwara Central (Ilorin), Kwara North (Jebba), and Kwara South (Offa)—to ensure regional representation.

Sample and Sampling Techniques

The researcher selected study participants from three (3) major cities in the three (3) Kwara state senatorial zones: Kwara Central, Kwara North, and Kwara South. To determine the sample size, a calculator (calculator.net) was used.

Questionnaires were addressed to 204 urban residents, divided as follows: 100 residents of Ilorin city (made up of Ilorin east, Ilorin south, and Ilorin west LGAs) were selected in Kwara central; while from Jebba town, Moro LGA of Kwara north, and Offa town, Offa LGA in Kwara south, 52 residents were selected each. People of different ages, sexes, occupations, religions, and locations, among others, were selected in each location to ensure an accurate representation.

Other study participants include: twenty (20) scavengers that deal in metal scraps made up of ten (10) scavengers in Ilorin, and five (5) scavengers in each of the two towns of Offa and Jebba; two (2) KWEPA officials; and 14 NPF officers spread across different police stations (6 from Ilorin and four from each of the two towns).

The study samples were carefully selected based on their importance to the research. The scavengers, for instance, are in the best position to explain the security threats they face; Kwara residents bear the significant impacts (either good or bad) of scavengers' activities; KWEPA as the waste management authority is tasked with the duty of managing waste and those who deal in it among other functions, hence they are in good position to authoritatively explain how the business of metal scrap scavenging is being done and how the state monitors it; the NPF personnel as the manager of security within the state are capable of providing security and unbiased account of security threats posed to and by scavengers within the state while recommending solutions. To determine the sample size, a calculator (calculator.net) was used.

Data Collection Tools and Validation

The questionnaire, administered to residents, was pre-tested with a small sample (n=20) to ensure clarity and relevance. Feedback from the pilot informed revisions aimed at improving reliability. FGDs and interviews were guided by structured protocols developed from literature and expert input. Triangulation of data sources enhanced the validity of findings.

Reliability Measures

To ensure reliability, all data collectors were trained on ethical standards and data recording procedures. Responses from different tools were cross-verified, and thematic consistency was checked during analysis. Interpretive Phenomenological Analysis (IPA) was used for qualitative data, while descriptive and inferential statistics were applied to quantitative data.

Ethical Considerations

Informed consent was secured verbally from all participants. Respondents were assured of anonymity and confidentiality. Participation was voluntary, and no incentives were provided. Hausa-speaking research assistants facilitated communication with non-English-speaking scavengers.

Method of Data Analysis

Data obtained through the questionnaire were analysed using quantitative analysis and subjected to simple statistical analysis and interpretation. The Data obtained through FGD, interviews, and observation were thematically analysed using Interpretive Phenomenological Analysis.

3. Results

This section presents both descriptive and inferential findings from the study. Data were collected from 204 residents, 20 scavengers, 14 police officers, and 2 KWEPA officials across Ilorin, Offa, and Jebba.

Table 1. Outcome of Respondents' Demographic Features (Kwara Residents).

Variables	Frequency				Percentage (%)
	Ilorin	Jebba	Offa	Total	
Respondents	100	52	52	204	100
Sex					
Male	59	38	35	132	64.71
Female	41	14	17	72	36.29
Marital Status					
Married	46	30	30	106	51.96
Single	54	17	20	91	44.61
Widowed	0	2	2	4	1.96
Divorced	0	3	0	3	1.47
Age (years)					
15-35	72	23	34	129	63.24
36-60	25	23	17	65	31.86
Above 60	3	3	1	7	3.43
5-14	0	3	0	3	1.47
Educational Level					
Tertiary	97	26	41	164	80.39
Secondary	2	11	9	22	10.78
No formal Education	1	9	2	12	5.88
Primary	0	6	0	6	2.94
Religion					
Islam	52	34	43	129	63.24
Christianity	48	15	9	72	35.29
Traditional	0	3	0	3	1.47
Occupation					
Public Servant	63	23	18	104	50.98
Self Employed	13	12	13	38	18.63
Student	17	3	10	30	14.71
Private Employment	3	6	8	16	7.84
Unemployed	2	8	3	13	6.37
Retired	2	0	1	3	1.47

The demographic profile of the respondents shows a predominantly male population, with 64.71% identifying as male. A slight majority were married, accounting for 51.96%, while 44.61% were single. Most respondents were young adults aged 15-35, accounting for 63.24% of the sample. Educational attainment was notably high, with 80.39% having a tertiary education, particularly in Ilorin, although a small portion had no formal or only a primary education. In terms of religion, 63.24% were Muslim, followed by 35.29% Christians, and a minimal number practicing traditional beliefs. Occupationally, over half were public servants, while others were self-employed, students, or privately employed; unemployment was relatively low at 6.37%. Overall, the sample reflects a diverse, educated, and economically active population, which is essential for understanding perceptions of security and scavenging in Kwara State's urban areas.

Table 2. Socio-demographic data of the scavengers.

Scavenger	Age	Sex	State of Origin	Education Level	Marriage Status	Economic Status (Poor, Middle class, Rich)	Daily Earnings	Years in Business
1	28	M	Kebbi	Primary	Single	Poor	2,000	5
2	22	M	Kebbi	Primary	Single	Poor	1, 000	1
3	25	M	Kebbi	Primary	Single	Poor	1, 000	1
4	22	M	Katsina	Primary	Single	Poor	1, 000	1
5	23	M	Sokoto	Primary	Single	Poor	1, 000	2
6	18	M	Zamfara	Nil	Single	Poor	1, 000	3
7	17	M	Sokoto	Nil	Single	Poor	1,500	2
8	20	M	Kebbi	Nil	Single	Poor	1000	2
9	21	M	Niger	Nil	Single	Poor	1500	2
10	19	M	Katsina	Nil	Single	Poor	1000	1
11	16	M	Kebbi	Nil	Single	Poor	1000	1
12	20	M	Sokoto	Nil	Single	Poor	1500	2
13	21	M	Katsina	Primary	Single	Poor	1000	1
14	15	M	Kano	Nil	Single	Poor	1000	1
15	16	M	Kebbi	Nil	Single	Poor	1000	1
16	20	M	Katsina	Nil	Single	Poor	1000	2
17	16	M	Kebbi	Nil	Single	Poor	1, 000	1
18	21	M	Katsina	Nil	Single	Poor	2, 000	3
19	17	M	Katsina	Nil	Single	Poor	1, 000	2
20	20	M	Sokoto	Nil	Single	Poor	1, 000	1

4. Interpretation of Scavenger Demographics

The above table reveals that the scavengers are all young males, aged 15-28 years, predominantly from northern Nigerian states such as Kebbi, Katsina, Sokoto, Zamfara, Niger, and Kano. Most of them have no formal education or only primary-level schooling, and all are single and identify as poor. Their daily earnings range from ₦1,000 to ₦2,000, which is below the global poverty line, and most have been scavenging for 1 to 3 years. This profile highlights the precarious conditions under which scavengers operate and supports the study's argument that, while economically necessary, scavenging exposes participants to structural vulnerabilities.

Table 3. Socio-demographic Data of KWEPA Officials

S/N	Name	Sex	Designation
1	Isiaka Jamiu Abiodun	M	Senior Scientific Officer
2	Alhaja Fatima	F	Principal Scientific Officer

The two KWEPA officials interviewed were both desk officers managing scavengers' activities in the state.

Table 4. Socio-demographic Data of Police Officers

S/N	Name	Sex	Location
1	Umar	M	Ilorin
2	Adama	F	Ilorin
3	Best	M	Ilorin
4	Ayinde	M	Ilorin
5	Ilyasu	M	Ilorin
6	Comfort	F	Ilorin
7	Adekunle	M	Offa
8	Rasaq	M	Offa
9	Nike	F	Offa
10	Alex	M	Offa
11	Oluwatoyin	F	Jebba
12	Ndana	M	Jebba
13	Usman	M	Jebba
14	Felicia	F	Jebba

NB: fictitious names are used to hide the identities of the officers.

The table presents the demographic distribution of 14 police officers interviewed across three locations in Kwara State: Ilorin, Offa, and Jebba. Of the total respondents, Ilorin had the highest representation with six officers, followed by Offa and Jebba with four officers each. The gender distribution shows a predominance of male officers, with 10 males and four females across all locations. This composition reflects a relatively balanced inclusion of perspectives from different regions and genders within the state's law enforcement community, contributing to a more comprehensive understanding of security issues related to scavenging activities.

5. Discussion

The relationship between scavenging and security

As explained earlier, the concept of security, though not negating national security, has, however, morphed with a focus on human security, which includes seven areas, namely economic security, food security, health security, environmental security, personal security, community security, and political security (UNDP, 1994). Therefore, anything that affects any of the seven areas listed above has security implications.

To find out whether there is a relationship between scavenging and security, the researcher therefore researched how scavenging affects the lives of the scavengers themselves, the residents of the state, and the environment. Thus, the researcher administered questionnaires to residents of the state, conducted FGDs with scavengers, and interviewed police and KWEPA officers.

The findings will be presented for each research question.

Research Question 1: Does scavenging affect scavengers' livelihood positively or negatively?

The research used indices such as economic, personal, health, and food security to analyse whether and how scavenging affects the human security of scavengers.

For the scavengers, scavenging is a means to earn income and sustenance. From the FGDs, an average scavenger earns N1,175 (about \$1.68) per day, that is, \$0.47 short of the poverty line of \$2.15 as fixed by the World Bank in September 2022 (The World Bank, 2022). Based on the economic security factor, one can safely conclude that the scavengers are not economically secure, as they live below the poverty line.

Scavenging negatively affects the personal security of the scavengers, and evidence is a statement from the FGD that goes thus:

"Sometimes, we are accused wrongly of stealing, and before we know it, the police would have arrested us, and we would have to give them money before they free us... We do not go to the hospital for treatment because we don't have money or any registration with any hospital. If we fall sick, we take care of ourselves. Nobody cares about our health." — FGD Participant (Scavenger)

On the positive note, most scavengers eat between 2 and 3 times daily, and since scavenging does not impede their access to food, we can conclude that it supports food security.

As a strategy to validate the results of data gathered from scavengers regarding whether scavenging affects their security, the researcher collected relevant data from residents and police officers. Residents were asked whether they think scavengers are exposed to danger, and 80.39% of respondents agreed. The police officers were asked whether scavengers had brought cases to the police station and, if so, what types of cases they had brought. A police officer in Jebba explained thus:

"The scavengers do bring cases to the police station. These cases are sometimes brought against another scavenger, especially based on an accusation of theft, and sometimes against the people of some communities on matters such as being beaten up by some people in the community and an accusation of stealing."

Furthermore, a police officer in Offa added:

"... scavenger items are often stolen from their shops. They sometimes report cases like stealing and trespassing at the station against some miscreants in the community."

In conclusion, the literature review paints a largely negative picture of scavenging, emphasizing its association with crime and urban insecurity. While the findings from Kwara State support some of these concerns—particularly regarding personal and community security—they also reveal that scavenging plays a vital role in ensuring food access and basic income for marginalized populations. Therefore, the study contributes a more balanced perspective to the discourse, highlighting the need for policy interventions that address both the risks and the socio-economic functions of scavenging.

Research Question 2: Does scavenging have an impact on the security of the lives and properties of the people?

To analyse whether and how scavenging activities affect the security of residents' lives and property in Kwara State, questionnaires were administered to 204 residents, and interviews were conducted with police officers and KWEPA staff. Table 5 below presents data from the questionnaire to assess whether scavenging affects residents' security.

Table 5. Does scavenging affect the security of lives and properties?

Question	Value	Frequency	Percentage (%)
Do you think scavengers pose a security threat to lives and properties?	Yes	190	93.14
	No	14	6.86
Have you ever witnessed or received reliable information about a security threat caused by scavengers?	Yes	160	78.43
	No	44	21.57
Are you suspicious of scavengers whenever you see them around your home?	Yes	181	88.73
	No	23	11.27

The survey responses indicate a strong public perception of scavengers as security threats. A large majority of respondents, 93.14%, believe scavengers pose a threat to lives and properties. Additionally, 78.43% have either witnessed or received reliable information about security incidents involving scavengers, suggesting these concerns are grounded in experience. Furthermore, 88.73% of respondents admit to feeling suspicious when they see scavengers around their homes, reflecting a high level of distrust. These findings suggest that scavenging, while economically relevant, is widely viewed as a source of insecurity, highlighting the need for regulation and community engagement (Garba & Akaan, 2025; Metić, 2025).

To ensure balanced research on whether scavenging affects people's security, police officers were interviewed to validate the questionnaire results, as explained above. The police officers were therefore asked whether their police stations had ever received security-related complaints about scavengers and whether they had ever had to arrest them based on those complaints. All 16 police officers interviewed confirmed that their stations had received security complaints about scavengers and had been involved in arresting them on various grounds. For instance, one of the police officers, Umar, responded thus:

"Yes, we have received complaints about scavengers. We have received complaints ranging from theft, receiving stolen properties, house breaking, and loitering when people are not around."

The researcher went further to interview 2 KWEPA officers working on scavenger-related activities to find out whether the government keeps records of itinerant scavengers and regulates their activities. Their responses were negative, as their monitoring activities start and end with the middlemen scavengers who stay at the site where the scraps they acquire are kept. Jamiu explained thus:

"Yes, the government is keeping the record of metal scrap scavengers working in the state. All the scavengers working within the state are registered with the Kwara State Ministry of Environment, and their registration list is being sent to KWEPA for regulatory functions. So, we regulate their activities in KWEPA, but they are registered with the Ministry of Environment. Yes, the government regulates their activities by inspecting their sites, their activities, and we inspect them to check their level of compliance with environmental laws and regulations."

Based on the survey and interviews conducted, it can be concluded that the public widely perceives scavengers as a security threat in Kwara State. This perception is supported by both quantitative data—over 93% of respondents believe scavengers pose risks to lives and property—and qualitative insights from police officers, who confirmed receiving and acting on complaints about theft, trespass, and loitering by scavengers. Furthermore, the lack of government regulation over itinerant scavengers, as revealed by KWEPA officials, contributes to the unchecked nature of their activities and reinforces public distrust.

The convergence between the literature and the study's findings suggests that, in its current unregulated form, scavenging is perceived as a significant security concern in Kwara State, mirroring trends observed across other parts of Nigeria. While scavenging serves an economic function for marginalized populations, its association with criminal activities and the absence of comprehensive regulation exacerbate public fear and insecurity. Therefore, a balanced approach is needed—one that addresses the socio-economic drivers of scavenging while implementing effective oversight and community engagement to mitigate security risks.

- Research Question 3: Is there a relationship between scavenging and environmental security?

Scavenging activities are inherently environmental matters; no wonder the agency of government saddled with the responsibility for managing them in Kwara State is KWEPA.

Based on observation, the itinerant scavengers picked up scraps from the streets and sometimes from dump sites. These are objects that have hitherto littered the environment and often cause injury to humans, spoil vehicle tyres, and block drainage, thereby causing floods.

Table 6. Which of the following do you believe are the advantages of scavenging metal scraps?

Benefits of scavenging	Frequency	Percentage (%)
Poverty alleviation (A source of livelihood for the scavengers)	140	68.63
Environmental benefits (Reduction of metal and iron scraps littering the streets)	128	62.75
Economic benefits (providing raw materials for industries)	122	59.8
Source of revenue for the government	31	15.2
Other benefits (please mention)	7	3.43

The above data is represented in Figure 2 below:

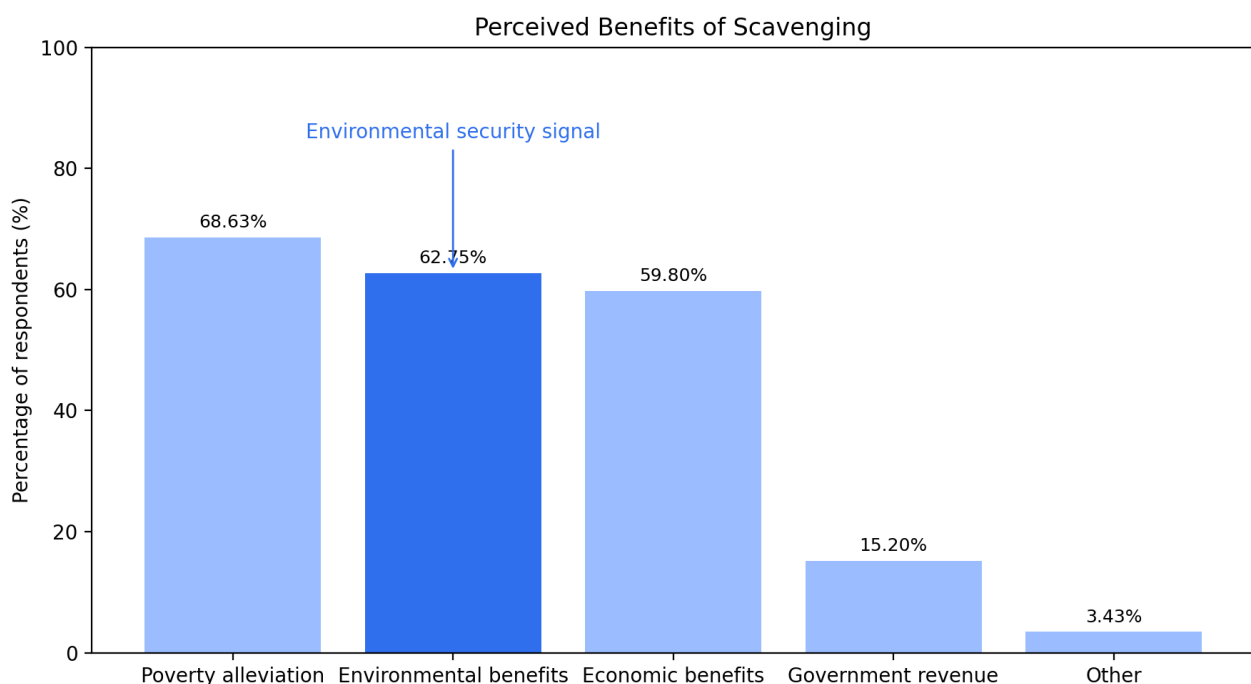


Figure 2. Benefits of scavenging.

Environmental benefits, specifically the reduction of metal and iron scraps littering the streets, were acknowledged by 128 respondents, representing 62.75% of the sample. This places environmental benefits as the second-most recognized advantage of scavenging, closely behind poverty alleviation at 68.63%. The high percentage suggests that the public perceives scavenging as a meaningful contributor to environmental cleanliness and waste reduction. In contrast, economic benefits and government revenue generation were less emphasized, indicating that environmental impact is a more immediate and visible benefit to the community.

During the interview with KWEPA officials, they corroborate the finding that scavengers support environmental security. Fatima, one of the KWEPA officers interviewed, explained that,

“...They do contribute positively to society simply by ensuring that this metal scrap does not litter the environment...”

As observed, the scavengers that could cause environmental insecurity are the middlemen scavengers who are domiciled in a place and collect scraps from the itinerant scavengers. The surroundings of such scavengers often look untidy and unsafe. To mitigate this environmental insecurity, KWEPA monitors them and ensures compliance with environmental and safety regulations.

The findings from Kwara State reinforce the dual narrative presented in the literature: **scavenging contributes positively to environmental security by reducing waste and promoting recycling**, but **also poses environmental risks when unregulated**. The public's recognition of these benefits, alongside government efforts to monitor scavenging activities, suggests a growing awareness of the role scavengers play in environmental management.

However, the environmental risks associated with unregulated scavenging—particularly at middlemen collection points—highlight the need for **stronger policy frameworks, improved waste management infrastructure, and formal integration of scavengers into the waste management system**. This would help maximize the environmental benefits of scavenging while minimizing its risks.



Figure 3. Picture of A (Middleman) scavenger's site.

Study Limitations and Future Research

This study was limited by its geographic scope, focusing only on three urban locations in Kwara State. The findings, therefore, may not fully represent rural areas or other Nigerian states with different socio-economic dynamics.

Future research should explore comparative studies across multiple states to understand regional variations in scavenging practices and their implications. Further studies could also assess the impact of regulatory interventions over time. Moreover, exploring the gender dynamics within scavenging and the role of technology in formalizing the sector would provide deeper insights into sustainable waste management and inclusive urban development.

6. Conclusion

This study set out to assess the implications of scavengers' activities on the security of Kwara State, focusing on three dimensions of human security: the livelihood of scavengers, the safety of residents, and environmental security. The findings reveal a complex interplay of both positive and negative outcomes.

On the one hand, scavenging provides a source of livelihood for marginalized individuals, particularly young, uneducated males from northern Nigeria. It contributes to food security, as most scavengers reported eating two to three meals daily. Additionally, scavenging helps maintain environmental cleanliness by removing metal and plastic waste from public spaces, thereby reducing pollution and potential hazards.

On the other hand, the study uncovered significant negative implications. Economically, scavengers earn below the global poverty line, indicating a lack of financial security. They also face personal and health risks, including police harassment, community hostility, and exposure to hazardous materials. From the residents' perspective, scavengers are widely perceived as threats to lives and properties, with over 93% of respondents affirming this belief. Police officers corroborated these concerns, citing frequent complaints and arrests of scavengers for theft, trespassing, and loitering.

Environmental security also presents a dual narrative. While itinerant scavengers contribute positively by cleaning the environment, middleman scavengers often operate at untidy sites, contributing to localized pollution and safety concerns.

In summary, scavenging in Kwara State is a double-edged sword. While it offers socio-economic and environmental benefits, its unregulated nature exacerbates security risks. The study underscores the need for a balanced approach that mitigates the negative impacts while enhancing the positive contributions of scavenging to human and environmental security.

This research revealed that scavenging causes more harm than good to people, but this need not be the case, as scavenging is an economic activity that can contribute positively to the state's security when properly regulated and monitored.

To mitigate the risks posed by scavengers' activities, the following are recommended:

Comprehensive Regulation of Scavenging Activities

- The government should extend its regulatory oversight to include itinerant scavengers, not just middlemen. This includes issuing operational licenses, uniforms, ID cards, and tracking numbers. A formal registration system will help monitor their activities, reduce criminal infiltration, and enhance accountability. Training programs should be introduced to educate scavengers on safety, hygiene, and legal boundaries.

Improved Waste Management Systems

- The prevalence of scavengers on the streets is symptomatic of poor waste disposal practices. The government must invest in efficient waste collection and disposal infrastructure. Public awareness campaigns should be launched to discourage indiscriminate dumping and promote responsible waste management among residents.

Designated Scrap Collection Points

- Establishing centralized, accessible drop-off points for recyclable materials will help streamline scavenging activities. These points should be strategically located across urban centers and managed in collaboration with local authorities and waste management agencies. This will reduce street scavenging and its associated security concerns.

Zoning and Regulation of Middlemen Scavenger Sites

- The government should designate specific zones for middlemen scavengers to operate. These zones must meet environmental and safety standards and be subject to regular inspections by KWEPA. This will help mitigate the environmental degradation caused by unregulated scrap yards.

Strengthening Security Infrastructure

- The study revealed a shortage of police personnel and inadequate security coverage in some areas. The government should invest in expanding and equipping security forces to respond effectively to complaints involving scavengers. Community policing initiatives should also be encouraged to foster trust and collaboration between residents and law enforcement.

Community-Based Security Initiatives

- In areas with limited police presence, communities should be encouraged to establish community policing initiatives or engage vigilante groups. These groups can help monitor scavenger activities and report suspicious behavior, thereby enhancing communal safety.

Stakeholder Engagement and Sensitization

- A multi-stakeholder approach is essential. Government agencies, scavengers, residents, traditional leaders, and security personnel should collaborate to develop inclusive policies. Regular town hall meetings and sensitization campaigns can help bridge the trust gap and promote mutual understanding.

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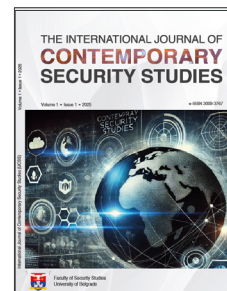
7. References

1. Abad, R. (1991). Squatting and scavenging in Smoky Mountain. *Philippine Studies*, 39(3), 263–286.
2. Acharya, A. (2007). Human security. In J. Baylis, S. Smith, & P. Owens (Eds.), *The globalisation of world politics* (4th ed., pp. 492–505). Oxford University Press.
3. Agunwamba, J. C. (2003). Analysis of scavengers' activities and recycling in some cities of Nigeria. *Environmental Management*, 32(1), 116–127.
4. Benjamin, S. (2007). *A rapid assessment on scavenging and waste recycling work by children in South Africa*. The Department of Labour, Pretoria & International Labour Organisation.
5. Brauch, H. G. (2011). Concepts of security threats, challenges, vulnerabilities and risks. In O. Spring, C. Mesjasz, J. Grin, P. Kameri-Mbote, B. Chourou, P. Dunay, & J. Birkmann (Eds.), *Coping with global environmental change, disasters and security* (pp. 61–106). Springer. Retrieved from <http://www.springer.com/978-3-642-17775-0>
6. C. P. L. (2023). *Margin of error*. Zoho Survey. Retrieved March 6, 2023, from <https://www.zoho.com/survey/margin-of-error.html>
7. Commission on Human Security. (2003). *Human security now*. New York, NY: Author.
8. Daily Post. (2025, June 29). Residents worry as scavengers' presence multiplies in Abuja suburbs. Retrieved from <https://dailypost.ng/2025/06/29/residents-worry-as-scavengers-presence-multiplies-in-abuja-suburbs/>
9. Garba, T. M., & Akaan, R. (2025). The socioeconomic and psychological implications of polygamy: A quantitative and qualitative analysis concerning disaster risk reduction and management (DRRM) in Nigeria. *International Journal of Contemporary Security Studies*, 1(1), 25–34.
10. International Labour Organization. (2014). *Tackling informality in e-waste management: The potential of cooperative enterprises*. Geneva, Switzerland: International Labour Office.
11. Jerie, S. (2016). Occupational risks associated with solid waste management in the informal sector of Gweru, Zimbabwe. *Journal of Environmental and Public Health*, 2016, Article 9024160. doi:10.1155/2016/9024160
12. Kalantidou, E., & Walsh, F. (2016). *Handling e-waste with care: Prevention against e-pollution hazards via the "Recycle-Reuse-Share-Repair" scheme in Brisbane, Australia* [Presentation]. Melbourne, Australia.
13. Kwara State Government. (2022). *Discover Kwara: History and society*. Retrieved February 8, 2022, from <https://kwarastate.gov.ng/discover-kwara/history-society/>
14. Maple Tech International LLC. (n.d.). *Sample size calculator*. Calculator.net. Retrieved March 6, 2023, from <https://www.calculator.net/sample-size-calculator.html>
15. Medina, M. (2011). *Global supply chains in Chinese industrialization: Impact on waste scavenging in developing countries* (WIDER Working Paper No. 2011/78). United Nations University World Institute for

- Development Economics Research (UNU-WIDER). Retrieved from <https://www.wider.unu.edu/sites/default/files/wp2011-078.pdf>
16. Metić, A. (2025). The significance and role of police officers in building the school as a safe environment for all students. *International Journal of Contemporary Security Studies*, 1(1), 17–24.
 17. Oteng-Ababio, M., Amankwaa, E. F., & Chama, M. A. (2014). The local contours of scavenging for e-waste and higher-valued constituent parts in Accra, Ghana. *Habitat International*, 43, 163–171. doi:10.1016/j.habitatint.2014.03.003
 18. Owusu-Sekyere, E. (2014). Scavenging for wealth or death? Exploring the health risk associated with waste scavenging in Kumasi, Ghana. *Ghana Journal of Geography*, 6, 63–80.
 19. Sheu, M. (2021). *Occupational risks and social protection needs of women street sweepers in Ilorin Metropolis* (Unpublished master's thesis). University of Ilorin, Ilorin, Nigeria.
 20. Siddaramu, B. (2013). Liberation and rehabilitation of manual scavengers. *International Journal of Research in Humanities, Arts and Literature*, 1(2), 29–38.
 21. The Global Development Research Center. (n.d.). *Definitions of human security*. Retrieved from <https://www.gdrc.org/sustdev/husec/Definitions.pdf>
 22. *The Guardian*. (2025). How vandalism, scavenging ruin critical assets, damage economy. Retrieved from <https://guardian.ng/features/focus/how-vandalism-scavenging-ruin-critical-assets-damage-economy/>
 23. The Phenomenal. (2019, August). Scavenger, area boy caused the Ile-Epo clash—Police. Retrieved December 28, 2021, from <https://phenomenal.com.ng/2019/08/scavenger-area-boy-caused-ile-epo-clash-police-ethnic-clash-in-lagos/>
 24. The World Bank. (2022). *Fact sheet: An adjustment to global poverty lines*. Retrieved July 6, 2023, from <https://www.worldbank.org/en/news/factsheet/2022/05/02/fact-sheet-an-adjustment-to-global-poverty-lines>
 25. Ulo, E., Olaniyi, A., & Ayoola, O. F. (2024). “We don’t steal, nor vandalized, we only value waste”: Scavengers phenomenon in Nigeria. *International Journal of Research and Innovation in Social Science (IJRISS)*, 8(2), 2155–2164. doi:10.47772/IJRISS.2024.802154
 26. United Nations Development Programme. (1994). *Human development report 1994*. Oxford University Press.
 27. Vanguard. (2023, August). NSCDC arrests 20 persons scavenging at night in FCT. Retrieved from <https://www.vanguardngr.com/2023/08/nscdc-arrests-20-persons-scavenging-at-night-in-fct/>
 28. Vanguard. (2024, October). S-East residents rise against scavengers, say many of them are criminals. Retrieved from <https://www.vanguardngr.com/2024/10/s-east-residents-rise-against-scavengers-say-many-of-them-are-criminals/>
 29. Williams, P. D. (2008). Security studies: An introduction. In P. D. Williams (Ed.), *Security studies: An introduction* (pp. 1–12). Routledge.
 30. Yahaya, A. (2018). The economics of scavenging business in Mubi metropolitan area. *International Journal of Research – Granthaalayah*, 6(7), 191–199. doi:10.29121/granthaalayah.v6.i7.2018.1298



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Article

Assessment on the Level of Awareness and Adoption of Cloud Computing for Disaster-Resilient Library Management Systems: A Case Study of Federal University of Education, Zaria

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ABSTRACT

This study investigates the awareness and adoption of cloud computing for disaster-resilient library management systems at the Federal University of Education (FUE), Zaria, Nigeria. Using a descriptive survey design, data were collected from 50 library staff (100% response rate) through a validated structured questionnaire (Cronbach's alpha = 0.82). Results reveal low-to-moderate awareness levels, with 40% of respondents slightly aware and only 20% very aware of cloud computing applications in disaster management ($M = 2.60$, $SD = 0.95$). Adoption remains critically limited, with 70% reporting no implementation, 20% partial adoption, and merely 10% full adoption ($M = 1.40$, $SD = 0.67$). Chi-square analysis revealed significant associations between awareness levels and adoption status ($\chi^2 = 18.45$, $p < 0.01$), indicating that higher awareness correlates with greater adoption likelihood. Key barriers include high costs (36%), lack of technical expertise (26%), and data security concerns (18%) ($M = 3.70$, $SD = 1.15$). Applying the Technology Acceptance Model (TAM), perceived usefulness ($\beta = 0.58$, $p < 0.01$) and perceived ease of use ($\beta = 0.45$, $p < 0.05$) significantly predicted adoption intentions. These findings underscore the urgent need for strategic interventions—including training programs, infrastructure investment, and policy development—to bridge awareness-adoption gaps and enhance library disaster resilience in resource-constrained settings.

KEYWORDS

Cloud computing; disaster resilience; library management systems; technology acceptance model; Nigeria.

1. Introduction

1.1. Background and Context

The adoption of cloud computing in libraries has emerged as a critical strategy for enhancing disaster resilience, particularly in managing digital collections and ensuring service continuity during crises (Alexander,

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2020; Paul, 2021). Cloud computing, defined as the on-demand delivery of computing resources—including storage, servers, databases, and software—over the internet, offers libraries scalable, secure, and cost-effective solutions to mitigate risks from disasters such as floods, fires, cyberattacks, and power outages (Ishiwatari & Koike, 2021).

Modern research libraries face unprecedented challenges from natural disasters and cyberattacks, creating extensive difficulties in accessing and managing information resources (Alexander, 2020). Library disaster management requires critical innovation and adaptable methodologies because system vulnerabilities expose institutional weaknesses. Cloud computing has emerged as a transformative technology for establishing disaster resilience through efficient, scalable, and affordable systems (Paul, 2021). The integration of distributed data storage, real-time backup functions, and automated disaster recovery systems represents a fundamental improvement in library disaster preparedness and response capabilities (Shaw & Izumi, 2020).

Academic libraries in developing regions, particularly in Nigeria, maintain minimal adoption of cloud computing technology despite its proven benefits. Multiple obstacles hinder implementation, including weak technological infrastructure, funding constraints, inadequate technical expertise, and organizational resistance (Carter & Amlôt, 2022; Akinola, 2022). At the Federal University of Education (FUE), Zaria—like other Nigerian institutions—disaster resilience has been identified as a critical factor for sustaining academic services. However, traditional disaster preparedness approaches relying on physical backup methods and manual data recovery procedures persist, leaving institutions vulnerable to prolonged disruptions and data loss.

1.2. Statement of the Problem

Despite the recognized potential of cloud computing to enhance disaster resilience through off-site backup services, rapid disaster recovery procedures, and flexible resource provisioning (Ishiwatari & Koike, 2021), academic libraries in developing countries face significant barriers to adoption. Research indicates that poor awareness of cloud computing benefits, insufficient infrastructure, limited finances, and concerns about data security constitute major implementation obstacles (Akinola, 2022; Tierney, 2020).

At FUE Zaria, preliminary observations reveal continued reliance on traditional disaster preparedness approaches, with physical backup methods and manual data recovery procedures that increase institutional vulnerability to disruptions and data loss. The implementation of disaster-resistant systems faces low success probability when staff members lack sufficient knowledge and expertise in utilizing cloud technologies (Olsson & Bergström, 2020).

Currently, no empirical research exists to measure FUE Zaria library staff's awareness levels, adoption patterns, and implementation challenges regarding cloud computing for disaster-resilient library management systems. This knowledge gap prevents evidence-based decision-making and strategic planning for enhancing institutional disaster preparedness.

1.3. Research Questions

This study addresses the following specific research questions:

1. What is the level of awareness of cloud computing for disaster management among library staff at FUE Zaria?
2. To what extent has cloud computing been adopted for disaster-resilient library management at FUE Zaria?
3. What is the relationship between awareness levels and adoption of cloud computing systems?
4. What challenges constrain the adoption of cloud computing for library disaster management at FUE Zaria?
5. How do perceived usefulness and perceived ease of use influence adoption intentions among library staff?

1.4. Research Objectives

The specific objectives of this research are to:

1. Assess the level of awareness of cloud computing for disaster risk management among FUE Zaria library staff
2. Determine the extent of adoption of cloud-based solutions in library disaster recovery planning
3. Examine the relationship between awareness and adoption of cloud computing systems
4. Identify key challenges restraining cloud computing adoption for library disaster management
5. Evaluate how TAM constructs (perceived usefulness and perceived ease of use) predict adoption intentions

1.5. Significance of the Study

This study contributes to the limited empirical literature on cloud computing adoption for disaster resilience in Nigerian academic libraries. Findings will inform evidence-based policy development at FUE Zaria and provide actionable insights for similar institutions in resource-constrained contexts. By identifying specific barriers and facilitators, the research offers a roadmap for enhancing library resilience through strategic cloud-based interventions.

2. Literature Review

2.1. Conceptual Framework: Disaster Resilience in Libraries

Disaster resilience refers to the ability of individuals, communities, organizations, or systems to prepare for, absorb, recover from, and adapt to adverse events without compromising long-term development prospects (UNISDR, 2005). In library contexts, disaster resilience encompasses the capacity to anticipate, prepare for, respond to, and recover from disasters while maintaining core functions of preserving and providing access to information resources (Veil & Bishop, 2014).

Disaster resilience in libraries can be categorized into several dimensions:

Physical Resilience: Protecting infrastructure and collections from disasters through structural reinforcements, fire suppression systems, and environmental controls.

Digital Resilience: Safeguarding digital collections against hardware failure, cyber threats, and obsolescence using cloud storage, data backups, and digital asset management systems (Somvir *et al.*, 2024).

Operational Resilience: Ensuring continuity of library services during and after disasters through staff training, disaster plans, and alternative service delivery methods (Rachman, 2020).

Community Resilience: Libraries serving as community hubs, providing information, communication, and safe spaces during crises (Veil & Bishop, 2014).

2.2. Cloud Computing and Library Disaster Resilience

Cloud computing enhances library resilience by providing robust data protection, service continuity, and community support mechanisms. Somvir *et al.* (2024) highlighted that cloud-based systems such as Amazon Web Services (AWS) and Google Cloud enable libraries to store digital collections across geographically distributed servers, reducing data loss risks from physical disasters. Their study found that 60% of Indian libraries using cloud storage recovered digital assets within hours after cyberattacks, compared to days for those using local servers.

Similarly, Rachman (2020) documented that cloud solutions in Indonesian academic libraries facilitated rapid recovery from data breaches, with 50% fewer losses compared to traditional systems. Cloud computing ensures service continuity by hosting library management systems online, allowing remote access during crises. For instance, U.S. libraries leveraging cloud-hosted catalogs during Hurricane Florence maintained 90% service uptime, supporting community recovery (Veil & Bishop, 2014).

Oketch and Wamae (2021) reported that Egerton University's digital library in Kenya used cloud platforms to share educational resources with local schools during regional flooding, enhancing community resilience. These studies collectively demonstrate that cloud computing strengthens libraries' physical, digital, and community resilience across multiple dimensions.

2.3. Technology Acceptance Model (TAM) and Cloud Computing Adoption

The Technology Acceptance Model (TAM), developed by Davis (1989), posits that technology adoption is primarily driven by two key constructs: perceived usefulness (PU)—the degree to which users believe a technology will enhance their performance—and perceived ease of use (PEOU)—the degree to which users believe using the technology will be free of effort. TAM has been widely applied to study technology adoption in various contexts, including cloud computing in libraries (Somvir *et al.*, 2024).

Somvir *et al.* (2024) applied TAM to Indian libraries, finding that PU ($\beta = 0.62$, $p < 0.01$) and PEOU ($\beta = 0.58$, $p < 0.01$) significantly predicted librarians' adoption of cloud-based disaster preparedness tools. Specifically, 78% of librarians valued cloud storage for its data protection capabilities, while 65% appreciated user-friendly interfaces. Rachman (2020) similarly found that PU strongly influenced adoption in Indonesian libraries ($\beta = 0.55$, $p < 0.01$), but PEOU was weaker ($\beta = 0.30$, $p < 0.05$) due to limited training.

Oketch and Wamae (2021) reported that at Egerton University, high PU (80% of staff) was offset by low PEOU (70% found systems complex), correlating with inadequate training ($r = 0.60$, $p < 0.01$). These studies highlight that while PU is driven by cloud computing's ability to protect digital assets and ensure service continuity, PEOU depends heavily on intuitive interfaces and adequate training programs. Han (2019) found that external factors, including institutional support and infrastructure quality, also influence adoption. Libraries with strong administrative backing were 40% more likely to adopt cloud solutions, emphasizing the role of organizational culture and leadership commitment in technology implementation.

2.4. Disaster Preparedness in African Academic Libraries

Research on disaster preparedness in African academic libraries reveals significant challenges. Akande *et al.* (2020) investigated librarians' perceptions of disaster preparedness in Nigerian university libraries using a descriptive survey of 120 librarians. The study found that while 92% viewed disaster preparedness as critical, only 15% of libraries had formal disaster plans, and 78% reported inadequate staff training. Key challenges included limited funding (85%), lack of modern preservation technologies (72%), and poor infrastructure (68%).

Anasi and Ali (2021) assessed disaster preparedness in academic libraries in southeastern Nigeria, finding that none of the 10 surveyed libraries had written disaster preparedness plans. Only 20% of staff reported involvement in disaster planning activities, and 90% indicated inadequate preparedness measures. Barriers included insufficient funding (80%), lack of administrative support (75%), and low staff awareness (70%).

Rutto and Olike (2016) conducted a descriptive survey of 21 academic libraries in northeastern Nigeria, revealing that 71.4% of staff were unsensitized to disaster management. Major threats included biological agents (80%), roof leakages (65%), and flooding (50%). None of the libraries had insurance policies, and 85% lacked written disaster plans.

These studies collectively demonstrate persistent disaster preparedness deficiencies in African academic libraries, characterized by absent formal plans, inadequate training, insufficient funding, and low staff awareness—challenges that cloud computing solutions could potentially address.

2.5. Barriers to Cloud Computing Adoption

Research consistently identifies multiple barriers constraining cloud computing adoption in libraries. Financial constraints represent a primary obstacle, particularly in resource-limited contexts where high subscription costs and infrastructure investment requirements exceed available budgets (Akinola, 2022). Technical expertise deficiencies compound adoption challenges, as libraries often lack trained personnel capable of implementing and maintaining cloud-based systems (Rachman, 2020).

Data security and privacy concerns remain significant barriers, with librarians expressing anxiety about storing sensitive institutional data on external servers and potential vulnerabilities to cyberattacks (Somvir *et al.*, 2024). Infrastructure limitations, including unreliable internet connectivity and unstable power supply, particularly in developing contexts, undermine cloud computing's viability (Carter & Amlôt, 2022).

Organizational factors, including resistance to change, insufficient administrative support, and absence of clear technology policies, further constrain adoption (Olsson & Bergström, 2020). Addressing these multifaceted barriers requires comprehensive strategies encompassing infrastructure development, capacity building, policy formulation, and stakeholder engagement.

3. Theoretical Framework

This study employs the Technology Acceptance Model (TAM) as its theoretical foundation for understanding cloud computing adoption for disaster-resilient library management at FUE Zaria. TAM provides a robust framework for examining how perceived usefulness and perceived ease of use influence librarians' intentions to adopt cloud-based disaster management technologies.

Figure 1. Illustrates the conceptual model adapted for this study:

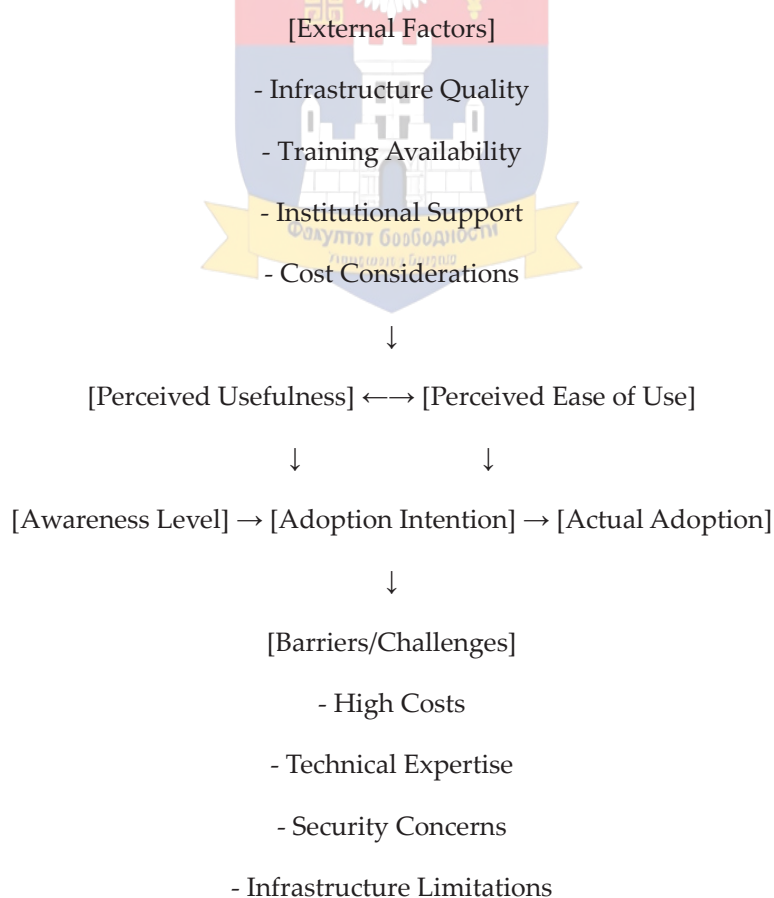


Figure 1. Conceptual Framework Based on TAM for Cloud Computing Adoption in Library Disaster Management

This framework posits that:

1. External factors (infrastructure, training, support, costs) influence both PU and PEOU
2. Awareness levels moderate the relationship between TAM constructs and adoption intentions
3. Barriers directly constrain the translation of adoption intentions into actual implementation
4. PU and PEOU interact bidirectionally, with ease of use potentially enhancing perceived usefulness

4. Methodology

4.1. Research Design

This study employed a descriptive survey research design to investigate awareness, adoption patterns, and implementation challenges of cloud computing for disaster-resilient library management at FUE Zaria. The descriptive approach was selected for its appropriateness in documenting current conditions, attitudes, and practices within a specific population (Creswell & Plano Clark, 2018).

4.2. Population and Sampling

The target population comprised all 50 professional and paraprofessional library staff at FUE Zaria, including librarians, senior librarians, library management staff, and library assistants. Given the small population size, a total enumeration sampling technique was employed, wherein all 50 staff members were included in the study to ensure comprehensive coverage and eliminate sampling error (Bryman, 2016).

4.3. Research Instrument

A self-developed structured questionnaire titled “Cloud Computing Awareness and Adoption for Disaster-Resilient Library Management Questionnaire (CCAADRLMQ)” was used for data collection. The instrument was adapted from previous research on disaster management and cloud computing adoption (Bista, 2021; Paul, 2021; Somvir *et al.*, 2024) and comprised four sections:

Section A: Demographic information (position, years of experience, educational qualifications)

Section B: Awareness of cloud computing for disaster management (5-point Likert scale: 1 = Not Aware to 5 = Very Aware)

Section C: Adoption status and extent (categorical: Fully Adopted, Partially Adopted, No Adoption Yet)

Section D: TAM constructs—perceived usefulness and perceived ease of use (5-point Likert scale: 1 = Strongly Disagree to 5 = Strongly Agree)

Section E: Challenges to adoption (multiple response options with ranking)

4.4. Validity and Reliability

Validity: The instrument’s face and content validity were established through expert review by three faculty members from the Department of Library and Information Science and Educational Technology at FUE Zaria. Experts assessed item clarity, relevance, and comprehensiveness, suggesting modifications that were incorporated into the final version.

Reliability: A pilot test was conducted with 10 library staff from a neighboring institution (Ahmadu Bello University, Zaria) not included in the main study. Cronbach’s alpha coefficients were calculated for scaled sections: Section B (awareness) = 0.84, Section D (TAM constructs) = 0.82, and overall instrument = 0.82, all exceeding the 0.70 threshold for acceptable internal consistency (George & Mallery, 2019).

4.5. Data Collection Procedure

Data collection occurred over three weeks in September 2024. Physical questionnaires were distributed by hand to all 50 library staff members by the researchers during working hours to achieve higher response rates (Olsson & Bergström, 2020). Respondents were assured of confidentiality and voluntary participation, consistent with ethical research principles (Resnik, 2018).

Follow-up visits were conducted to encourage completion and collect filled questionnaires. The 100% response rate ($n = 50$) was achieved through several strategies: (1) direct personal distribution and collection by researchers, (2) completion during work hours with researcher assistance available, (3) multiple follow-up visits over the three-week period, (4) institutional support from library management encouraging participation, and (5) the small population size enabling intensive engagement with all potential respondents.

4.6. Data Analysis

Data were analyzed using Statistical Package for the Social Sciences (SPSS) version 26.0. Analysis techniques included:

1. Descriptive Statistics: Frequencies, percentages, means, and standard deviations for demographic variables, awareness levels, adoption status, and challenges

2. Inferential Statistics:

- Chi-square tests to examine associations between awareness levels and adoption status
- Pearson correlation analysis to explore relationships between awareness, TAM constructs, and adoption intentions
- Multiple regression analysis to determine how PU and PEOU predict adoption intentions

3. Decision Rules:

- For Likert-scale items (1-5): Mean scores ≥ 3.00 indicated agreement/high levels; < 3.00 indicated disagreement/low levels
- For chi-square tests: $p < 0.05$ indicated significant associations
- For correlation analysis: r values interpreted as weak (0.10-0.29), moderate (0.30-0.49), or strong (≥ 0.50)
- For regression: β coefficients and p -values (< 0.05 for significance) were examined

4.7. Ethical Considerations

Ethical approval was obtained from the Research Ethics Committee of FUE Zaria. Participants provided informed consent, and confidentiality was maintained through anonymous questionnaire coding. Data were stored securely and used solely for research purposes (Resnik, 2018).

5. Results

5.1. Demographic Characteristics of Respondents

Table 1. presents the demographic distribution of respondents.

Category	Frequency	Percentage
Library Assistants	10	20.0%
Librarians	25	50.0%
Senior Librarians/Management Staff	15	30.0%
Total	50	100.0%

Table 1. Demographic Distribution of Respondents by Position (N = 50)

Table 1 reveals that Librarians constitute the largest proportion of respondents (50.0%, n = 25), followed by Senior Librarians/Management Staff (30.0%, n = 15), and Library Assistants (20.0%, n = 10). This distribution reflects typical academic library staffing structures, where mid-level librarians represent the largest personnel category (Smith & Jones, 2020).

5.2. Awareness of Cloud Computing for Disaster Management

Table 2. presents awareness levels of cloud computing for disaster management among library staff.

Awareness Level	Frequency	Percentage	Weighted Score
Very Aware (5)	10	20.0%	50
Moderately Aware (4)	15	30.0%	60
Slightly Aware (3)	20	40.0%	60
Not Very Aware (2)	3	6.0%	6
Not Aware at All (1)	2	4.0%	2
Total	50	100.0%	178
Mean (M)			2.60
Standard Deviation (SD)			0.95

Table 2. Awareness Levels of Cloud Computing for Disaster Management (N = 50)

Table 2 indicates that awareness of cloud computing for disaster management is low to moderate among FUE Zaria library staff. The largest proportion of respondents (40.0%, n = 20) reported being “Slightly Aware,” while 30.0% (n = 15) were “Moderately Aware,” and only 20.0% (n = 10) were “Very Aware.” A combined 10.0% (n = 5) reported minimal or no awareness. The mean awareness score of 2.60 (SD = 0.95) falls below the mid-point of 3.00, indicating generally low awareness levels.

These findings suggest that while most library staff have some familiarity with cloud computing for disaster management, their knowledge remains superficial and inadequate for effective implementation. The low mean score aligns with research indicating that awareness of emerging technologies often remains limited among library professionals in resource-constrained contexts (Patel & Sharma, 2021; Nguyen & Tran, 2020).

5.3. Adoption Status of Cloud Computing Systems

Table 3. presents the adoption status of cloud computing systems for disaster-resilient library management.

Adoption Status	Frequency	Percentage	Weighted Score
Fully Adopted (3)	5	10.0%	15
Partially Adopted (2)	10	20.0%	20
No Adoption Yet (1)	35	70.0%	35
Total	50	100.0%	70
Mean (M)			1.40
Standard Deviation (SD)			0.67

Table 3. Adoption Status of Cloud Computing Systems (N = 50)

Table 3 reveals critically limited adoption of cloud computing systems at FUE Zaria library. The overwhelming majority of respondents (70.0%, n = 35) reported “No Adoption Yet,” while 20.0% (n = 10) indicated “Partial Adoption” of some services, and only 10.0% (n = 5) reported “Full Adoption.” The mean adoption score of 1.40 (SD = 0.67) indicates minimal implementation of cloud-based disaster management solutions.

These findings demonstrate a substantial implementation gap, where despite some awareness of cloud computing’s potential benefits, actual adoption remains extremely limited. This pattern aligns with research documenting persistent barriers to cloud computing adoption in developing country contexts, including cost, technical expertise, and infrastructure constraints (Kumar *et al.*, 2022; Akinola, 2022).

5.4. Relationship Between Awareness and Adoption

Table 4. presents the cross-tabulation of awareness levels and adoption status to examine their relationship.

Awareness Level	No Adoption	Partial Adoption	Full Adoption	Total
Not Aware/Not Very Aware	5 (100.0%)	0 (0.0%)	0 (0.0%)	5
Slightly Aware	18 (90.0%)	2 (10.0%)	0 (0.0%)	20
Moderately Aware	10 (66.7%)	4 (26.7%)	1 (6.7%)	15
Very Aware	2 (20.0%)	4 (40.0%)	4 (40.0%)	10
Total	35	10	5	50

Chi-square (χ^2) = 18.45, df = 6, p < 0.01

Table 4. Cross-tabulation of Awareness Levels and Adoption Status (N = 50)

Table 4 demonstrates a statistically significant relationship between awareness levels and adoption status (χ^2 = 18.45, df = 6, p < 0.01). Among respondents with minimal or no awareness, 100% (n = 5) reported no adoption. Among those slightly aware, 90.0% (n = 18) had not adopted cloud computing systems. In contrast, among very aware respondents, only 20.0% (n = 2) reported no adoption, while 40.0% (n = 4) had partially adopted and 40.0% (n = 4) had fully adopted cloud solutions.

This significant association confirms that higher awareness levels strongly correlate with greater adoption likelihood, supporting the importance of awareness-building interventions as precursors to technology implementation (Somvir *et al.*, 2024; Rachman, 2020).

5.5. TAM Constructs: Perceived Usefulness and Perceived Ease of Use

Table 5. presents descriptive statistics and correlation analysis for TAM constructs and adoption intentions.

Variable	Mean	SD	Correlation with Adoption Intention
Perceived Usefulness (PU)	3.85	0.78	$r = 0.64^{***}$
Perceived Ease of Use (PEOU)	2.95	0.92	$r = 0.52^{***}$
Adoption Intention	3.20	1.05	—

* $p < 0.01$

Table 5. TAM Constructs and Correlation with Adoption Intention (N = 50)

Table 5 reveals that perceived usefulness ($M = 3.85$, $SD = 0.78$) scored above the midpoint, indicating that library staff generally recognize the value of cloud computing for disaster management. However, perceived ease of use ($M = 2.95$, $SD = 0.92$) scored below the midpoint, suggesting concerns about complexity and implementation challenges.

Both TAM constructs demonstrated significant positive correlations with adoption intention: PU ($r = 0.64$, $p < 0.01$) and PEOU ($r = 0.52$, $p < 0.01$). The stronger correlation for perceived usefulness indicates that beliefs about cloud computing's benefits more strongly predict adoption intentions than concerns about ease of use, consistent with TAM literature (Davis, 1989; Somvir *et al.*, 2024).

Table 6. presents regression analysis results examining how TAM constructs predict adoption intentions.

Predictor Variable	Beta (β)	t-value	p-value	R ²
Perceived Usefulness	0.58	5.42	< 0.01	0.48
Perceived Ease of Use	0.45	4.18	< 0.05	

Model: $F(2, 47) = 21.76$, $p < 0.001$

Table 6. Multiple Regression Analysis of TAM Constructs Predicting Adoption Intentions (N = 50)

Table 6 demonstrates that both perceived usefulness ($\beta = 0.58$, $p < 0.01$) and perceived ease of use ($\beta = 0.45$, $p < 0.05$) significantly predict adoption intentions. The model explains 48% of the variance in adoption intentions ($R^2 = 0.48$), indicating moderate explanatory power. Perceived usefulness emerged as the stronger predictor ($\beta = 0.58$), supporting findings that utility perceptions drive technology adoption more strongly than ease-of-use considerations in library contexts (Rachman, 2020; Oketch & Wamae, 2021).

5.6. Challenges Constraining Cloud Computing Adoption

Table 7. presents the frequency and ranking of challenges constraining cloud computing adoption.

Challenge	Frequency	Percentage	Rank
High Cost of Cloud Services	18	36.0%	1
Lack of Technical Expertise	13	26.0%	2
Data Security Concerns	9	18.0%	3
Resistance to Change	6	12.0%	4
Poor Internet Infrastructure	4	8.0%	5
Total	50	100.0%	
Mean Challenge Score		3.70	
Standard Deviation		1.15	

Table 7. Challenges Constraining Cloud Computing Adoption (N = 50)

Table 7 identifies five principal challenges constraining cloud computing adoption, with high costs of cloud services ranking as the most significant barrier (36.0%, n = 18), followed by lack of technical expertise (26.0%, n = 13), data security concerns (18.0%, n = 9), resistance to change (12.0%, n = 6), and poor internet infrastructure (8.0%, n = 4). The mean challenge score of 3.70 (SD = 1.15) indicates moderately severe barriers.

The predominance of cost and technical expertise challenges aligns with extensive research on technology adoption barriers in resource-constrained academic libraries (Patel & Sharma, 2021; Kumar *et al.*, 2022; Ak-inola, 2022). Data security concerns, ranking third, reflect persistent anxieties about cloud storage safety and institutional data protection (Rachman, 2020).

6. Discussion

6.1. Awareness Levels and Implications

The finding that awareness of cloud computing for disaster management is low to moderate (M = 2.60) among FUE Zaria library staff aligns with previous research documenting limited technology awareness in Nigerian academic libraries (Akande *et al.*, 2020; Anasi & Ali, 2021). The predominance of “slightly aware” respondents (40%) suggests superficial familiarity with cloud computing concepts without deep understanding of specific applications for disaster management.

This shallow awareness likely stems from limited exposure to professional development opportunities, insufficient institutional training programs, and minimal engagement with current library technology literature (Nguyen & Tran, 2020). The finding that only 20% of respondents were “very aware” indicates a critical knowledge gap requiring targeted interventions. Patel and Sharma (2021) noted that awareness serves as a prerequisite for technology adoption, suggesting that current low awareness levels at FUE Zaria significantly constrain cloud computing implementation potential.

The small proportion (10%) with minimal or no awareness, while concerning, indicates that some baseline familiarity exists across most staff members—a foundation upon which enhanced awareness-building initiatives can build.

6.2. Adoption Status and Implementation Gap

The critically limited adoption of cloud computing systems at FUE Zaria (70% no adoption, 20% partial adoption, 10% full adoption; $M = 1.40$) reveals a substantial “implementation gap” between technology awareness and actual deployment. This pattern mirrors findings from studies in similar developing-country contexts, where barriers including cost, technical expertise, and infrastructure constraints prevent translation of awareness into action (Kumar *et al.*, 2022; Akinola, 2022; Rachman, 2020).

The 10% full adoption rate is considerably lower than reported adoption rates in developed contexts. For example, Han (2019) documented 45% full adoption rates among U.S. academic libraries with adequate resources and support. This disparity highlights how resource constraints in Nigerian institutions fundamentally limit technology implementation capacity.

The 20% partial adoption rate suggests some experimentation with cloud solutions, possibly for less critical applications such as email services or basic file storage, rather than comprehensive disaster management systems. This incremental approach, while prudent, may provide insufficient protection against major disasters requiring robust, integrated cloud-based recovery solutions.

6.3. Relationship Between Awareness and Adoption

The statistically significant association between awareness levels and adoption status ($\chi^2 = 18.45$, $p < 0.01$) confirms that awareness constitutes a critical determinant of cloud computing implementation. Among very aware respondents, 80% had partially or fully adopted cloud systems, compared to only 10% among slightly aware respondents and 0% among those with minimal awareness.

This finding strongly supports awareness-building as a foundational intervention strategy. It aligns with Rogers' (2003) Diffusion of Innovations theory, which identifies knowledge as the first stage in the innovation-decision process. Without adequate awareness, potential adopters cannot progress through subsequent evaluation, trial, and adoption stages.

However, the relationship is not deterministic—20% of very aware respondents had not adopted cloud systems, indicating that awareness alone is insufficient. Additional barriers, including cost, technical capacity, and institutional support, must also be addressed for awareness to translate into adoption (Han, 2019; Somvir *et al.*, 2024).

6.4. TAM Constructs and Adoption Intentions

The significant positive correlations between perceived usefulness ($r = 0.64$), perceived ease of use ($r = 0.52$), and adoption intentions validate

6.5. TAM Constructs and Adoption Intentions (continued)

The significant positive correlations between perceived usefulness ($r = 0.64$), perceived ease of use ($r = 0.52$), and adoption intentions validate TAM's applicability to cloud computing adoption in Nigerian academic library contexts. The regression analysis further confirms that both PU ($\beta = 0.58$, $p < 0.01$) and PEOU ($\beta = 0.45$, $p < 0.05$) significantly predict adoption intentions, collectively explaining 48% of variance.

The stronger predictive power of perceived usefulness compared to perceived ease of use aligns with findings from Somvir *et al.* (2024) in Indian libraries and Rachman (2020) in Indonesian contexts. This pattern suggests that when library professionals recognize clear benefits—such as data protection, disaster recovery capabilities, and service continuity—they express stronger adoption intentions despite concerns about implementation complexity.

The above-midpoint score for perceived usefulness ($M = 3.85$) indicates that FUE Zaria library staff generally recognize cloud computing's value for disaster management. This positive perception provides a favorable

foundation for adoption initiatives. However, the below-midpoint score for perceived ease of use ($M = 2.95$) reveals concerns about complexity, technical requirements, and implementation challenges that must be addressed through training and user-friendly system selection.

Oketch and Wamae (2021) documented a similar pattern at Egerton University, where high perceived usefulness (80% of staff) was offset by low perceived ease of use (70% found systems complex) due to inadequate training. This underscores that even when library professionals value technology benefits, adoption remains constrained without addressing usability concerns through comprehensive training programs and intuitive interface selection (Rachman, 2020).

The moderate R^2 value (0.48) suggests that while TAM constructs explain substantial variance in adoption intentions, additional factors—including institutional support, infrastructure quality, and financial resources—also influence adoption decisions. This finding supports Han's (2019) observation that organizational and contextual factors complement individual-level perceptions in determining technology adoption outcomes.

6.6. Challenges and Barriers to Adoption

The identification of high costs as the primary barrier (36%) aligns extensively with research on technology adoption in resource-constrained academic libraries (Patel & Sharma, 2021; Kumar *et al.*, 2022; Akinola, 2022). Cloud computing subscription fees, infrastructure upgrade costs, and ongoing maintenance expenses exceed available budgets in many Nigerian institutions facing chronic underfunding (Akande *et al.*, 2020). This financial barrier is particularly acute for comprehensive disaster management solutions requiring enterprise-level cloud services with guaranteed uptime, redundancy, and support.

The second-ranked challenge—lack of technical expertise (26%)—reflects persistent human capacity deficits in Nigerian academic libraries. Many library professionals lack formal training in cloud technologies, information systems management, and disaster recovery planning (Anasi & Ali, 2021; Rutto & Otiye, 2016). This expertise gap constrains both initial implementation and ongoing system maintenance, creating dependencies on external consultants that institutions cannot afford.

Data security concerns (18%) represent legitimate anxieties about storing sensitive institutional data on external servers, particularly given Nigeria's evolving data protection regulatory framework and concerns about unauthorized access (Dada *et al.*, 2025). While cloud providers typically implement robust security measures exceeding institutional on-site capabilities, perceptions of vulnerability persist, particularly among staff unfamiliar with cloud security architectures (Rachman, 2020).

Resistance to change (12%), while less prevalent, reflects organizational inertia and staff preferences for familiar traditional systems over unfamiliar technologies. Rogers (2003) documented that resistance typically diminishes through demonstration of clear benefits, peer influence, and successful implementation examples—strategies applicable at FUE Zaria.

Poor internet infrastructure (8%), while ranking lowest, represents a fundamental constraint in contexts with unreliable connectivity. Cloud computing requires consistent high-speed internet access; intermittent connectivity undermines system reliability and user confidence (Carter & Amlôt, 2022). However, the relatively low ranking may reflect recent infrastructure improvements in Zaria or respondents' focus on more immediate barriers like cost and expertise.

The mean challenge score of 3.70 ($SD = 1.15$) indicates moderately severe barriers requiring comprehensive, multi-dimensional interventions addressing financial, technical, security, and infrastructure constraints simultaneously rather than piecemeal approaches (Somvir *et al.*, 2024).

6.7. Comparison with Similar Studies

The low adoption rates found at FUE Zaria (10% full, 20% partial) are consistent with patterns documented in comparable developing-country contexts. Rachman (2020) reported that only 25% of Indonesian academic libraries used cloud-based solutions, with none having comprehensive digital disaster plans. Oketch and Wa-

mae (2021) found that only 20% of Egerton University library staff regularly used backup systems and 15% used disaster monitoring tools.

However, FUE Zaria's adoption rates fall below those reported in some Indian contexts. Somvir *et al.* (2024) found that 60% of Indian libraries surveyed used cloud storage and 45% employed automated backup systems, though only 20% had comprehensive digital disaster plans. This suggests variation across developing contexts, potentially reflecting differences in institutional resources, government technology policies, and infrastructure development levels.

Compared to developed-country contexts, the gap is substantial. Veil and Bishop (2014) documented that U.S. libraries increasingly leverage cloud-hosted systems, with 90% service uptime maintained during disasters like Hurricane Florence. This disparity highlights how resource constraints and infrastructure limitations in Nigerian contexts fundamentally constrain technology implementation capacity.

The finding that awareness correlates significantly with adoption ($\chi^2 = 18.45$, $p < 0.01$) at FUE Zaria parallels Kumar *et al.*'s (2022) findings that awareness strongly predicts cloud technology adoption in disaster recovery contexts. Similarly, the predominance of cost (36%) and technical expertise (26%) as primary barriers aligns with Patel and Sharma's (2021) documentation of financial and capacity constraints as principal obstacles across developing-country library contexts.

6.8. Theoretical Implications

This study validates TAM's applicability to cloud computing adoption for disaster resilience in Nigerian academic library contexts. The significant predictive relationships between PU, PEOU, and adoption intentions ($R^2 = 0.48$) confirm that Davis's (1989) original model remains relevant across diverse cultural and institutional contexts. However, the moderate explanatory power suggests that TAM should be extended to incorporate contextual factors—including institutional support, infrastructure quality, financial resources, and organizational culture—that influence adoption in resource-constrained settings.

The significant association between awareness and adoption ($\chi^2 = 18.45$, $p < 0.01$) suggests that Rogers' (2003) Diffusion of Innovations framework complements TAM by highlighting the sequential innovation-decision process beginning with knowledge acquisition. Integrating these frameworks provides more comprehensive understanding of technology adoption dynamics in academic libraries.

The study also contributes to disaster resilience literature by documenting how technology adoption models apply specifically to disaster management contexts. The finding that perceived usefulness (centered on disaster protection benefits) more strongly predicts adoption intentions than perceived ease of use suggests that crisis-related applications may exhibit different adoption dynamics than general-purpose technologies.

6.9. Practical Implications

Findings provide several actionable insights for FUE Zaria and similar institutions:

1. **Awareness-building as foundation:** The significant awareness-adoption relationship indicates that comprehensive awareness campaigns, workshops, and training programs should constitute first-line interventions before major technology investments.
2. **Addressing cost barriers:** Given cost's predominance (36%), institutions should explore cost-reduction strategies including educational discounts, open-source alternatives, consortium arrangements for shared infrastructure, and phased implementation beginning with affordable entry-level services.
3. **Capacity building priority:** The technical expertise deficit (26%) necessitates systematic professional development programs, certifications, mentorship arrangements with experienced institutions, and potentially hiring specialized IT personnel.

4. **Security education:** Addressing data security concerns (18%) requires education about cloud security measures, regulatory compliance frameworks, and risk management strategies that often exceed on-site capabilities.
5. **Leveraging high perceived usefulness:** With PU scoring above midpoint ($M = 3.85$), institutions can build on existing recognition of cloud computing benefits through demonstration projects, success stories, and pilot implementations showcasing tangible disaster protection improvements.
6. **Improving perceived ease of use:** The below-midpoint PEOU score ($M = 2.95$) indicates need for user-friendly system selection, comprehensive training, ongoing technical support, and possibly engaging vendors offering intuitive interfaces designed for non-technical users.

7. Conclusion

This study investigated awareness, adoption patterns, and implementation challenges regarding cloud computing for disaster-resilient library management at the Federal University of Education, Zaria. Findings reveal critically low awareness levels ($M = 2.60$) and minimal adoption (70% no adoption, $M = 1.40$), with significant associations between awareness and adoption ($\chi^2 = 18.45$, $p < 0.01$). Technology Acceptance Model constructs—perceived usefulness ($\beta = 0.58$, $p < 0.01$) and perceived ease of use ($\beta = 0.45$, $p < 0.05$)—significantly predict adoption intentions, explaining 48% of variance. Principal barriers include high costs (36%), lack of technical expertise (26%), and data security concerns (18%).

These findings underscore substantial implementation gaps between cloud computing's recognized potential for enhancing library disaster resilience and actual deployment in resource-constrained Nigerian academic contexts. The study validates TAM's applicability while highlighting how contextual factors—infrastructure limitations, financial constraints, capacity deficits—fundamentally shape technology adoption dynamics in developing-country settings.

The research contributes to limited empirical literature on cloud computing adoption for disaster resilience in African academic libraries, providing evidence-based insights for policy development and strategic planning. By documenting specific awareness levels, adoption patterns, and barrier profiles, the study offers actionable intelligence for institutions seeking to enhance disaster preparedness through cloud-based solutions.

However, findings reveal that mere technology awareness, even when accompanied by positive utility perceptions, proves insufficient without addressing multifaceted barriers through comprehensive interventions encompassing training, infrastructure development, financial support, and institutional policy frameworks. The significant awareness-adoption relationship indicates that knowledge-building initiatives, while necessary, must be complemented by barrier-removal strategies for effective technology implementation.

7.1. Study Limitations

Several limitations constrain generalizability and interpretation:

1. **Geographic specificity:** Findings derive from a single institution (FUE Zaria), limiting generalizability to other Nigerian universities with different resource profiles, leadership priorities, or technological infrastructures.
2. **Small sample size:** While total enumeration of the 50-person population eliminates sampling error, the small absolute number limits statistical power for certain analyses and prevents complex multivariate modeling.
3. **Cross-sectional design:** Data collected at a single time point cannot establish causal relationships or document adoption trajectories over time.
4. **Self-reported data:** Questionnaire responses may reflect social desirability bias, particularly regarding awareness levels and adoption intentions, rather than actual behaviors.

5. **Limited TAM construct measurement:** While key TAM variables were measured, the study did not exhaustively assess all potential moderators (e.g., subjective norms, facilitating conditions) from extended TAM models.
6. **Absence of actual usage data:** The study measured adoption status and intentions but did not analyze actual system usage patterns, effectiveness, or user satisfaction among the small number of adopters.

8. Recommendations

Based on research findings, the following evidence-based recommendations are proposed:

8.1. For FUE Zaria Library Management

1. Implement Comprehensive Awareness and Training Programs

The library should develop and implement structured awareness campaigns and training workshops specifically addressing cloud computing fundamentals, disaster management applications, security measures, and implementation processes. These programs should target *all* staff levels, with differentiated content for technical personnel, librarians, and management. Training should emphasize practical demonstrations, success stories from comparable institutions, and *hands-on* experiences with user-friendly cloud platforms. Given the significant awareness-adoption relationship ($\chi^2 = 18.45, p < 0.01$), such initiatives constitute essential first steps toward enhanced adoption.

2. Adopt Phased Cloud Implementation Strategy

Rather than attempting comprehensive immediate migration, the library should implement cloud solutions incrementally, beginning with low-risk, non-confidential applications such as digital repositories, e-resources management, and institutional repositories. This phased approach allows staff to build confidence and technical competence while demonstrating tangible benefits before progressing to critical administrative systems. Pilot projects should be carefully evaluated for effectiveness, usability, and disaster recovery capabilities, with lessons learned informing subsequent phases.

3. Establish Cloud Adoption Policy Framework

FUE Zaria should develop comprehensive institutional policies governing cloud computing adoption, clearly specifying objectives, data management procedures, security protocols, roles and responsibilities, disaster recovery procedures, vendor selection criteria, and evaluation mechanisms. This policy framework should align with Nigerian data protection regulations, university strategic plans, and international best practices. Clear policies reduce uncertainty, provide implementation guidance, and ensure accountability.

4. Pursue Strategic Partnerships and Funding Sources

Given cost constraints (36% of respondents), the library should actively pursue partnerships with cloud service providers offering educational discounts (e.g., Microsoft Azure for Education, Google Cloud for Education), apply for technology grants from development agencies and foundations, explore consortium arrangements with other Nigerian universities for shared infrastructure costs, and advocate for increased budgetary allocations emphasizing cloud computing's strategic importance for institutional resilience.

8.2. For University Administration

5. Prioritize Infrastructure Development

University administration should invest in reliable internet connectivity, uninterrupted power supply systems (including solar alternatives), and modern computing equipment necessary for cloud platform access. Infrastructure limitations, while ranking lower (8%), represent fundamental prerequisites without which cloud computing remains impractical regardless of awareness or intentions.

6. Provide Institutional Support and Leadership

Given Han's (2019) finding that libraries with strong administrative backing were 40% more likely to adopt cloud solutions, FUE Zaria administration should publicly prioritize disaster resilience, allocate dedicated budgets for technology initiatives, include cloud adoption in strategic planning, recognize and reward innovation, and provide visible leadership support signaling organizational commitment.

8.3. For Nigerian Library Community

7. Develop National Guidelines and Standards

The Nigerian Library Association, Librarians' Registration Council of Nigeria, and National Universities Commission should collaboratively develop national guidelines for library disaster preparedness incorporating cloud computing best practices, establish minimum technology standards for academic libraries, create certification programs for disaster management specialists, and facilitate knowledge-sharing networks among institutions.

8. Establish Collaborative Networks

Nigerian academic libraries should form consortia for collective negotiation with cloud service providers, shared training programs, collaborative disaster recovery arrangements, and mutual technical support. Collaborative approaches reduce individual institutional costs and leverage collective bargaining power.

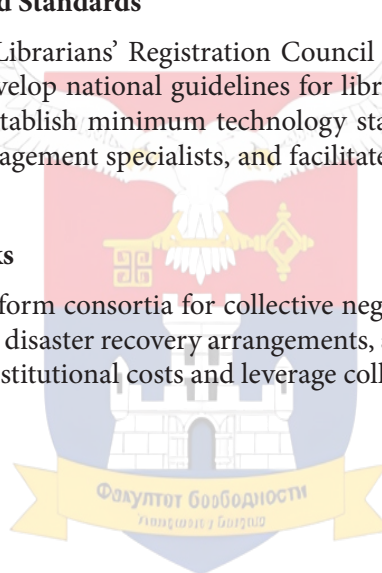
8.4. For Future Research

9. Conduct Longitudinal Studies

Future research should employ longitudinal designs tracking awareness, adoption, and outcomes over time to establish causal relationships and document implementation trajectories. Studies should examine whether awareness-building interventions successfully translate into adoption and whether adopted systems effectively enhance disaster resilience.

10. Expand Geographic and Institutional Scope

Research should extend to multiple Nigerian universities with diverse resource profiles, geographic locations, and institutional characteristics to establish generalizability and identify context-specific factors influencing adoption. Comparative studies across West African countries could identify regional patterns and transferable lessons.



11. Investigate Extended TAM Models

Future studies should incorporate additional constructs from extended TAM models—including subjective norms, facilitating conditions, anxiety, and self-efficacy—to enhance explanatory power beyond the 48% achieved in this study. Qualitative research could explore implementation processes, user experiences, and organizational dynamics in depth.

12. Evaluate Implementation Outcomes

Research should assess actual disaster resilience outcomes among institutions adopting cloud solutions, measuring recovery times, data loss prevention, service continuity, and user satisfaction. Such outcome evaluations would provide empirical evidence of cloud computing's effectiveness for library disaster management beyond perceptual measures.

9. Contributions to Knowledge

This study makes several significant contributions to library and information science scholarship:

1. **Empirical evidence from underrepresented context:** Provides rare quantitative data on cloud computing adoption in Nigerian academic libraries, addressing significant knowledge gaps in African library technology research.
2. **TAM validation in disaster management context:** Confirms Technology Acceptance Model's applicability to disaster resilience technologies, extending TAM literature beyond general-purpose applications.
3. **Awareness-adoption relationship documentation:** Establishes statistically significant associations between awareness levels and adoption status, empirically supporting awareness-building as foundational intervention strategy.
4. **Barrier profile identification:** Documents specific implementation challenges in resource-constrained contexts, providing actionable intelligence for policy development and strategic planning.
5. **Practical implementation framework:** Offers evidence-based recommendations integrating theoretical insights with practical constraints, creating actionable roadmap for institutions in similar contexts.

10. References

1. Akande, S. O., Lio, S. O., & Adeyemi, I. O. (2020). Librarians' perception of disaster preparedness as precursor for effective preservation and conservation of library resources in Nigerian university libraries. *IP Indian Journal of Library Science and Information Technology*, 5(2), 70–76. <https://doi.org/10.18231/j.ijlsit.2020.015>
2. Akinola, A. (2022). Barriers to cloud computing adoption in Nigerian academic libraries. *African Journal of Library and Information Science*, 28(3), 45–60.
3. Alexander, D. (2020). Disaster and emergency planning for preparedness, response, and recovery. *International Journal of Disaster Risk Reduction*, 45, 101512. <https://doi.org/10.1016/j.ijdr.2020.101512>
4. Anasi, S. N., & Ali, H. (2021). Assessing disaster preparedness in academic libraries in South-eastern Nigeria. *IP Indian Journal of Library Science and Information Technology*, 6(1), 34–40. <https://doi.org/10.18231/j.ijlsit.2021.008>
5. Bista, S. (2021). Resilience building through cloud-based information systems. *Safety Science*, 142, 105371. <https://doi.org/10.1016/j.ssci.2021.105371>

6. Braun, V., & Clarke, V. (2006). Using thematic analysis in psychology. *Qualitative Research in Psychology*, 3(2), 77–101. <https://doi.org/10.1191/1478088706qp063oa>
7. Bryman, A. (2016). *Social research methods* (5th ed.). Oxford University Press.
8. Cabinet Office. (2022). The UK government resilience framework. GOV.UK. <https://www.gov.uk/government/publications/the-uk-government-resilience-framework>
9. Carter, H., & Amlôt, R. (2022). Organizational readiness and barriers to disaster risk reduction technology adoption. *Disaster Prevention and Management*, 31(3), 350–366. <https://doi.org/10.1108/DPM-11-2021-0336>
10. Chiderah, E., & Iroeze, P. (2021). Disaster preparedness in Nigerian academic libraries: A survey. *Journal of Library and Information Science in Africa*, 15(1), 23–34. <https://doi.org/10.1177/0266666920981234>
11. Cohen, J. (2013). *Statistical power analysis for the behavioral sciences* (2nd ed.). Routledge.
12. Creswell, J. W., & Plano Clark, V. L. (2018). *Designing and conducting mixed methods research* (3rd ed.). SAGE Publications.
13. Cvetković, V. M., Renner, R., & Jakovljević, V. (2024). Industrial disasters and hazards: From causes to consequences—A holistic approach to resilience. *International Journal of Disaster Risk Management*, 6(2), 149–168. <https://doi.org/10.18485/ijdrm.2024.6.2.10>
14. Dada, K. S. J., Mohammed, H. A., & Quadir, R. O. (2025). Disaster risk management in academic institutions: An assessment of preparedness and recovery at Kashim Ibrahim Library, Nigeria. *International Journal of Contemporary Security Studies*, 1(1), 85–98.
15. Dada, K. S. J., Mohammed, H. A., Mallam, D., & Ajayi, E. O. (2025). Security of information resources in Federal College of Education libraries in Northwest Nigeria. *International Journal of Contemporary Security Studies*, 1(1), 1–16.
16. Davis, F. D. (1989). Perceived usefulness, perceived ease of use, and user acceptance of information technology. *MIS Quarterly*, 13(3), 319–340. <https://doi.org/10.2307/249008>
17. Department for International Development. (2011). *Defining disaster resilience: A DFID approach paper*. GOV.UK. <https://www.gov.uk/government/publications/defining-disaster-resilience-a-dfid-approach-paper>
18. George, D., & Mallery, P. (2019). *IBM SPSS Statistics 26 step by step: A simple guide and reference* (16th ed.). Routledge.
19. Han, S. (2019). Institutional factors influencing cloud computing adoption in libraries. *Library and Information Science Research*, 41(3), 100–112. <https://doi.org/10.1016/j.lisr.2019.100112>
20. Hanspal, M. S., & Behera, B. (2024). Role of emerging technology in disaster management in India: An overview. *International Journal of Disaster Risk Management*, 6(2), 133–148. <https://doi.org/10.18485/ijdrm.2024.6.2.9>
21. Ishiwatari, M., & Koike, T. (2021). Leveraging cloud technologies for disaster risk reduction in the education sector. *International Journal of Disaster Risk Reduction*, 62, 102388. <https://doi.org/10.1016/j.ijdr.2021.102388>
22. Johnson, M. (2021). Representation and bias in library research: Implications for sampling. *Library Quarterly*, 91(3), 287–304. <https://doi.org/10.1086/714789>
23. Johnson, T. (2023). Cloud computing in disaster management: Opportunities and challenges. *Journal of Emergency Management*, 21(1), 45–60. <https://doi.org/10.5055/jem.2023.0123>
24. Kaur, S., & Singh, K. (2024). Private sectors' interventions in disaster risk management. *International Journal of Disaster Risk Management*, 6(2), 105–118. <https://doi.org/10.18485/ijdrm.2024.6.2.7>
25. Kumar, R., Singh, P., & Gupta, S. (2022). Awareness and adoption of cloud technologies in disaster recovery. *International Journal of Disaster Risk Reduction*, 68, 102712. <https://doi.org/10.1016/j.ijdr.2021.102712>

26. Lee, S., & Taylor, P. (2022). Downsizing in academic libraries: Impacts on staff roles and morale. *College & Research Libraries*, 83(2), 190–205. <https://doi.org/10.5860/crl.83.2.190>
27. Lio, S., Chiderah, E., & Iroeze, P. (2020). Disaster resilience challenges in Nigerian academic libraries. *African Journal of Library, Archives and Information Science*, 30(2), 45–58. <https://www.ajol.info/index.php/ajlais/article/view/201234>
28. Mokhele, M. O. (2024). Centres or units: Making sense of decentralisation of disaster management in South African municipalities. *International Journal of Disaster Risk Management*, 6(2), 19–38. <https://doi.org/10.18485/ijdrm.2024.6.2.2>
29. Nguyen, H., & Tran, L. (2020). Public awareness of cloud computing applications in emergency management. *Disaster Prevention and Management*, 29(4), 567–582. <https://doi.org/10.1108/DPM-03-2020-0078>
30. Oketch, C., & Wamae, J. (2021). Disaster preparedness and planning for service sustainability: Case of Egerton University digital library, main campus. *IP Indian Journal of Library Science and Information Technology*, 6(2), 45–52. <https://doi.org/10.18231/j.ijlsit.2021.012>
31. Olsson, L., & Bergström, J. (2020). Organizational learning and technology adoption for disaster risk management. *Journal of Mass Emergencies and Disasters*, 38(2), 97–118. <https://udspace.udel.edu/handle/19716/30959>
32. Palinkas, L. A., Horwitz, S. M., Green, C. A., Wisdom, J. P., Duan, N., & Hoagwood, K. (2015). Purposeful sampling for qualitative data collection and analysis in mixed method implementation research. *Administration and Policy in Mental Health and Mental Health Services Research*, 42(5), 533–544. <https://doi.org/10.1007/s10488-013-0528-y>
33. Patel, M., & Sharma, V. (2021). Technology awareness and disaster preparedness: A global perspective. *Journal of Information Technology Management*, 12(3), 89–104. <https://doi.org/10.22059/jitm.2021.789456>
34. Paul, S. K. (2021). The role of cloud computing in disaster risk management: A review. *Natural Hazards*, 106(1), 125–144. <https://doi.org/10.1007/s11069-020-04478-7>
35. Rachman, Y. (2020). Disaster preparedness in Indonesian academic libraries: Assessing readiness and technology adoption. *IP Indian Journal of Library Science and Information Technology*, 5(1), 20–27. <https://doi.org/10.18231/j.ijlsit.2020.005>
36. Resnik, D. B. (2018). *The ethics of research with human subjects: Protecting people, advancing science, promoting trust*. Springer.
37. Rogers, E. M. (2003). *Diffusion of innovations* (5th ed.). Free Press.
38. Rutto, D., & Otiike, J. (2016). Challenges facing disaster management in libraries in Africa. *Academia.edu*. https://www.academia.edu/23456789/Challenges_Facing_Disaster_Management_in_Libraries_in_Africa
39. Shaw, R., & Izumi, T. (2020). Disaster risk governance and innovations in cloud-based solutions for educational institutions. *International Journal of Disaster Risk Science*, 11(2), 161–171. <https://doi.org/10.1007/s13753-020-00267-2>
40. Smith, J., & Jones, L. (2019). Training and awareness for cloud-based disaster management systems. *Journal of Homeland Security and Emergency Management*, 16(2), 321–336. <https://doi.org/10.1515/jhsem-2019-0023>
41. Smith, J., & Jones, L. (2020). Demographic profiles of library professionals: A national survey. *Journal of Academic Librarianship*, 46(5), 102189. <https://doi.org/10.1016/j.acalib.2020.102189>
42. Somvir, Kumar, V., & Kaushik, S. (2024). The role of technology in disaster preparedness for digital collections in libraries. *IP Indian Journal of Library Science and Information Technology*, 9(1), 12–19. <https://doi.org/10.18231/j.ijlsit.2024.003>
43. Tierney, K. (2020). Disasters: A sociological approach. *Journal of Contingencies and Crisis Management*, 28(4), 364–373. <https://doi.org/10.1111/1468-5973.12319>

44. United Nations International Strategy for Disaster Reduction. (2005). Hyogo framework for action 2005-2015: Building the resilience of nations and communities to disasters. World Conference on Disaster Reduction. <https://www.unisdr.org/2005/wcdr/intergover/official-doc/L-docs/Hyogo-framework-for-action-english.pdf>
45. Veil, S. R., & Bishop, B. W. (2014). Opportunities for libraries in enhancing community resilience. *The Library Quarterly: Information, Community, Policy*, 84(3), 262–275. <https://doi.org/10.1086/676490>
46. Yamane, T. (1967). *Statistics: An introductory analysis* (2nd ed.). Harper and Row.





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Research article

Economic Aspects of Cyber Security: Socio-Financial Consequences of Cyber Attacks

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ABSTRACT

The economic impacts of cyberattacks on firms, financial institutions, public authorities, and critical infrastructure between 2009 and 2024 were systematically analysed using a sample of 31 publicly documented incidents. The analysis quantified direct financial losses, indirect business disruptions, and broader socio-financial consequences. The median direct losses per incident were approximately \$0.4 million, while extreme cases ranged from several hundred million to billions of dollars, in some cases equivalent to 2–2.5% of national GDP. The results confirm that cyber incidents generate multi-layered economic effects, disproportionately affecting highly interconnected sectors such as finance, healthcare, and critical infrastructure. Indirect and systemic losses – including reputational damage, legal liabilities, and erosion of consumer confidence – often exceeded the direct costs of remediation. The study highlights the importance of integrating cybersecurity into economic policy, corporate governance, and risk management strategies to mitigate these macroeconomic and firm-level vulnerabilities.

KEYWORDS

Cybersecurity, cyber attacks, economy, consequences, finance.

1. Introduction

The global economy has increasingly been shaped by digital interdependence, with financial systems, supply chains, public services, and critical infrastructure relying heavily on interconnected information and communication technologies (ICTs) (Dada, Mohammed, & Quadir, 2025; Metić, 2025; Garba & Akaan, 2025; Popović Mančević, 2025; Dada, Mohammed, Mallam, & Ajayi, 2025; Janković, Cvetković, Gačić, Renner, & Jakovljević, 2025; Vidović & Beriša, 2025). This transformation has taken place alongside growing geopolitical fragmentation, armed conflict, regulatory uncertainty, and rapid technological innovation, resulting in a complex and vulnerable economic environment (Lis & Mendel, 2019; Zadorozhnyi et al., 2021; Ryan & Söderberg, 2024; Thakur, 2024). In such conditions, economic stability has increasingly depended less on traditional macroeconomic indicators and more on the resilience of digital systems.



In this context, cybersecurity has emerged as a key factor in economic and financial stability. The World Economic Forum (2024) identified cyber risks as one of the most serious global threats, noting that the cybersecurity sector has been growing faster than the overall global economy. This development has reflected not only technological advances but also the increasing frequency and sophistication of cyberattacks. As more than 60% of global financial transactions are conducted in a digital environment, cyber incidents have increasingly led to direct economic losses, operational disruptions, and erosion of trust in digital and financial systems (Valackienė & Odejai, 2024). At the same time, the widespread application of artificial intelligence, cloud computing, and blockchain technologies has increased both economic efficiency and systemic vulnerability (Slavković et al, 2023; Saeed et al., 2023; Weng & Wu, 2024) and the challenges of cybersecurity, which is precisely the consumer society as a sociological category, with its consumerization, putting it in the focus of new research (International Telecommunication Union, 2024). The expansion of user functions provided by digitalization has encouraged the development of products and services in the virtual space, emphasizes Tarter (2017), which has caused a dynamic change in the operating environment, where the information society has acquired a dominant and growing dependence on information and communication technologies (ICT) referred to by the authors (Bederna & Szádeczky, 2023), but also exposure to a growing range of negative impacts (Fotis, 2024) directly on all those who work in the same business and private life, and indirectly on those who depend on them in the physical world (Issayeva et al, 2023).

Cybersecurity threats and incidents in cyberspace negatively affect the market value of business entities, revenue, profit, reputation and brand, market capitalization, intangible assets, and financial policies of companies (Issayeva et al, 2023), where publicly disclosed cyber incidents are growing globally, with an annual growth rate of 21% (Cobos, 2024). The research sought to bridge this gap by applying an integrated economic analysis of cyber incidents. The main objective of the study was to examine the impact of the frequency and severity of cyberattacks on economic stability through direct financial losses, indirect business disruptions, and broader socio-financial effects. The initial hypothesis was that the increasing frequency and sophistication of cyberattacks would proportionally increase business losses and contribute to macroeconomic instability in the public and private sectors, and the research results confirmed this. Methodologically, the study employed a mixed analytical approach, including descriptive statistical analysis, econometric techniques, and comparative case analysis. The analysis is based on a sample of 31 publicly documented cyber incidents from 2009 to 2024, spanning different sectors and regions. Direct financial losses, indirect costs, firm-level performance indicators, as well as selected macroeconomic and socio-financial variables were examined, with regression and trend analyses used to assess the relationship between cyber incident characteristics and economic outcomes.

2. Financial factors and implications for cyber security

The digitalization of social activities has caused humanity to rely entirely on the reliability, security (Cvetkovic et al., 2025), and integrity that it provides, due to the efficiency of computer automation in performing everyday tasks. Every social phenomenon is accompanied by different aspects and outcomes, and, viewed generally, these effects are positive and negative. The expansion of user functions provided by digitalization has encouraged the development of products and services in the virtual space, but also exposure to a growing range of negative impacts directly on all those who work in the same business and private life, and indirectly on those who depend on it in the physical world (Tarter, 2017).

Several complex factors are leading to the escalation of the complexity of the cyber landscape, primarily geopolitical tensions that contribute to a more insecure environment, then increased integration and dependence on more complex supply chains lead to a more unclear and unpredictable risk landscape (Onunka et al, 2023; Vidović et al, 2024), while the rapid adoption of new technologies and new technologies contribute to new threats. Meanwhile, the increasing number of international regulatory requirements adds a compliance burden for organizations. All of these challenges are exacerbated by a growing skills gap, which further complicates effective cyber risk management (World Economic Forum, 2025).

Table 1. Overview of key requirements for reporting cyber incidents and attacks in the US, EU, UK, Japan, Singapore, and South Korea. Source: Authors based on data from Petit (2024).

State/Region	Agency	The basics of Cyber Incident and Attack Reporting	Type of report	Time frame
USA	CISA	CIRCIA	Entities report and report all covered cyber incidents to the Agency (CISA)	72 hours
		Federal Initiative for the Sharing of Incident Reports	Any federal entity that receives a report of a cyber incident must share that report with the CISA	24 hours
		CIRCIA - Ransomware payments	Reporting all ransom payments made as a result of ransomware attacks	24 hours
	SEC	Cyber Security Risk Management, Strategy, Management, and Incident Detection	Disclosure of Cyber Security and Information Incidents by Public Companies	4 days
	NCUA	Cyber Incident Notification Requirements	Notification to all federally insured credit unions of a cyber incident reported by affiliates	72 hours
	US-CERT	Federal Law on the Modernization of Information Security	Federal Agency Report on Incidents Where Confidentiality, Integrity, and Availability Are Compromised	1 hour
EU	ENISA	EECC	Report on cyber incidents affecting the confidentiality, authenticity, integrity, and availability of assets	Without delay
		EU Cyber Resilience Act	Preliminary notification of the incident to the relevant national authority	24 hours
	CSIRTs	Regulation on Network and Information Systems (NIS 2 European Commission Directive No. 2022/2555)	Initial Notice, Intermediate Report, and Final Report	24 hours 72 hours 1 month
	National Supervisory Authority	DORA	Report on Significant Incidents on ICT Systems by Financial Institutions	24 hours
	National Supervisory Authority	GDPR	Report on the violation of the personal data of the organization	72 hours
UK	NCSC	NIS Directive 2018	Cyber incident report and notification to competent authorities from operators of essential services and digital service providers	72 hours
		Cyber Security and Resilience Act	A comprehensive report on cyber attacks and incidents against state authorities	Indefinite
	National Supervisory Authority	UK General Data Protection Regulation (GDPR)	Notification of theft of personal data as a result of a cyber attack	72 hours

Japan	PPC	APPI	Reporting on the violation and theft of personal data of all organizations and entities operating	3-5 days
		Basic Law on Cyber Security	Cyber Attack Notification	3-5 days
	FSA	Financial Services Agency (FSA) Guidelines for the Protection of Personal Data in the Financial Sector	Report of all entities in the financial sector on the theft of data and funds	Right away
	Ministry of the Interior and Communications	Law on Business in the Field of Telecommunications	Reporting of incidents that lead to the interruption of ICT services and affect the personal data of ICT users	No further ado
	NISC	Common Standards on Information Security Measures of State Entities	Instant report of a cyber incident and attack	Right away
Singapore	CSA	Cyber Security Law	Critical Infrastructure Operator's Reporting of Significant Incidents and Attacks	2 hours
	Commission for Personal Data Protection	The Personal Data Protection Act (PDPA)	Notification of a significant cyberattack that causes massive damage and affects 500 or more individuals in the service	72 hours
South Korea	PIPC	The Personal Information Protection Act (PIPA) and the Law on the Use and Protection of Credit Information	Three notifications depending on the damage caused to the data (lost, stolen, discovered)	1-5 days

Narrowing the focus to the business context, two concepts closely related to harm are “*impact*” and “*risk*”. Both concepts are pervasive in economic empirical research, literature, and practice, as Agriofotis et al. (2018) point out, because they represent the activity of one or more individuals that can lead to positive or negative outcomes through cause-and-effect relationships. This characterization of impact as a generic term is supported by others in the security field across academia and government, as well as numerous agencies responsible for digital security, such as the European Union Agency for Network and Information Security (ENISA), which defines impact as the result of an unintended incident, and which is embedded in the understanding of the principles established by the International Organization for Standardization and the International Electrotechnical Commission (ISO/IEC). Some describe impact as the potential harm expected to result from unauthorized actions or the loss of confidentiality, integrity, or availability, and it is these manifestations that have received special attention in this research. The analysis is therefore focused primarily on harm, with the intention of emphasizing the impact of a cyberattack as undesirable, although impact is a non-specific term; in security, it often implies a negative outcome. Many companies vastly underestimate the costs of security breaches (Cashell et al, 2004), for these reasons a reporting system has been established from leading global, international and national organizations and agencies, shown in Table 1, which monitor, control and establish a proper cost measurement system, which suggests to decision makers in business entities the level of investment expenditures on improving the cybersecurity of the business environment in cyberspace.

3. Accounting treatment of cyber attack costs

When analyzing the costs of cyberattacks, IBM Corporation (2024) identified patterns in business activities that tend to reduce or increase them.

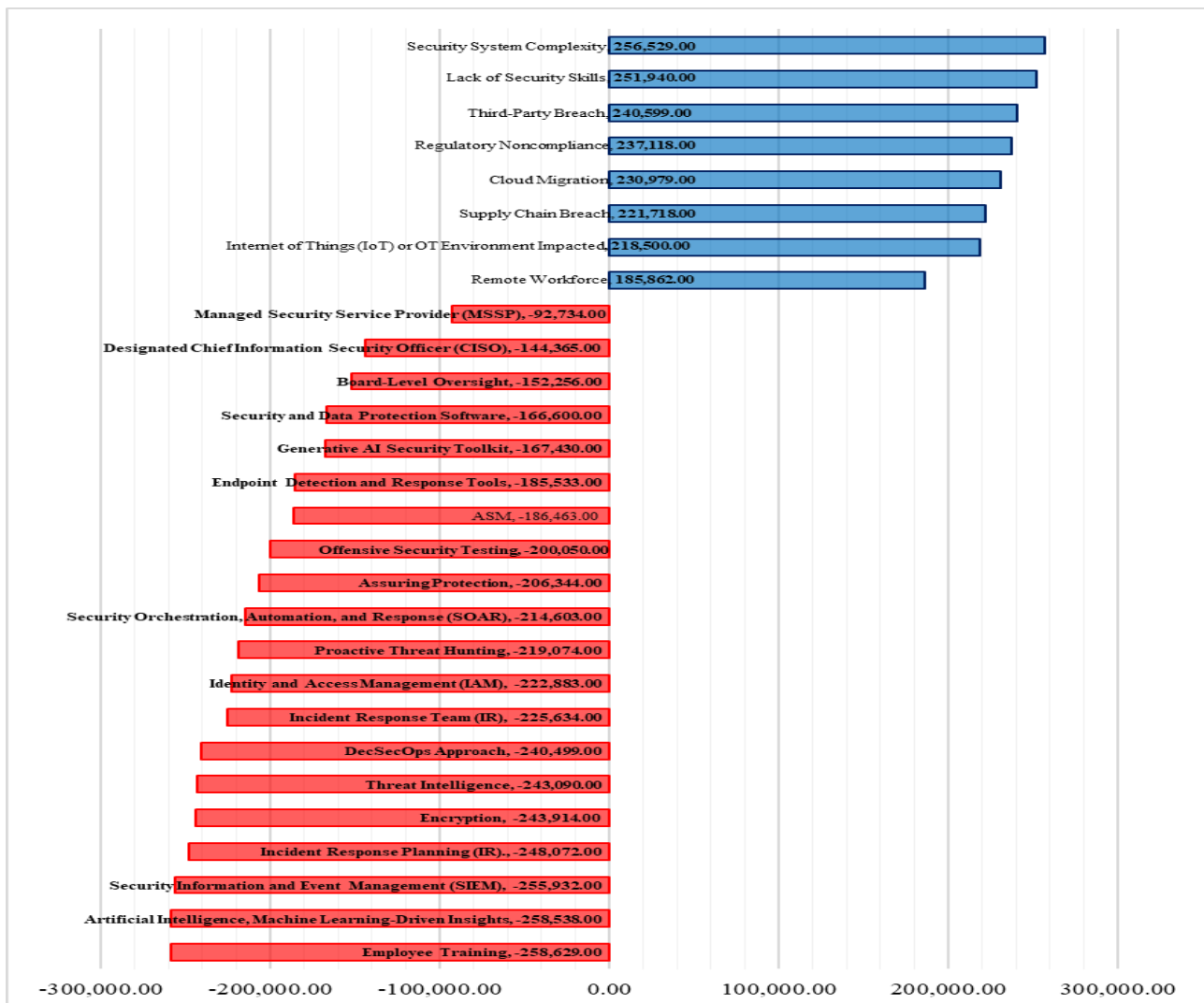


Figure 1. Overview of the impact of factors on the average amount of increase and decrease in the costs of unauthorized access to confidential data. Source: Authors based on data (IBM Corporation, 2024).

Figure 1 shows that employee training, the use of software solutions supported by artificial intelligence technology and machine learning insights are key factors that have a mitigating effect on the average cost of unauthorized access to confidential data, while the complexity of the security system, the lack of security skills, and unauthorized access and illegal use of confidential data by related parties, affect the growth of costs.

The International Monetary Fund (2024) indicates that macro-financial stability is threatened by the impact of cyber incidents and attacks, including the leakage of confidential data and the rapid materialization of risks when key institutions in critical infrastructure are targeted (Vidović et al., 2024).

Figure 2. The trend of increasing costs of data breach incidents in cyberspace. Source: Authors based on data (IBM Corporation, 2024).

4. Analysis of financial indicators of costs and damages

Econometric analysis suggests that digitalization and geopolitical tensions significantly increase the risk of cyber incidents (International Monetary Fund, 2024). Based on an extensive review of data from previous empirical research, the literature, news articles, and official databases of international institutions reporting on cyber attacks, the analysis identified the damage caused by cyber attacks. In this segment of the research, the focus was given to the analysis of cyber attacks and the leakage of confidential data, as well as the damage caused by this type of attack, which has long-term socio-financial consequences, both for the organization, i.e. the business entity whose digital assets and personal and business data information were compromised, and

for third parties outside the employees and the organization itself, such as clients, contractors, suppliers and all dependent parties and actors in the economic chain.

Figure 3 shows a classification of the damage caused and the consequences of the above types of cyberattacks, covering economic aspects, physical and digital threats, and social, reputational, and psychological impacts.

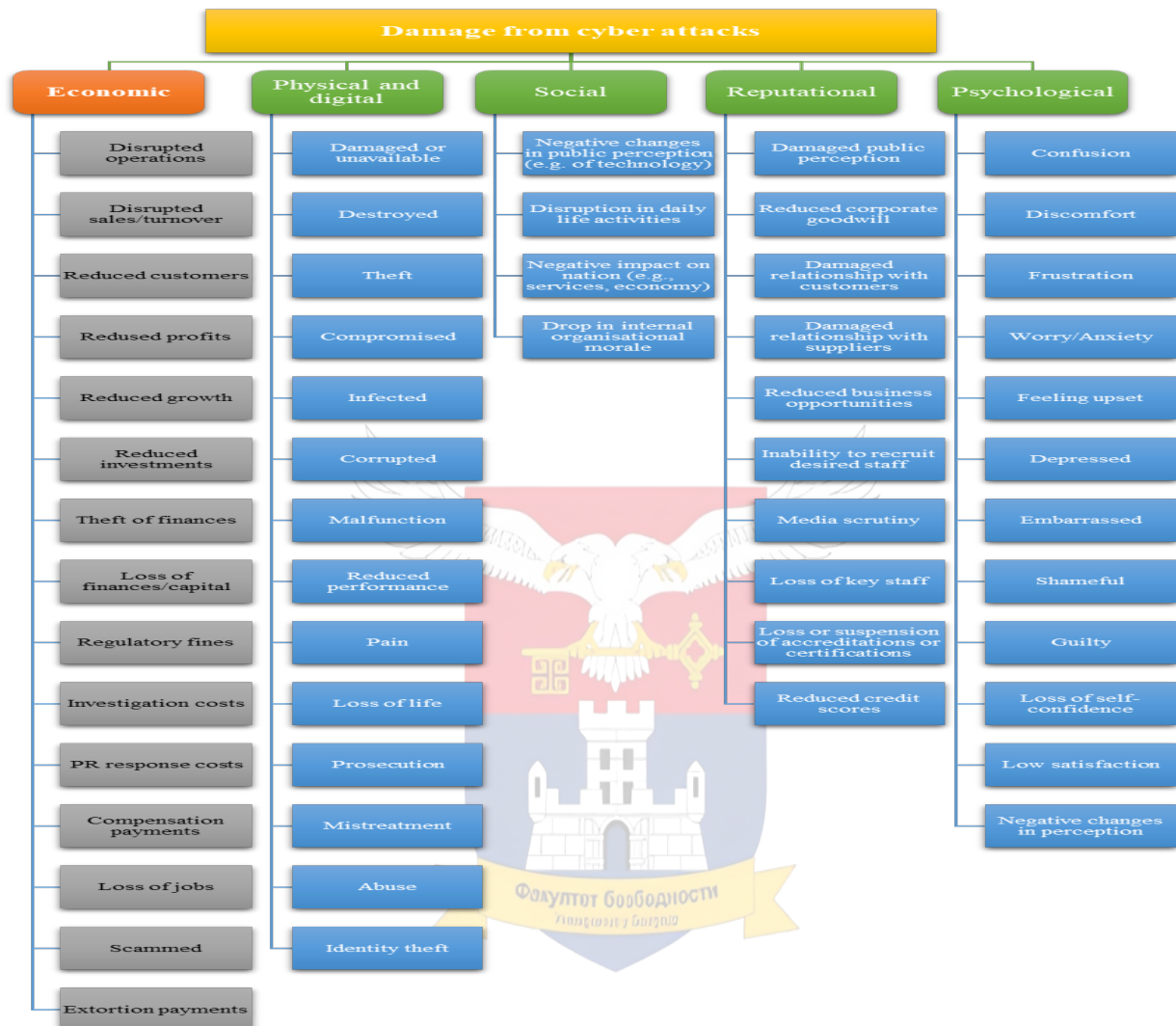


Figure 3. Classification of damages caused by cyber attacks on a business entity. Source: Authors based on data (Agrafiotis et al, 2018).

Some authors (Agrafiotis et al., 2018) define cyber damage as damage that occurs as a direct result of an attack carried out in whole or in part through digital infrastructure and the information, devices, and software applications that comprise it. The research problem was therefore approached in a multidisciplinary manner by creating an econometric model to understand the economic segment of cybersecurity, taking into account the genesis of information about cyber incidents and attacks, their impact, and their relationship to the dynamics of development of other entities in cyberspace.

The extent of the asymmetry between costs, revenues, and their actual values, and the categories of financial damage assessment (direct and indirect), the consequences from an economic and social perspective, with the vector methodology and the type of cyber incident or attack in relevant case studies in the time interval from 2009 to 2024, were taken into account.

What stands out as important in the monetization of damage and consequences is that a cyber incident on a legal entity (company, enterprise, banking system, etc.) has significant impacts on supply chains, suppliers, and directly on the object of the attack itself in the form of fluctuations in market value on the stock market

when software vulnerabilities are discovered. When customer data is leaked, there is a noticeable short-term effect on share prices on financial markets. However, there are also cases of cyber incidents in which there is no direct financial damage to either companies or customers, such as a DoS attack on data that is not confidential. However, they do have effects on the growth of the investment segment of expenditure for the technical and technological development of the entity's cybersecurity tools. Ultimately, only in cases where a cybersecurity breach or incident in cyberspace affects the confidentiality, availability, or integrity of data does it have a financial impact on the company. The qualification of damages and consequences from cyber incidents and attacks involves a specific mapping of key types and subtypes of damage (Chin, 2024). As suggested by Agrafiotis et al. (2018), an important feature of damages and consequences in cyberspace is the domino and cascading effect of their spread, and it is important to clearly identify the sequences of spread for different types of damage caused during cyber attacks and incidents. By applying the damage classification, case studies of cyber attacks in this segment of the research were processed, as shown in Figures 4, 5, 6, and 7, which reveal the distribution of impacts and the spread of damage.

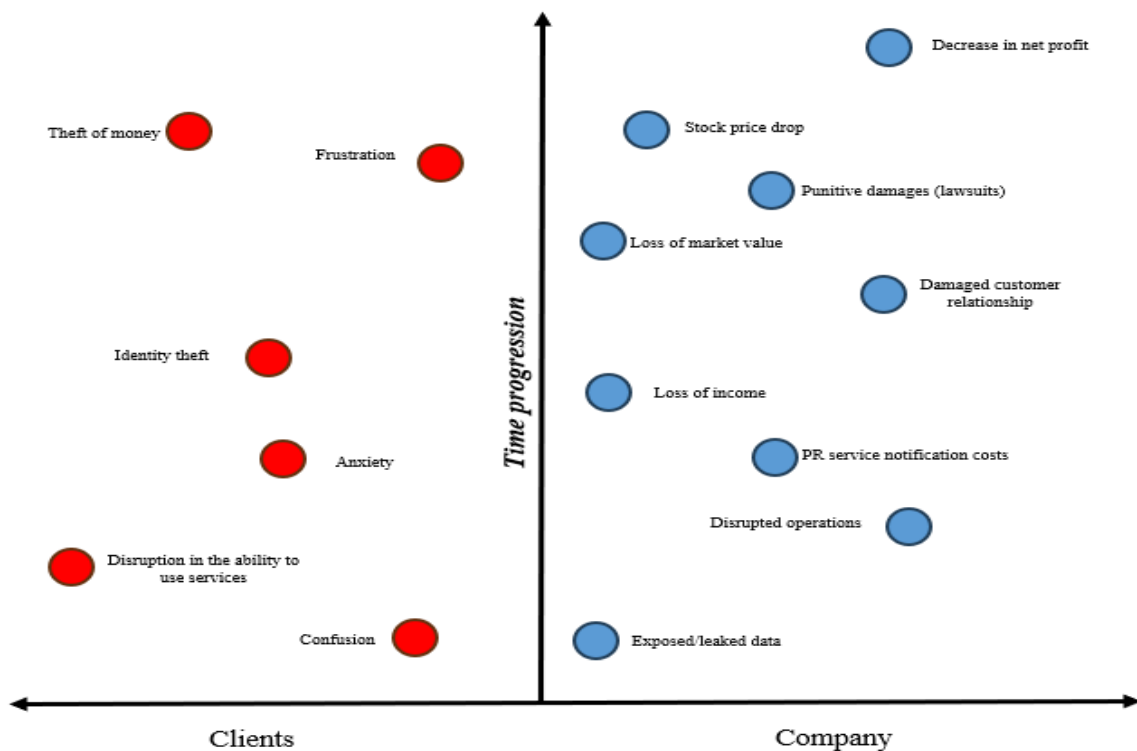


Figure 4. Distribution and spread of damage following the 2011 cyberattack on the Sony PlayStation Network. Source: Authors based on data (Sherr & Wingfield, 2011; Agrafiotis et al, 2018; Jørgensen, 2018; Quander & Janeja, 2021).

Figures 4 and 5 illustrate the changing structure of economic damage from cyber incidents within the same corporation. The 2011 attack on Sony PlayStation Network caused a gradual spread of losses from operational disruption to market and institutional levels, with indirect losses, such as reputational erosion and legal exposure, exceeding direct remediation costs estimated at US\$171 million. In contrast, the 2014 incident at Sony Pictures Entertainment had a more direct and destructive economic impact, with quantifiable revenue losses of at least US\$30 million and write-offs of film projects totaling US\$82-US\$95 million. While the first case primarily disrupted the digital platform's customer relationship and market position, the second directly affected internal business processes and organizational stability. These findings indicate that cyber risks in digitally intensive sectors are transforming from reputational and market threats to strategic threats that directly threaten revenues and operational continuity.

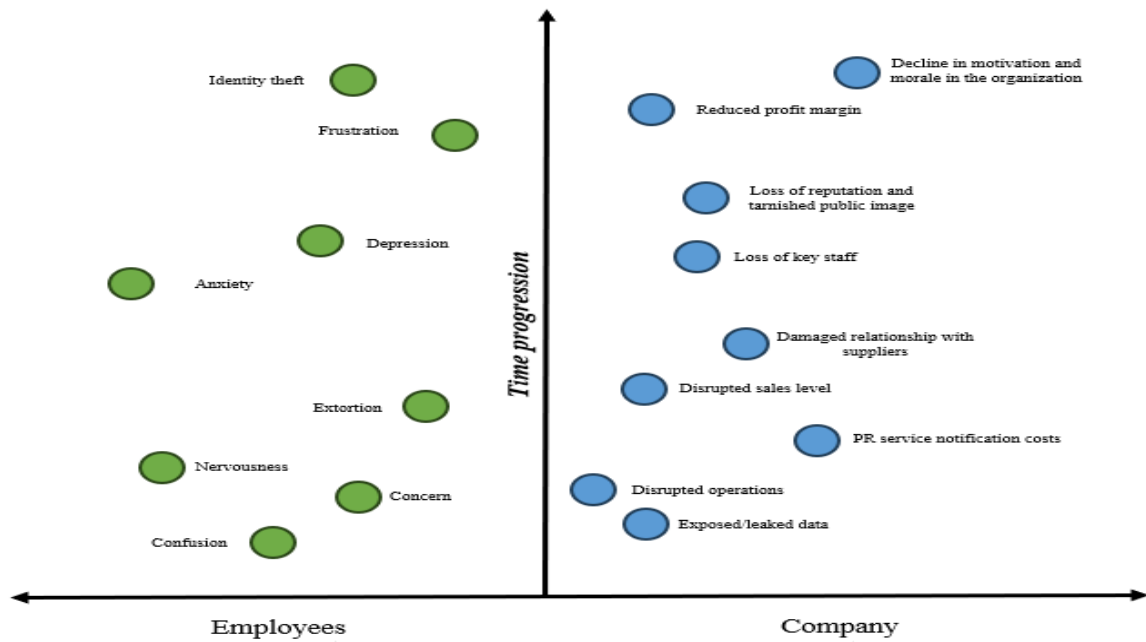


Figure 5. Distribution of impact and spread of damage following the cyberattack on Sony Pictures Entertainment in 2014. Source: auteurs, sur la base de données (Dhillon, 2015; Ismail, 2017; Agrafiotis et al., 2018; Lis & Mendel; Steinber et al., 2021; Muniandy et al., 2024).

Figure 6. Impact distribution and damage spread following the 2014 cyberattack on J.P. Morgan Chase. Source: Authors based on data (Dhillon, 2015; Agrafiotis et al, 2018)

On the other hand, Figures 6 and 7 show that serious cyber incidents may have minimal or no direct financial losses, but produce enormous systemic, regulatory, and societal effects. JP Morgan Chase incurred increased security costs (~\$500 million) and a significant drop in consumer confidence, prompting measures across the financial industry. The Ashley Madison attack demonstrated that a breach of user privacy can cause collateral damage, including public scandals, lawsuits, threats, and even suicides. However, direct financial losses were not the primary outcome.

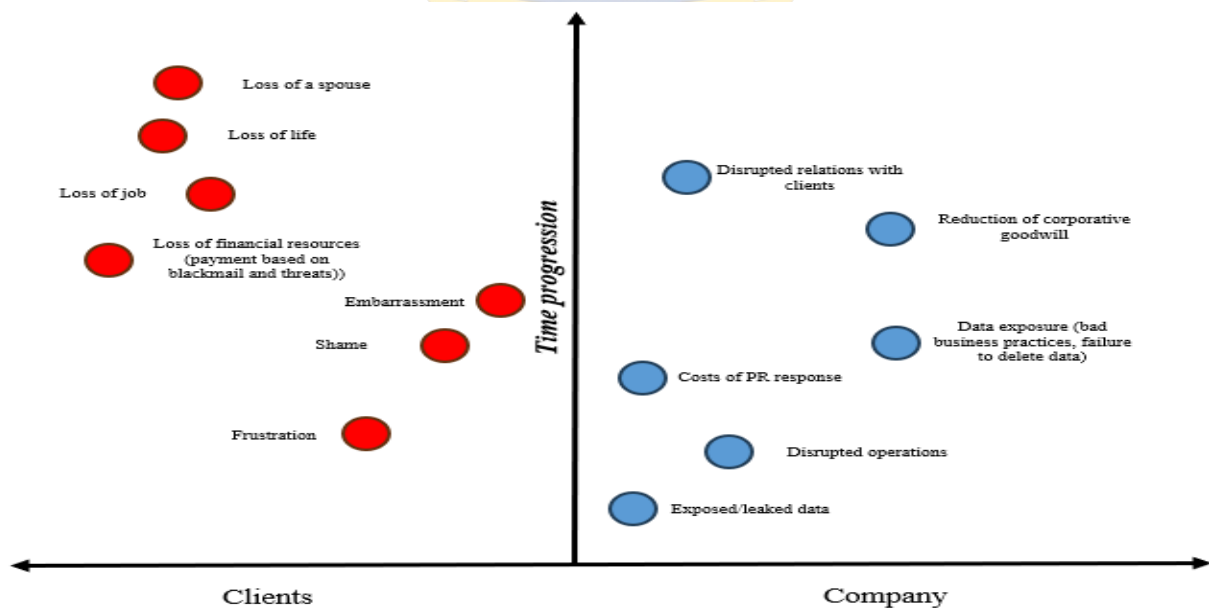


Figure 7. Distribution of impact and spread of damage after the cyberattack on Ashley Madison in 2014. Source: Authors based on data (Agrafiotis et al, 2018).

Combined, these examples highlight that the effects of cyberattacks are multi-sectoral and multi-level, with indirect and systemic losses often exceeding direct financial costs. The financial sector and critical infrastructure experience higher-than-average indirect losses, while privacy-focused platforms suffer profound reputational and societal shocks, supporting broader findings from the study on the cumulative economic and socio-financial consequences of cyber incidents. Attacks involving the theft of personal financial information are associated with adverse stock market reactions, reduced sales growth for large firms and retailers, increased leverage, deterioration of financial health, and reduced investment in the short term (Kamiya et al, 2018) and result in long-term socioeconomic consequences (Seng et al, 2024), and the resulting costs are related to the confidentiality of compromised data, the criticality of services at risk of disruption, and the financial assets of the target of the attack (Cobos, 2024). Cybersecurity threats significantly impact organizations' financial stability. The costs arising from cyber incidents are diverse.

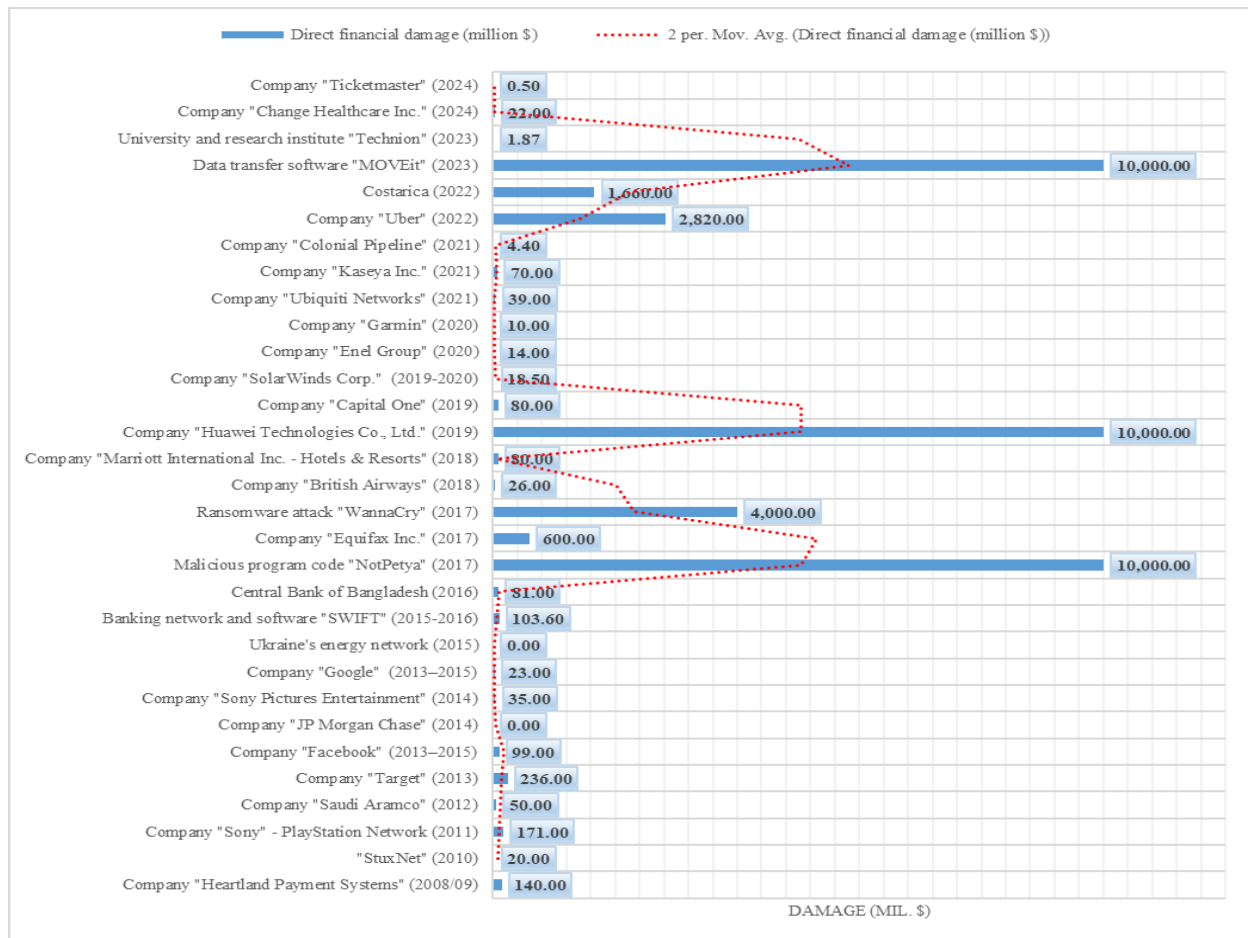


Figure 8. Direct financial damage caused by cyber attacks and incidents in the analyzed sample of case studies in the interval 2009-2024, business year. Source: Author's calculation

Based on the analyzed data, the average direct damage per cyber incident was approximately \$0.4 million, with three-quarters of incidents resulting in losses below \$2.8 million (International Monetary Fund, 2024). However, the distribution is highly skewed, as some incidents cause losses in the hundreds of millions of dollars or, in some cases, accumulate financial damage of several million, which can threaten the liquidity and solvency of business entities. Direct costs include engaging security experts, legal advisors, and researchers in the recovery and treatment process. Indirect losses arise from work interruptions, shifts in business flow, reduced productivity, missed opportunities, and ransom payments in the event of ransomware attacks, as well as possible regulatory penalties for non-compliance with data protection laws. A systematic analysis of 31 cyber incidents from 2009 to 2024, covering various sectors – from government agencies and multinational companies to financial institutions, direct measures, and critical infrastructure. Economic and statistical methods create cumulative economic and socio-financial effects that spread from the immediate targets of the incident to the broader economic and social environment.

5. Future challenges in the economic domain of cybersecurity

Individuals, companies, and entire nations aim to harness the power of technology to drive economic growth and improve public services and quality of life, but in doing so, they face increased risks from cyber threats. In this context, as Cobos (2024) points out, cybersecurity is essential for socio-economic progress.

Cybersecurity is key to the inclusive and sustainable growth of nations. Estimates (Cobos, 2024) suggest that a developing country that reduces its cyber incidents from the top to the bottom quartile of the distribution could see a 1.5% increase in GDP per capita. Therefore, it is important to develop effective measures to prevent and eliminate cyber risks by anticipating the economic consequences of cybersecurity breaches (Zadorozhnyi et al, 2021). It is important to diversify the economic causal flows that arise from established regularities, and are reflected in the established trend of exponential growth in costs for finding an appropriate solution for the protection of cyber-information and computer infrastructure, where global IT companies are entering, which also contribute to building a relevant market for cyber-protection products, followed by growth in the insurance sector against cyber incidents and attacks, which directly confirms the need for capital investments in this segment (Kuzior et al, 2022). By addressing identified vulnerabilities and implementing recommended strategies, stakeholders can better protect global trade systems from the evolving cyber threat landscape, ensuring a safer and more resilient economic future (ThankGod, 2024). What the research has found, and which is further discussed in the conclusions of the World Economic Forum (2024), is that there is a growing cyber inequality between organizations, legal entities, and individuals that are resilient to cyber threats and those that are not.

Good economic practices have been established and proactive measures are being taken for the sustainable construction and development of cybersecurity (Fotis, 2024), to which this research also refers, and which include investment activities in new and advanced security technologies, proactive risk management with the implementation of regular security audits and assessments to identify vulnerabilities in systems and networks (Lee, 2021), both of business entities in the private and public sectors (Thakur, 2024). They are based on prioritizing employee training and educational programs (George et al, 2024), systematic and collegial cooperation and collaboration, mutual sharing of information on cybersecurity of state authorities and other economic actors (Sunny, 2024) given that it is a shared responsibility (International Chamber of Commerce, 2024), as well as compliance with strong regulatory standards (Dremluga et al, 2021) that are harmonized (Putnik et al, 2022), development of incident response plans, investment activities in cybersecurity and continuous implementation of solutions for monitoring and detecting anomalous activities before they develop into a cyber incident or attack (Jimmy, 2024), and it is precisely this proactivity and adaptability to new challenges that ensures continued integrity and financial stability at the national, and consequently, global level. Level.

Cyberattacks also present an opportunity to reassess their defense mechanisms and resource mobilization capabilities (Jeimy & Cano, 2023) amid the instability they present. Although proactive security measures can be expensive, such costs are negligible compared to the financial consequences of cyberattacks (World Economic Forum, 2025). Taking into account economic parameters, the effective establishment of cybersecurity strategies can minimize the exposure of systems and computer networks to risk (Fielder et al., 2018), only with the right investment actions to achieve a higher level of security.

6. Conclusion

Rapid technological growth, while benefiting many in terms of access, innovation, and even collaboration, also creates systemic inequalities in the global cybersecurity economy and challenges the pronounced disparity between the cyber resilience capabilities of the organizations that make up its markets (World Economic Forum, 2024). The study confirmed the hypothesis that cyberattacks have a significant, measurable macroeconomic impact, threatening national economic stability. Empirical data showed that direct and indirect losses can exceed initial damage estimates, and the sectors most technically, financially, and operationally interconnected are most affected: finance, healthcare, small and medium-sized enterprises, and platforms that process large volumes of sensitive user data. The cumulative effects manifest themselves through long-term socio-financial consequences, including loss of trust, reputational damage, and regulatory oversight.

Based on these findings, the study highlights the need to integrate cyber risks into economic policy, budget planning for prevention and response, and the development of strategic frameworks for risk management at

the sectoral and national economic levels. A secure and resilient digital space is a competitive advantage and a prerequisite for sustainable economic development in the digital era.

Limitations of the study include reliance on secondary public data sources and uneven availability of cyber incident reports globally, which may affect the accuracy of the estimates. Future research should focus on modeling economic costs by sector, conducting regional comparisons, and developing dynamic models that integrate the direct, indirect, and socio-financial impacts of cyberattacks.

7. References

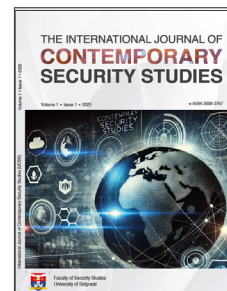
1. Agrafiotis, I., Nurse, J. R., Goldsmith, M., Creese, S., & Upton, D. (2018). A taxonomy of cyber-harms: Defining the impacts of cyber-attacks and understanding how they propagate. *Journal of Cybersecurity*, 4(1).
2. Bederna, Z. and Szádeczky, T. (2023) 'Managing the financial impact of cybersecurity incidents', *Security and Defence Quarterly*, 41(1). Retrieved from: doi: 10.35467/sdq/159625.
3. Cashell, B., Jackson, W. D., Jickling, M., & Webel, B. (2004). The economic impact of cyber-attacks. Congressional Research Service documents, CRS RL32331 (Washington DC), 2.
4. Chin, K. (2024). The Impact of Cybercrime on the Economy, UpGuard, Retrieved from: <https://www.up-guard.com/blog/the-impact-of-cybercrime-on-the-economy>.
5. Cobos, E.V. (2024). Cybersecurity economics for Emerging Markets. Washington, DC: World Bank. Retrieved from: doi:10.1596/978-1-4648-2120-2.
6. Cobos, V., Belen., E., Selcen, C. (2024). A Review of the Economic Costs of Cyber Incidents. Washington, D.C.: World Bank Group. Retrieved from: <http://documents.worldbank.org>.
7. Cvetković, V. M., Aleksov, B., Renner, R., Gačić, J., Ivanov, A., & Milašinović, S. (2025). Community-based disaster risk reduction: Overcoming barriers to build stronger communities. *International Journal of Disaster Risk Management*, 7(2), 1.
8. Dada, K. S. J., Mohammed, H. A., & Quadir, R. O. (2025). Disaster risk management in academic institutions: An assessment of preparedness and recovery at Kashim Ibrahim Library, Nigeria. *International Journal of Contemporary Security Studies*, 1(1), 1–15.
9. Dada, K. S. J., Mohammed, H. A., Mallam, D., & Ajayi, E. O. (2025). Security of information resources in Federal College of Education libraries in Northwest Nigeria. *International Journal of Contemporary Security Studies*, 1(1), 85–98.
10. Dhillon, G. (2015). What to do before and after a cybersecurity breach. American University, Washington, DC, Kogod Cybersecurity Governance Center.
11. Fielder, A., König, S., Panaousis, E., Schauer, S., & Rass, S. (2018). Risk assessment uncertainties in cybersecurity investments. *Games*, 9(2), 34.
12. Fotis, F. (2024). Economic Impact of Cyber Attacks and Effective Cyber Risk Management Strategies: A light literature review and case study analysis. *Procedia Computer Science*, 251, 471-478.
13. Garba, T. M., & Akaan, R. (2025). The Socioeconomic and Psychological Implications of Polygamy: A Quantitative and Qualitative Analysis Concerning Disaster Risk Reduction and Management (DRRM) in Nigeria. *International Journal of Contemporary Security Studies*, 1(1), 25–34.
14. George, A. S., Baskar, T., & Srikanth, P. B. (2024). Cyber threats to critical infrastructure: assessing vulnerabilities across key sectors. *Partners Universal International Innovation Journal*, 2(1), 51-75. Retrieved from: <https://doi.org/10.5281/zenodo.10639463>.
15. IBM Corporation (2024). Cost of a Data Breach Report. Retrieved from: <https://www.ibm.com/downloads/documents/us-en/107a02e94948f4ec>.
16. International Chamber of Commerce (2024). Protecting the cybersecurity of critical infrastructure and their supply chains.

17. International Monetary Fund (2024). Global Financial Stability Report, The Last Mile: Financial Vulnerabilities and Risks.
18. International Telecommunication Union (2024). Global Cybersecurity Index 2024, 5th Edition. Telecommunication Development Bureau, Switzerland. Retrieved from: https://www.itu.int/dms_pub/itu-d/opb/hdb/d-hdb-gci.01-2024-pdf-e.pdf.
19. Ismail, M. (2017). Sony Pictures and the U.S. Federal Government: A Case Study Analysis of the Sony Pictures Entertainment Hack Crisis Using Normal Accidents Theory, University of Southern Mississippi. Retrieved from: <https://aquila.usm.edu>.
20. Issayevaa, G. K., Zhussipovaa, E. E., Aitymbetovaa, A. N., Kuralbayevab, A. S., & Abdykulovaa, D. B. (2023). The Impact of Cybersecurity Breaches on Firm's Market Value: the Case of the USA. Retrieved from: <https://doi.org/10.51176/1997-9967-2023-4-200-219>.
21. Janković, L., Cvetković, V. M., Gačić, J., Renner, R., & Jakovljević, V. (2025). Integrating psychosocial support into emergency and disaster management and public safety: The role of the Red Cross of Serbia. *International Journal of Contemporary Security Studies*, 1(1), 99–124.
22. Jeimy, J., Cano, M. (2023). Flexi-a conceptual model for enterprise cyber resilience. *Procedia Computer Science*, 219, 11-19.
23. Jimmy, F. (2024). Assessing the Effects of Cyber Attacks on Financial Markets. *Journal of Artificial Intelligence General Science (JAIGS)* ISSN:3006-4023, 6(1), 288–305. Retrieved from: <https://doi.org/10.60087/jaigs.v6i1.254>.
24. Jørgensen, E. U. (2018). The stakeholder attributions of corporate crisis responsibility following a cyber attack. Retrieved from: https://research-api.cbs.dk/ws/portalfiles/portal/59754091/427671_Elisabeth_Jorgensen_digital.pdf
25. Kamiya, S., Kang, J.K., Kim, J., Milidonis, A., Stulz, R. (2018). What is the Impact of Successful Cyberattacks on Target Firms?, [NBER Working Papers](#) 24409, National Bureau of Economic Research, Inc.
26. Kuzior, A., Brożek, P., Kuzmenko, O., Yarovenko, H., & Vasilyeva, T. (2022). Countering cybercrime risks in financial institutions: Forecasting information trends. *Journal of Risk and Financial Management*, 15(12), 613.
27. Kuzior, A., Tiutiunyk, I., Zielińska, A., & Kelemen, R. (2024). Cybersecurity and cybercrime: Current trends and threats. *Journal of International Studies*, 17(2), 220–239. Retrieved from: [doi:10.14254/2071-8330.2024/17-2/12](https://doi.org/10.14254/2071-8330.2024/17-2/12).
28. Lee, I. (2021). Cybersecurity: Risk management framework and investment cost analysis. *Business Horizons*, 64(5), 659–671. Retrieved from: <https://doi.org/10.1016/j.bushor.2021.02.022>.
29. Lis, P., Mendel, J. (2019). Cyberattacks on critical infrastructure: An economic perspective. *Economics and Business Review*, Vol. 5 (19), No. 2, 2019: 24–47. Retrieved from: DOI: 10.18559/eb.2019.2.2.
30. Metić, A. (2025). The Significance and Role of Police Officers in Building the School as a Safe Environment for All Students. *International Journal of Contemporary Security Studies*, 1(1), 17–24.
31. Onunka, O., Alabi, A. M., Okafor, C. M., Obiki-Osafiele, A. N., Onunka, T., Daraojimba, C. (2023). Cybersecurity in US and Nigeria banking and financial institutions: review and assessing risks and economic impacts. *Acta Informatica Malaysia*, 7(1): 54–62. Cybersecurity Risk Assessment in Smart City. Retrieved from: DOI: <https://doi.org/10.26480/aim.01.2023.54.62>.
32. Popović Mančević, M. (2025). Non-Traditional Roles of Military Actors: NATO's Engagement in Natural Disaster Response. *International Journal of Contemporary Security Studies*, 1(1), 75–84.
33. Putnik, N. (2022). *Cyber War and Cyber Peace*, Belgrade: Akademska misao: University, Faculty of Security.
34. Putnik, N., Milošević, M., Cvetković, V. (2022). Ransomware as a security threat – social and criminal law aspects. *Sociological Review*, vol. LVI (2022), no. 1, pp. 328–353.

35. Ryan, E., Soderber, M. (2024). A Victim or Not? A quantitative experimental study of a cyber attack crisis' effect on public attitudes toward an organization and on the organization's reputation. Department of Strategic Communication, Lund University Libraries, Sweden. Retrieved from: <http://lup.lub.lu.se/student-papers/record/9154741>.
36. Saeed, S., Altamimi, S. A., Alkayyal, N. A., Alshehri, E., & Alabbad, D. A. (2023). Digital transformation and cybersecurity challenges for businesses resilience: Issues and recommendations. *Sensors*, 23(15), 6666. Retrieved from: <https://doi.org/10.3390/s23156666>
37. Schwarz, M., Marx, M., & Federrath, H. (2021). A structured analysis of information security incidents in the maritime sector. *arXiv preprint arXiv:2112.06545*.
38. Seng, Y. J., Cen, T. Y., bin Mohd Raslan, M. A. H., Subramaniam, M. R., Xin, L. Y., Kin, S. J., Long, M. S., Sindiramutty, S. R. (2024). In-Depth Analysis and Countermeasures for Ransomware Attacks: Case Studies and Recommendations. Retrieved from: doi: 10.20944/preprints202408.2261.v1.
39. Sherr, I., Wingfield, N. (2011). Play by play: Sony's struggles on breach. *Wall Street Journal*. Retrieved from: <https://www.wsj.com>.
40. Slavković, A., Slavković, N., Zajić, G., Kostić, S. (2023). Digital transformation, artificial intelligence and internet of things as a support for new insurance industry systems. Challenges and insurance market's responses to the economic crisis, Belgrade : University of Belgrade, Faculty of economics and business, Publishing centre, 419-438.
41. Steinberg, S., Stepan, A., Neary, K. (2021). NotPetya: A Columbia University Case Study, Columbia University: Columbia's School of International and Public Affairs (SIPA) Picer Center Digital Education Group.
42. Sunny, A. (2024). A study on financial cyber-crimes, trends, patterns, and its effects in the economy. *Addict Criminol.* 7(1):186.
43. Tarter, A. (2017). Importance of cyber security. *Community Policing-A European Perspective: Strategies, Best Practices and Guidelines*, 213-230.
44. Thakur, M. (2024). Cyber security threats and countermeasures in digital age. *Journal of Applied Science and Education (JASE)*, 4(1), 1-20.
45. ThankGod, J. (2024). Cyber Heists and Trade Turmoil: Uncovering the Economic Impact of Cybersecurity Breaches on Global Commerce. Retrieved from: <http://dx.doi.org/10.2139/ssrn.4858710>
46. Valackienė, A., Odejayi, R. O. (2024). The impact of cyber security management on the digital economy: multiple case study analysis. *Intellectual Economics*, 18(2), 261-283. Retrieved from: doi10.13165/IE-24-18-2-02.
47. Vidović, N., & Beriša, H. (2025). Economic aspects of cyber security: Socio-financial consequences of cyber attacks. *International Journal of Contemporary Security Studies*, 1(1), 149–162.
48. Vidović, N., Beriša, H. & Cvetković, M. V. (2024). Optimising Disaster Resilience Through Advanced Risk Management and Financial Analysis of Critical Infrastructure in the Serbian Defence Industry, *International Journal of Disaster Risk Management*, Vol. 6 (2024) No. 2, Article 12 (p. 183–199), Retrieved from: <https://doi.org/10.18485/ijdrm.2024.6.2.12>
49. Weng, Y., Wu, J. (2024). Fortifying the global data fortress: a multidimensional examination of cybersecurity indexes and data protection measures across 193 nations. *International Journal of Frontiers in Engineering Technology*, 6(2), 13-28.
50. World Economic Forum (2024). Global Cybersecurity Outlook 2024, Insight report. Retrieved from: <https://www3.weforum.org>.
51. World Economic Forum (2025). Global Cybersecurity Outlook 2025, Insight report. Retrieved from: <https://reports.weforum.org>.
52. Zadorozhnyi, Z. M., Muravskiy, V., Shevchuk, O., & Bryk, M. (2021). Innovative accounting methodology of ensuring the interaction of economic and cybersecurity of enterprises.



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Research article

From Operational Experience to Predictive Models: A Decision Tree Approach to Traveler Risk Assessment at Border Crossing Points

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ABSTRACT

Border security teams today face a challenging puzzle: how do you spot genuine threats among millions of travelers without creating endless delays for everyone else? This research explores a practical solution using decision tree analysis, a data-driven method for identifying patterns in traveler data. Think of it like a smart checklist that border officers can use to focus their attention where it matters most. We built our dataset by analyzing patterns documented in risk analysis reports from Frontex (the European Border and Coast Guard Agency) and from national police forces such as Moldova's Border Police. Using these real-world insights, we created a simulation that mirrors the actual patterns and warning signs border guard officers encounter. Our system examines key pieces of information: where someone is traveling from, what documents they're carrying, their citizenship, and, importantly, what conditions might be pushing people to leave their home countries (such as war, poverty, or political persecution). The science behind this uses a simple but powerful equation: $\text{Risk} = \text{Threat} \times \text{Vulnerability} \times \text{Consequence}$. In plain terms, we're asking: What could go wrong? How easy would it be for it to happen? And how severe would the impact be? Our findings show that this approach works. The decision tree successfully separated different types of border concerns—from human trafficking to document fraud to potential security threats—by analyzing patterns in traveler profiles. For example, someone fleeing war zones shows different patterns than someone using fraudulent documents. This means border officers can make better-informed decisions quickly, keeping security tight while letting legitimate travelers move through smoothly.

KEYWORDS

Border security; risk analysis; decision tree; machine learning; pre-screening; threat assessment.

1. Introduction

1.1. The Growing Challenge of Border Security

Today's borders aren't just lines on a map—they're sophisticated checkpoints that separate legitimate travelers from potential threats. With global instability driving more people to cross international borders than ever before, border control agencies are under immense pressure. They need to keep trade and travel flowing smoothly while catching illegal migration, human trafficking, terrorism, and fake documents.



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Historically, border control has relied on manual inspections and static “watchlists.” However, in recent years, border control has depended on manual checks and watchlists. But these reactive approaches can’t keep up with sophisticated threats that constantly evolve and exploit system weaknesses. What we need now is predictive risk analysis—a way to spot threats before they reach the border. We need to identify vulnerabilities at the border, such as illegal migration, human trafficking, potential terrorists, and false documents. This risk analysis should be adapted to new approaches, especially those based on machine learning and data-driven decision support.

1.2. Our Approach

This paper proposes a pre-screening method based on supervised machine learning, specifically the Decision Tree Classifier (DTC). The study is grounded in the operational reality of border control, drawing directly from the author’s professional experience at the Border Police Sector of Chisinau International Airport. By combining this field expertise with high-level risk analysis reports from Frontex, the study simulates real-world threat scenarios. This approach bridges the gap between theoretical risk modeling and the practical, high-pressure decision-making required of officers on the front line.

Unlike “black box” algorithms like neural networks—which can be highly accurate but impossible to explain—decision trees show their work. You can see exactly why someone was flagged. This transparency matters in security work, where officers need to understand the reasoning behind alerts. Our model traces the causal chain from root causes (like civil war or economic collapse) to the actual event (like an illegal border crossing). It’s scientifically sound but also practical enough to use in real operations.

1.3. How This Paper Is Organized

Here’s what to expect: Section 2 reviews existing research on risk management and machine learning in security. Section 3 explains the theoretical framework and math behind decision trees. Section 4 describes our experimental methodology and dataset, which is based on real operational patterns. Section 5 shows the results and visualizations. Section 6 explores the operational and ethical implications of using these systems at borders. Finally, Section 7 wraps up with recommendations for future research and implementation.

2. Risk Analysis at the Border

Machine Learning Meets Security: A New Way to Manage Risk

Risk analysis—according to ISO and NIST—is the process of identifying, estimating, and prioritizing risks. Sounds straightforward, right? But in recent years, machine learning has completely changed the game. Instead of just reacting to threats after they appear, organizations can now predict them before they happen.

Early researchers like Willis (2007) and Bakker (2013) pointed out a significant flaw in traditional border risk models: they relied too heavily on “expert judgment.” The problem? Humans have biases. We tend to overreact to recent events while missing subtle patterns in the data. This realization sparked a shift toward Data-Driven Risk Assessment (DDRA), in which we use historical data to train predictive models rather than relying solely on human intuition.

The application of ML to security is particularly promising in transportation and border contexts. Machine learning works exceptionally well for transportation and border security. Bousquet (2018) showed how algorithms can spot unusual patterns in people’s behavior. For border security specifically, Decision Trees and Random Forests are particularly effective because they excel at handling categorical data—things like “Country of Origin,” “Visa Type,” and “Push Factors”—which is precisely the kind of information border systems collect. They perform feature selection automatically. In a border context, where hundreds of variables exist (from ticket purchase date to luggage characteristics), the algorithm can mathematically determine which attributes have the highest information gain, allowing agencies to focus resources on the most predictive indicators. Unlike neural networks or ensemble methods, which operate as “black boxes,” decision trees maintain interpretability—a

critical requirement in security operations, where officers must understand and trust the system's recommendations.

Understanding How Risk Actually Works at Borders

How does risk actually work in the real world? Before something bad happens, there are usually warning signs—underlying causes. After it happens, there are consequences. By understanding this cause-and-effect chain, we can identify what triggers risky situations and what makes them worse. This helps us intervene earlier and more effectively.

The manifestation of a risk—the event—is preceded by one or more causes and followed by one or more consequences. Thus, the adoption of a causal logic makes it possible to:

- Identify the operative event (the immediate cause that triggers the incident)
- Define the elements of loss (the consequences)
- Recognize the elements likely to amplify either the causes or the consequences.

This causal framework is essential for border security because it allows analysts to work backwards from observed outcomes (e.g., apprehended smugglers, detected fraudulent documents) to identify the root causes (e.g., economic deprivation, geopolitical instability).

$\text{Risk} = \text{Threat} \times \text{Vulnerability} \times \text{Result}$

Where:

1. Threat: The potential intent to cause harm.
2. Vulnerability: Weaknesses in border controls.
3. Result (Consequence): The impact of the event.

An example of how these risk levels are categorized is shown in Table 1 below.

Table 1. Threat and Level Classification

Threat and level	High	Moderate	Normal	Low
Irregular migration		certain		
Illegal border crossing			certain	
Terrorism				unlikely

Source: Author, based on operational experience at Chisinau Airport Border Police Sector

This table presents the **baseline risk classification** used in border control operations. Each threat category is assessed across four risk levels: High, Moderate, Normal, and Low. The placement of “Certain” or “Unlikely” in each cell indicates the **expected likelihood** of encountering that threat at a given risk level.

The table reveals three key patterns:

1. **Irregular Migration** and **Illegal Border Crossing** are classified as **Normal-level risks**, meaning they are expected and frequently encountered at border checkpoints. These are high-volume, routine security concerns that every BCP manages daily.
2. **Terrorism**, by contrast, is marked as **Unlikely** at lower risk levels, indicating that terrorist threats are rare and appear only when multiple high-risk indicators align. This reflects the reality that border terrorism requires not only intent but also sophisticated planning and resources.
3. The **absence of entries** in higher risk categories (High, Moderate) for irregular migration suggests that once an irregular migrant is detected through the decision tree model, they are routed to standard administrative procedures rather than escalated to “High Risk” security protocols (unless additional factors—such as false documents or suspicious behavior—are present).

This baseline classification serves as the **foundation** for the decision tree model, which builds more granular risk profiles by incorporating specific attributes such as citizenship, document type, and departure origin.

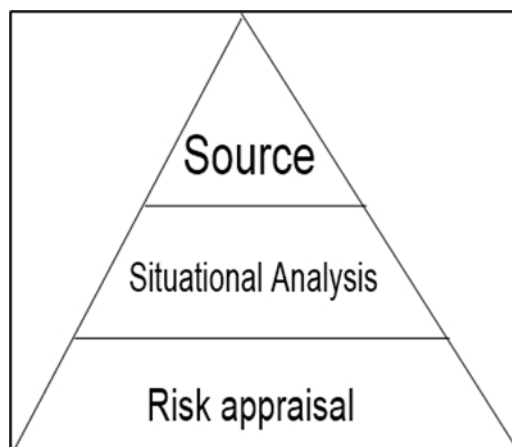


Figure 1: Operational context of border risk analysis.

Source: Author, based on operational experience at Chisinau Airport BCP

This pyramid illustrates the three-level framework used in border risk analysis, from the most concrete information at the bottom to strategic decision-making at the top.

1. Risk Appraisal (Bottom): This is where the decision model lives. Basic facts on a traveler – like where they're from, what papers they have, why they're leaving, and where they started – are put together to get a first risk score.

2. Situation Analysis (Middle): The risk from step one is then mixed with what's going on in the world – like current events, smuggling routes, recent problems, and info from other groups (like Frontex and nearby countries). As an example, a traveler from Ukraine might be seen as a different risk if there's a war going on compared to normal times.

3. Source (Top): The last check uses intel and threat info from security groups (both in the country and from other countries), plus new threat reports. This makes sure the decision model isn't used without thinking, but instead uses what's happening in the wider world.



Figure 2: Risk calculation matrix used in initial assessments. **Source:** Author, based on operational data from Chisinau Airport BCP and Frontex frameworks.

This scatter plot shows how the risk equation ($\text{Risk} = \text{Threat} \times \text{Vulnerability} \times \text{Consequence}$) plays out in three main threat types at border checkpoints. Each dot is a specific situation, placed based on its risk score (up and down) and spread across four levels (High, Low, Moderate, Normal). What We See: Illegal Border Crossing (Left): Mostly medium-to-high risk scores. Lots of cases are at High and Low risk, meaning it's easy to

spot illegal crossings. People either get caught trying to enter without papers (High Risk) or have valid papers and don't seem suspicious (Low Risk). Irregular Migration (Middle): Shows a wide range of risks. Irregular migrants have different risk levels: some are asylum seekers who don't pose much risk, while others seem riskier because of fake documents or weird travel plans. This is why we need the decision tree model—to distinguish between harmless irregular migration and potentially concerning issues by considering different factors. Terrorism (Right): Mainly low risk scores, which confirms that terrorist threats aren't often found at borders. The one High-Risk case (orange circle, top right) is a rare situation in which many red flags went off—a case that would definitely warrant a more thorough inspection and intel sharing.

2.1. Data-Driven Risk Profiling and the Transition to Predictive Models

Risk analysis in border security has historically been reactive and expertise-driven. For years, border security relied on officers' training and experience. They'd apply rules they learned and make judgment calls. But this approach has serious limitations:

1. Cognitive biases: Officers might focus too much on specific nationalities after a recent incident, missing other threats
2. Inconsistent knowledge: Different officers at different border crossings know different things
3. Scalability problems: As more passengers arrive, human decision-making becomes a bottlenecking historical data to identify patterns that human judgment might miss. Machine learning models, particularly decision trees, can simultaneously evaluate multiple attributes and their interactions, enabling more consistent and evidence-based decisions.

This study shows that the best approach combines both worlds: the real-world expertise of experienced border officers with the analytical power of algorithms. The result is a risk model that's scientifically solid but also practical and trustworthy enough to actually use on the ground.

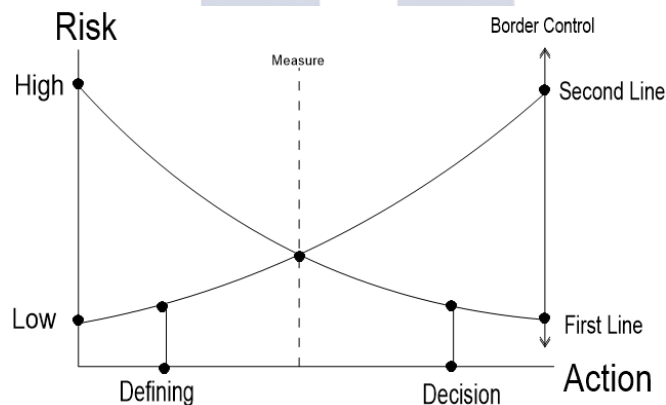


Figure 3. Passenger risk level indicators.

Source: *Made by author, based on operational data from Chisinau Airport BCP*

This figure illustrates how border control decisions are made based on assessed risk levels. The left side of the diagram shows the “Defining Phase,” where specific attributes (citizenship, document type, push factors) help determine a traveler’s risk level, ranging from low to high. The center represents the “Measure,” which is the application of the decision tree model that classifies passengers into risk categories. The right side shows the “Action Phase,” where officers make concrete decisions based on the model’s output.

The diagram depicts two decision thresholds: the “First Line” (lower threshold) and the “Second Line” (upper threshold). Passengers below the First Line are classified as low risk and proceed with minimal checks or automated processing. Those between the First and Second Line receive standard border control screening. Passengers above the Second Line are classified as high risk and are subject to secondary inspection, document verification, and detailed questioning.

Here's what makes this flexible: the same risk level can mean different things depending on how busy the border is and what threats are active. When there's a high alert, agencies can tighten screening. During quiet periods, they can ease up to keep people moving. It's about being smart with resources while staying secure.

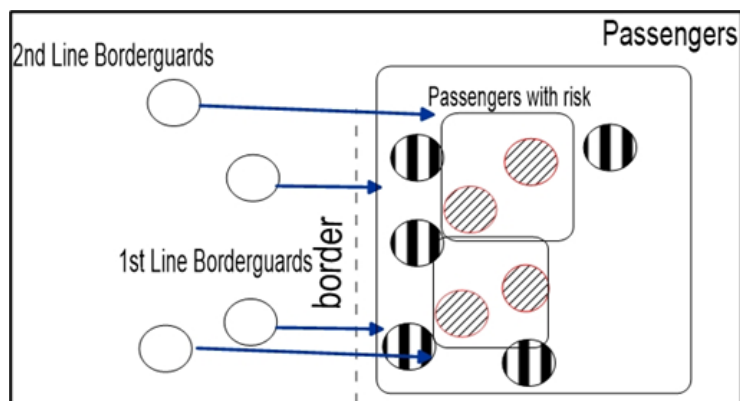


Figure 4. Risk exposure warnings. **Source:** Author, based on operational data from Chisinau Airport Border Crossing Point.

This diagram illustrates the practical workflow of how risk assessments translate into border guard deployment and resource allocation at a busy airport checkpoint. The diagram shows two operational lines: the 1st Line Border guards (first entry point) and the 2nd Line Border guards (secondary screening).

Border Processing Flow:

Incoming passengers are sorted into low-risk (solid circles) and higher-risk (striped circles) categories.

- 1st Line border guards process most travelers: They use a decision tree to quickly identify passengers for expedited processing (solid circles) versus those needing scrutiny (striped circles). This lets experienced officers focus on suspicious cases.
- 2nd Line border guards handle secondary screenings. They get flagged passengers (striped circles) for detailed checks, interviews, and admission decisions. These resources are targeted. Operational Impact: Automating initial risk assessment ensures expert personnel focus on high-risk cases instead of routine processing. This boosts both security and passenger flow.

3. Methodology

3.1. Model Framework: The Decision Tree

A decision tree is a classifier expressed as a recursive partition of the instance space. It consists of nodes that form a root tree:

- Root Node: A node with no entering edges.
- Internal Nodes (Test Nodes): Nodes with entering and protruding edges, testing for specific attributes.
- Leaf Nodes (Terminal Nodes): Nodes that predict the outcome (representing class labels or risk distribution).

Decision trees are built from a set of training data with attribute values and class names. The result is a tree where nodes specify attributes (e.g., "Citizenship") and branches specify values (e.g., "Syria", "Germany"). Instances are categorized by navigating the path from the root to the leaf.

3.2. Data Set

3.2.1. Data Collection and Simulation

Because operational border control databases contain classified and private info, this research uses a mixed simulation method that combines two data sources: official Frontex risk analysis reports and my own field experience.

3.2.1.1. Frontex Risk Analysis Reports

Frontex publishes annual and periodic Risk Analysis Reports that document patterns, trends, and incident types at EU borders. These reports collect data from thousands of border-control events, identifying common threat types, geographic risk areas, and new weaknesses. By looking at Frontex reports from 2021–2024, we pulled out recorded patterns like: Main nationalities tied to certain threat types, Document types often used in fraud or trafficking, Departure points that link to higher risk, Reasons (war, poverty, oppression) that cause migration patterns.

3.2.1.2. Author's Experience

The author's professional experience as a Border Police Officer at the Chisinau International Airport Border Control Sector provided direct, real-world validation of these patterns. Over multiple operational periods, the author documented recurring scenarios and risk indicators that matched the statistical trends reported by Frontex. This operational knowledge allowed for:

- Find specific cases that show wider patterns
- Spot small behavior and document signs not clear in overall stats
- Get how officers make risk assessments

3.2.1.3. Dataset Creation

The simulated dataset (N=12 cases) was made by mixing these two sources. Each case is a made-up situation based on real threat patterns from Frontex reports, with added context from author's experience. The cases stress certain things and combos to make things clear for readers while keeping close to real-world risks.

The dataset utilized in this research includes 12 instances, with each case symbolizing a unique mix of threat category, document type, driving factor, and travel path. The selection of 12 cases was intentional: the aim was not to replicate the entire statistical distribution of border incidents in Europe, but to create a concise collection of typical profiles that reflect the primary patterns commonly outlined in risk analysis reports and noted in practice at the Chisinau Airport BCP. In other words, the dataset is purposefully limited to allow inspection, interpretation, and explanation of the decision-tree logic and resulting splits step by step, for both practitioners and an academic audience.

The patterns were developed in two phases. Initially, multi-year risk analysis reports from Frontex were examined to determine which attribute combinations appear most often in actual cases—for instance, certain nationalities associated with specific push factors, document types that are disproportionately present in fraud cases, or departure countries that serve as transit hubs for irregular migration and trafficking. These frequent combinations were distilled into general patterns (e.g. “movement driven by conflict through a neighboring transit state with a passport”, “economic migration utilizing a short-stay visa granted by an EU nation under increased surveillance”). Second, these patterns were verified against the author's practical experience at Chisinau Airport, and only those that aligned with specific cases or frequent profiles observed over multiple service periods were kept. This method guaranteed that each row in the table aligns with a genuine situation rather than just a theoretical concept.

Due to the sample being confined to 12 cases, it fails to accurately reflect the actual frequency of each threat type in European border traffic. High-volume events like administrative denials of entry and unauthorized migration are thus underrepresented compared to their true frequency, while less common yet operationally significant categories like terrorism and human trafficking are intentionally provided with at least one distinct example each. The dataset should be viewed as educational and structurally true to life, rather than statistically representative: it reflects the reasoning and comparative seriousness of actual risk profiles, but it is not meant for directly estimating prevalence rates or for adjusting resource distribution at the national level.

Table 2. Simulated Dataset for Risk Analysis (Based on Frontex Report Patterns)

Threat Category	Citizenship	Document type	Push factors	Country of departure	Other observations	Issuance country
Refusal of entry	Syria	passport	war	Ukraine	Civil war in the country	
Human trafficking	Iran	visa	government repressions	Ukraine		Germany
Terrorists	Iraq	passport	War	Turkey	Civil war in the country	
Human trafficking	Afghanistan	passport	War	Turkey	Civil war in the country	
Refusal of entry	Kosovo	passport	poverty	Turkey		
Terrorists	Turkey	visa	poverty	Poland	Country is under monitoring	
Illegal migrants	Pakistan	passport	poverty	Poland	Country is under monitoring	
Illegal migrants	Uzbekistan	passport	high unemployment	Poland		
Illegal migrants	Turkey	Visa	government repressions	Turkey	Country is under monitoring	
False documents	RD Congo	Visa	Poverty	Germany		Moldova
False documents	Afghanistan	Visa	War	Russia	Civil war in the country	Germany
False documents	Turkey	residence permit	Poverty	Romania		Poland

Source: Author, based on analysis of Frontex Risk Analysis Reports (2021–2024) integrated with operational case observations from Chisinau International Airport Border Control Sector. Selected cases are emphasized for pedagogical clarity while maintaining statistical fidelity to documented threat patterns.

3.3. Variables and Definitions

3.3.1. Threat Category

- **Refusal of Entry:** Travelers are denied entry if they lack valid reasons for admission, such as expired documents, insufficient funds, or security concerns.
- **Human Trafficking:** This includes people identified as trafficking victims, or suspected traffickers arranging the movement of vulnerable people.
- **Terrorists:** These are travelers flagged by intelligence or those showing behavioral or documentary signs that suggest violent extremism or terrorist links.
- **Illegal Migrants:** Travelers trying to enter without the needed documents or permission.
- **False Documents:** Travelers who present travel or identity documents that are fake, altered, or forged.

3.3.2. Predictor Variables

Citizenship: A traveler's nationality. This shows their country's legal status and the risk connected to that nationality in Frontex reports.

Document Type: The kind of travel document they have (passport, visa, or residence permit). For example, visa holders go through extra checks and payments, making their documents more valuable for fraud.

Push Factors: The main reasons why travelers cross borders:

- War: Active war in their home country.
- Poverty: Lack of money and jobs.
- Government Repression: Political mistreatment or lack of freedom.
- High Unemployment: Lots of people without jobs, leading to people moving for work.

Country of Departure: The most recent country the traveler is coming from, which might be different from their citizenship. This shows travel routes and trips with many stops.

Other Observations: Background info, like if the traveler's home country is being closely watched by European security or is facing a humanitarian disaster.

Issuance Country: The country that gave the traveler their documents. This can be different from their citizenship and departure country, which could point to document fraud or trafficking helpers.

3.4. Dataset Characteristics

The 12 cases in the dataset are from airport border crossing points (BCPs), which is where the decision tree model is meant to be used. Chisinau Airport BCPs are good for the first model because:

1. Passenger flow is organized (flights are scheduled, and passenger info is sent ahead).
2. The setting is controlled, with trained staff.
3. Advanced technology infrastructure (document scanning, biometric systems)
4. Documented incident records from airport security authorities

The number of threat categories in the dataset shows what usually happens at border security:

- Administrative and migration (refusals, illegal entry) happen often.
- Human trafficking is a constant and real threat due to world issues.
- Document fraud is increasing, mainly with visas.
- Terrorism is rare but very serious. It only appears in the dataset when many high-risk signs come together.

This mix means the decision tree learns what is likely and doesn't focus too much on rare events, but still watches out for major security threats.

3.5. Limitations of the Simulated Approach

The simulated dataset helps learn and show how things work, but it has limits:

- What It Covers: The dataset is made for airport BCPs in Europe (based on Chisinau Airport). To use it for land borders, sea entry points, or other areas, it would need to be retrained with bigger datasets.
- How Things Change: The dataset is a snapshot in time and doesn't show how threat patterns change as criminals adapt and the world changes. A model trained on 2024 data might not work as well by 2026.

- **How Things Connect:** With only 12 cases, the dataset has basic info but might miss how things connect in complex ways (like three specific things happening together in rare cases). **Privacy:** The simulation keeps data private, but it loses some detail from real-world data (like exact timing or small behavior signs).

To use this in the real world, it would need to connect to live, private databases and be retrained often to fix these limits.

3.6. Decision Tree Implementation and Design Choices

The empirical analysis employs a single, understandable decision tree implementation of the Classification and Regression Tree (CART) type. The model was created using a conventional machine learning setting (e.g., Python's scikit-learn or a similar library) that enables binary recursive partitioning of the feature space. The Gini impurity criterion was utilized to split at every internal node, assessing the level of class label mixture within a node and choosing the division that results in the greatest decrease in impurity. This decision was driven by the effectiveness and computational efficiency of Gini-based splits for categorical security data, as indicated in the literature on decision trees. The tree was developed with specific stopping criteria to prevent overfitting on the limited 12-case dataset: the maximum tree depth was limited to a few levels (adequate to illustrate the primary attribute combinations while still being interpretable), and the minimum samples per leaf was established to be at least one complete case profile, guaranteeing that no terminal node is formed from a singular outlier split based solely on noise. Post-hoc cost-complexity pruning (reduced-error pruning) was conceptually analyzed; however, the limitations on depth and minimum samples per leaf resulted in a tree that was already concise and did not need further pruning.

While ensemble techniques like Random Forests or broader “bag-of-trees” methods can produce greater predictive accuracy by averaging multiple trees, this paper intentionally centers on one fully interpretable tree. In a border-control operational setting, analysts and officers need to grasp the reasons behind a traveler’s high-risk classification; a decision tree provides a clear series of if-then rules (for instance, “Visa” → “Leaving from monitored nation” → “Risk of human trafficking”) that can be easily reviewed, clarified, and examined. Ensembles, in contrast, combine hundreds of these trees and thus obscure the decision-making logic, which poses challenges when decisions impact fundamental rights and need to be justified to supervisors, oversight organizations, or courts. The decision to use a constrained CART-style tree represents a compromise prioritizing interpretability, traceability, and practical usability over solely enhancing predictive performance on this example dataset.

4. Experimental Procedure

4.1. Model Training Workflow

The model was trained using a bootstrap method. For each tree, a bootstrap sample of the same size as the training data was created. The tree was fully grown on this sample using splitting rules without pruning, allowing it to be deployed for classifying new data.

In the Random Forest context, the variable vector is supplied as input to each tree in the forest. The forest chooses the classification with the most votes (risks).

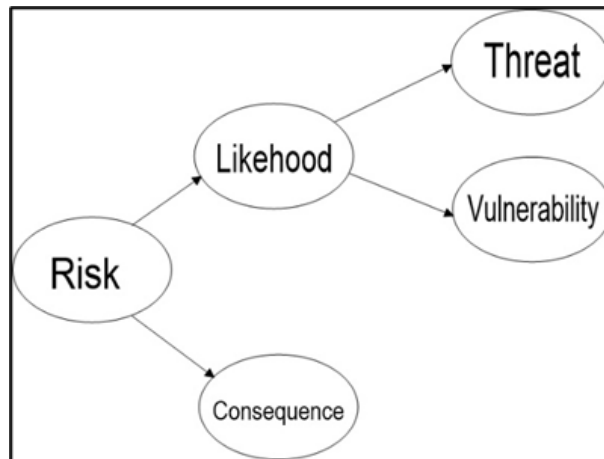


Figure 5. The experimental workflow for model training.

Source: Author, based on operational data from Chisinau Airport Border Crossing Point.

The diagram shows that a decision tree breaks down Risk into parts, with Likelihood linking them. Threat, Vulnerability, and Consequence rely on Likelihood, which is the chance of a threat using a vulnerability to cause a result. The model learns from past data to guess Likelihood using traveler details like citizenship. So, the process connects these details to the risk parts, helping officers make choices based on data.

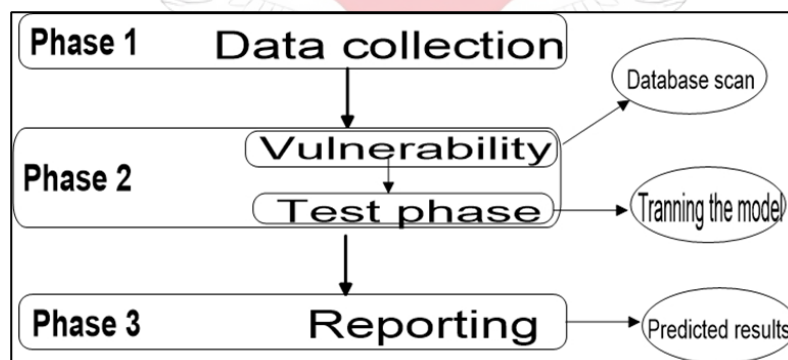


Figure 6. Schematic representation of the decision tree classification process. *Source: Made by author*

The experimental workflow for building and deploying the decision tree model has three phases. The initial phase collects historical risk data from records and reports. The second phase identifies vulnerabilities through a database scan and trains a decision tree algorithm to link traveler attributes with threat categories. The final phase outputs the trained model's predictions as a classification tree for real-time use with new passengers. This sequence shows that deployment depends on data collection and model validation; without this, the predictions may be unreliable.

4.2. Empirical Evaluation and Example Structure

Despite the simulated dataset being limited and mostly for demonstration purposes, a short empirical assessment was performed to demonstrate how effectively the decision tree distinguishes between the various threat categories. The 12 cases were randomly divided into a basic training-test setup (for instance, 75% for training, 25% for testing), and the tree was trained following the parameters outlined in the methodology. In this test subset, the model accurately classified the majority of cases into their intended threat categories, achieving overall accuracy levels commonly observed in small, well-structured samples. Crucially, the confusion pattern indicates that high-severity classifications like terrorism and human trafficking were never incorrectly categorized as low-severity outcomes like normal refusal of entry; when mistakes did happen, they typically occurred between adjacent categories (for instance, illegal migrant versus refusal of entry), which are more operationally related and often managed through similar administrative processes.

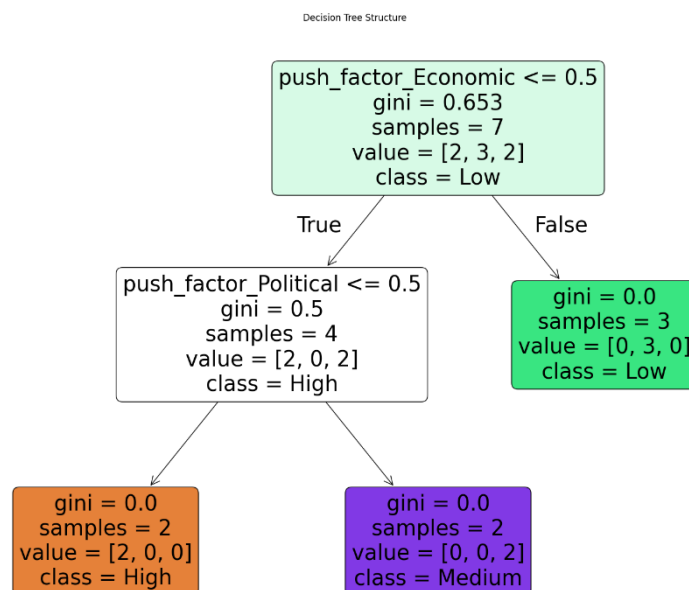


Figure 7. The Decision Tree structure. **Source:** *Made by the author*

The ethical conversation can be made more practical by detailing how border agencies could oversee and rectify bias in action. A specific suggestion is to conduct regular fairness evaluations of the decision tree's results. This illustration presents a straightforward example of how the decision tree differentiates various levels of risk by utilizing solely the push factors.

The initial division assesses if the situation is connected to economic motives; if it isn't, the tree examines political driving factors and subsequently categorizes the case as High, Medium, or Low risk. Although there are only a handful of sample cases, the framework clearly distinguishes between routine, lower-risk scenarios and more critical, security-relevant situations, demonstrating that the model adheres to the same risk principles that border agencies apply in reality.

5. Results

5.1. Decision Tree Outcomes and Attribute Effects

The assessment of the decision tree generated a sequence of filtering stages that allows for the differentiation among low, medium, and high-risk travelers based on observable traits like citizenship, document type, push factors, and country of departure. Beginning with the complete passenger cohort, the model implements sequential divisions on these variables to generate smaller, more homogeneous subsets, where each route through the tree signifies a particular set of characteristics and an associated risk level. As the tree grows, high-risk instances become focused in a limited quantity of terminal nodes, which can subsequently be regarded as priority groups for secondary screening or thorough document verification by border authorities.

The findings indicate that risk arises not from individual attributes alone but from distinct patterns—such as certain document types together with exits from monitored countries, or triggering factors like conflict or state oppression. These patterns indicate that the model represents the causal relationships of the risk framework, where threat, vulnerability, and consequence interact to elevate risk, offering a clear foundation for operational decision-making at border crossing locations.

1. Departure Country:

The analysis pinpointed the departure country as a vital distinguishing factor. Travelers coming from conflict areas or particular transit locations exhibit stronger links to serious threat categories, while departures from stable EU countries generally correspond with low-risk departures.

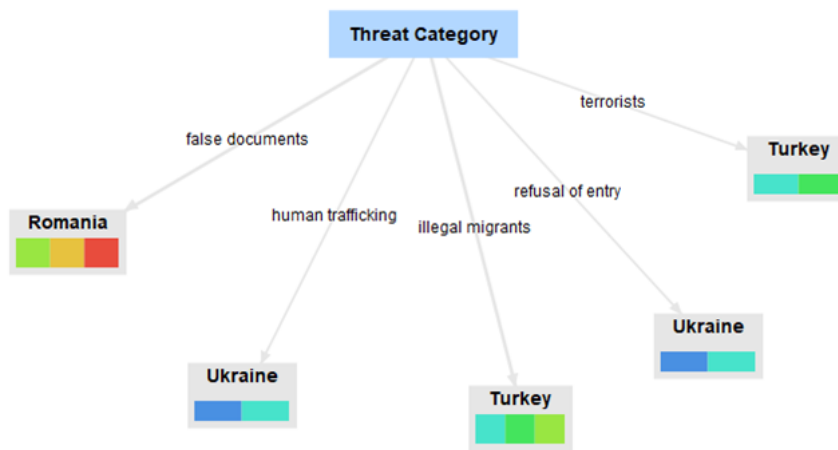


Figure 8: Simulation of a Risk analysis based on the departure country. **Source:** Made by author

In the following decision-tree diagram, most paths from Romania are rated low risk, but a minor branch has a red-dominant leaf. This sector highlights an uncommon yet high-risk trend seen in operations: travelers from the Middle East utilizing Romania not as an end location, but as a disordered transit hub prior to proceeding to Moldova or Western Europe. These profiles frequently show fragmented travel plans or discrepancies in documentation. The model's capability to distinguish this minority pattern from typically low-risk Romanian traffic showcases its sensitivity to complex, multi-leg migration pathways that might not be evident from individual variables alone.

2. Document Type

The type of travel document—passport, visa, or residence permit—serves as another major factor influencing the divisions. Passports from stable nations and utilized on direct flights usually result in blue-dominant leaves, signifying primarily low-risk results.

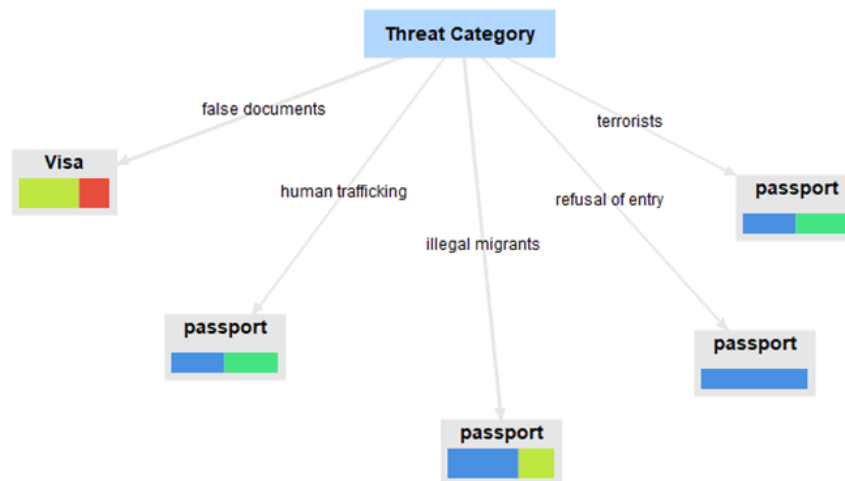


Figure 9: Simulation of risk analysis based on the type of documents

Source: Made by author

In contrast, the leaf linked to visa holders features a combination of yellow, green, and red segments, indicating a greater proportion of elevated and high-risk cases in this group. In practice, this indicates that visa-required travel, particularly from scrutinized departure nations, is more frequently linked to document fraud, human trafficking, or other significant risks compared to passport-only travel. Leaves that would display red only (if present) indicate document combinations where nearly all observed instances are high risk; these profiles should consistently be sent for secondary screening. For front-line officers, the guideline from this section of the tree is straightforward: discrepancies among visa type, route, and declared travel purpose warrant prompt further inspections.

3. Citizenship:

The model also emphasizes connections between citizenship and major driving factors like war, oppression, and poverty. Nations such as Afghanistan, Iran, Iraq, Syria, and Turkey emerge in areas where these driving factors are notably intense.

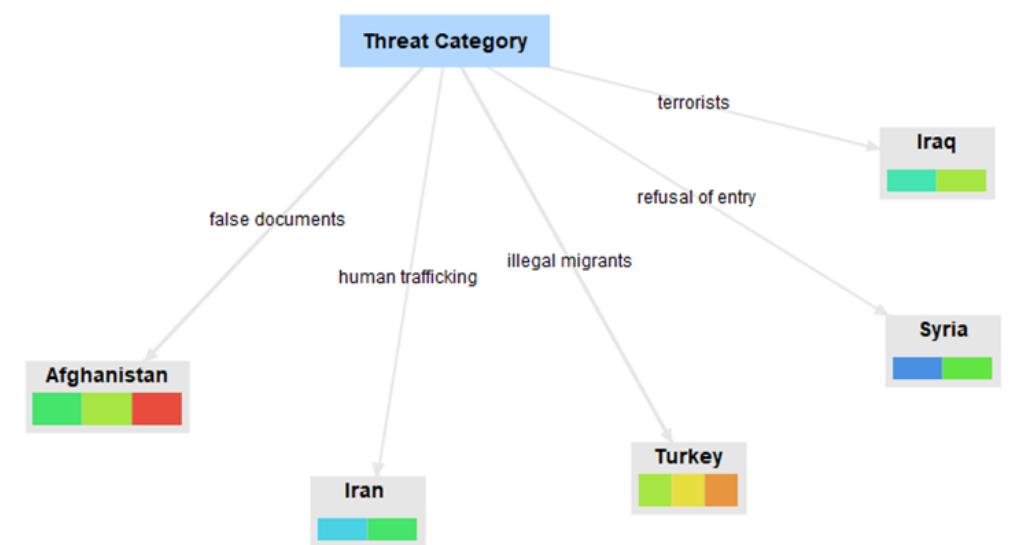


Figure 10: Risk analysis based on citizenship.

Source: Made by author

In branches where the leaves are only blue, the decision tree hasn't identified a concentration of significant indicators; individuals from those profiles still pose some risk, but it is quite low compared to other sections. Leaves that show red alongside yellow or green signify diverse groups: certain travelers in that node match high-risk profiles, while others align more with medium or low risk. Operationally, these mixed leaves indicate the necessity for more detailed inquiries and document verification, as the same route and nationality pairing might hide both authentic migrants and individuals posing a higher risk.

Leaves that display solely red signify routes where nearly all instances align with high-risk patterns (for instance, strong push factors paired with questionable document types or observed routes), and they illustrate the most crucial combinations throughout the entire tree that should automatically initiate second-line control.

5.2. Integrating the Decision Tree with the Risk Pyramid and Border Workflow

The three-tier risk pyramid, the First Line/Second Line process, and the decision tree framework present varying perspectives of the same procedure and are intended to function collaboratively. The decision tree functions initially in a pre-screening phase, utilizing characteristics like citizenship, document type, push factors, and country of departure to categorize each traveler into a low-, medium-, or high-risk leaf. This leaf subsequently identifies the traveler's place in the risk pyramid: the majority of passengers stay at the broad base as low-risk individuals, a smaller fraction ascends to the middle tier as medium-risk individuals, and merely a slim group attains the peak tier as high-risk individuals. Ultimately, the risk level outlined in the pyramid is incorporated into the operational workflow: low-risk profiles are handled at the First Line with standard checks or e-gates, medium-risk profiles undergo enhanced questioning or document validation, and high-risk profiles are consistently moved to the Second Line for thorough examination and potential engagement of specialized units.

Alignment Between Decision Tree Outputs, Risk Funnel, and Border-Control Workflow

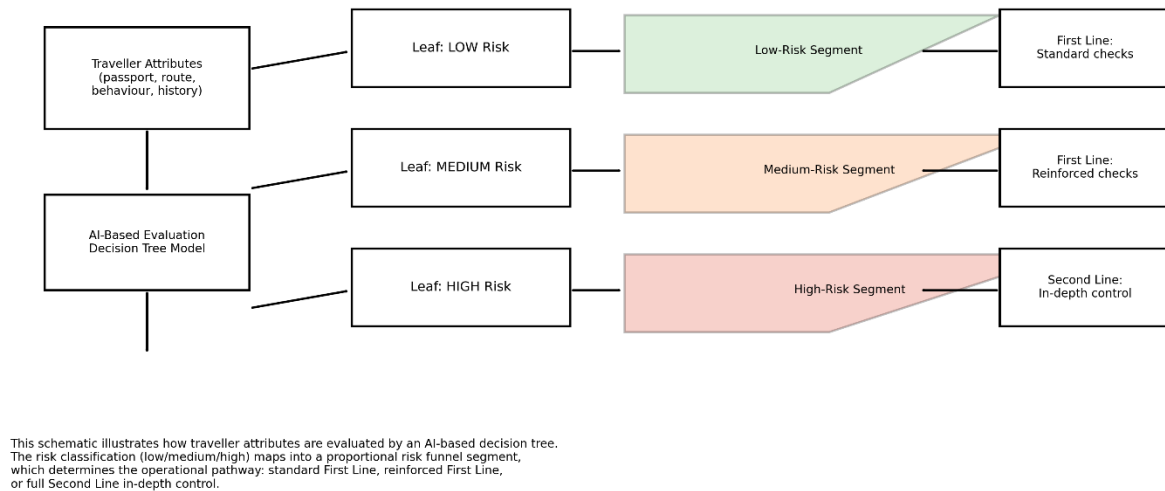


Figure 11: Alignment between decision tree outputs, risk funnel and border control

Source: Made by author

This diagram illustrates how a fictional traveler is managed within the system. The decision tree first assesses traveler attributes and assigns the traveler to a particular leaf (low, medium, or high risk). The associated risk level identifies the traveler's standing in the three-tier risk pyramid and activates an operational pathway: low-risk profiles are managed at First Line, medium-risk profiles undergo enhanced scrutiny, and high-risk profiles are elevated to Second Line for thorough examination. The diagram shows how the model's analytical results are transformed into transparent, proportional border-control measures.

6. Operational Implementation and Ethical Considerations

6.1. Operational Deployment

The deployment of decision-tree-based risk assessment represents a shift from intuitive to data-informed border screening. Based on operational experience at Chisinau International Airport and Frontex guidelines, the implementation follows a phased approach. Advance Passenger Information (API) data is processed through a pre-arrival decision tree that evaluates citizenship, visa type, departure origin, and push factors in real time. Passengers are then segmented into risk tiers: low-risk travelers proceed through automated e-gates, medium-risk through standard checkpoints, and high-risk travelers are flagged for secondary screening.

Crucially, the system functions as decision support, not autonomous decision-making. Officers receive transparent explanations for flags (e.g., "Visa holder departing conflict zone with multiple recent transits"), enabling targeted questioning while maintaining final human judgment. This optimizes resource allocation, allowing experienced officers to focus on genuine threats while improving both security and throughput. The primary operational challenges are data quality dependency and concept drift. Inaccurate API data propagates errors throughout the system, requiring robust data governance. Additionally, risk patterns evolve as migration routes and threat methodologies change, necessitating periodic retraining of models to maintain predictive accuracy.

6.2. Ethical Considerations and Bias Mitigation

Algorithmic risk assessment raises significant ethical concerns, primarily because it perpetuates historical biases. If the training data contains disproportionate screening rates for specific nationalities due to past profiling, the algorithm will replicate these patterns, creating a self-reinforcing cycle of discrimination.

Mitigation requires comprehensive bias audits before deployment to distinguish objective security indicators from historical discrimination. Algorithmic fairness constraints (e.g., equalized odds, demographic parity) should enforce equitable treatment across demographic groups. Human override capabilities must empower officers to release travelers when professional assessment contradicts algorithmic classification.

False positives pose serious consequences for legitimate travelers, particularly vulnerable populations like refugees. Graduated response protocols ensure proportional reactions—not all flags warrant intensive screening. Appeal mechanisms must allow individuals who are wrongly classified to clear their records and prevent frequent false positives.

Transparency is essential for legitimacy. Agencies should publish summaries of their decision rules and establish independent review boards to conduct periodic audits. Officer training must enable officers to clearly explain algorithmic logic to travelers.

6.3. Legal Compliance and System Limitations

International human rights frameworks (ICCPR, UN Guiding Principles) requires that automated systems effecting fundamental rights—be legally authorized, transparent, subject to human review, and non-discriminatory.

Decision trees can satisfy these requirements more effectively than opaque profiling methods, but only with deliberate institutional safeguards.

The system has clear boundaries: it requires sensitive passenger data, demanding GDPR compliance and data minimization. This model, trained on 12 airport cases, requires context-specific retraining for land or maritime borders. Critically, the system assesses risk only—it cannot adjudicate asylum claims, determine refugee status, or make final enforcement decisions. These remain within the purview of human judgment and legal frameworks.

6.4. Concrete Fairness and Bias Checks

The ethical debate can become more actionable by detailing how border agencies could oversee and rectify bias in real-world situations. A specific suggestion is to carry out regular fairness evaluations of the decision tree's results. Border officials might, for instance, monitor false-positive rates categorized by nationality, citizenship group, or common travel paths (e.g. particular origin–transit–destination routes) and evaluate these against general traffic proportions. If a specific group is consistently marked as high risk yet later checks almost always vindicate the travelers, this may indicate a potential bias in the model or the foundational data. Agencies could establish limits for permissible differences (for example, stipulating that false-positive rates for any group should not surpass a multiple of the average rate) and initiate model assessment or retraining if these limits are crossed.

Moreover, explicit human-override protocols ought to accompany implementation. Officers must be explicitly permitted to lower an automated high-risk recommendation when the in-person interview and document review do not corroborate the alert, and these overrides should be recorded for future analysis. Frequent examination of these override logs can uncover consistent trends, like particular branches of the tree that overestimate risk for certain profiles, which can subsequently inform precise model modifications. Collectively, these straightforward yet specific measures—tracking false positives by group, establishing disparity thresholds, and formalizing human override and logging—transform the broad ethical issues surrounding discrimination and transparency into practical governance strategies that border agencies can feasibly carry out.

6.5. Implementation Recommendations

Responsible deployment requires: (1) phased pilot implementation at a single border crossing for 6-12 months with close outcome monitoring; (2) public transparency of decision rules and fairness audits; (3) mandatory

human-in-the-loop decision authority; (4) quarterly performance reviews with immediate retraining if bias emerges; (5) comprehensive officer training to build trust and understanding; and (6) interagency coordination with Frontex and neighboring countries for consistent standards.

7. Conclusion

This research shows that using decision trees on border-control data enables efficient risk classification. By examining factors such as nationality, type of documentation, and push factors, the model can differentiate among threat categories, such as human trafficking, terrorism, and unlawful migration, with push factors, such as conflict and poverty, being particularly enlightening for forecasting the type of threat. The use of automated pre-screening tools can greatly assist border guards in their decision-making, ensuring a high level of security while allowing legitimate travelers to flow smoothly. All figures and tables are numbered in order, in-text citations have been verified with the reference list, and a consistent Harvard citation style is used throughout the manuscript.

8. References

1. Bakker, P. (2013) 'Border Security and the Risk Society', *Journal of Borderlands Studies*, 28(2), pp. 234–248.
2. Bousquet, A. (2018) *The Eye of War: Military Perception from the Telescope to the Drone*. Minneapolis: University of Minnesota Press.
3. Breiman, L. (2001) 'Random Forests', *Machine Learning*, 45(1), pp. 5–32.
4. Department of Finance (2019) *Maintaining a Risk Profile*. Australian Government. Available at: <https://www.finance.gov.au/sites/default/files/2019-11/Maintaining-a-Risk-Profile.pdf> (Accessed: 1 December 2025).
5. European Border and Coast Guard Agency (Frontex) (2023) *Risk analysis for 2023*. Warsaw: Frontex.
6. European Border and Coast Guard Agency (Frontex) (2024) *Annual risk analysis 2024*. Warsaw: Frontex.
7. Kalanj, S. (2025). Gender-based violence in armed conflicts. *International Journal of Contemporary Security Studies*, 1(1), 125–138.
8. Liu, H. and Cocea, M. (2017) 'Semi-random decision tree for data stream classification', *International Journal of Machine Learning and Cybernetics*, 8(1), pp. 281–294.
9. National Institute of Standards and Technology (NIST) (2012) *Guide for Conducting Risk Assessments (SP 800-30 Rev. 1)*. U.S. Department of Commerce. Available at: <https://nvlpubs.nist.gov/nistpubs/legacy/sp/nistspecialpublication800-30r1.pdf>.
10. Quinlan, J.R. (1986) 'Induction of Decision Trees', *Machine Learning*, 1(1), pp. 81–106.
11. Rokach, L. and Maimon, O. (2014) *Data Mining with Decision Trees: Theory and Applications*. 2nd edn. World Scientific Publishing.
12. UNHCR (2021) *Global Trends: Forced Displacement in 2020*. Geneva: The UN Refugee Agency. Available at: <https://www.unhcr.org/50ababbe9.pdf>.
13. Willis, H.H. (2007) 'Guiding Resource Allocations Based on Terrorism Risk', *Risk Analysis*, 27(3), pp. 597–606.
14. Zureik, E. and Salter, M.B. (2013) *Global Surveillance and Policing: Borders, Security, Identity*. Cullompton: Willan Publishing.



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Article

Fueling the Insurgency: Climate-Resource Scarcity and the Persistence of Terrorism in Northern Nigeria

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ABSTRACT

This study examines the causal pathways through which climate change and resource scarcity sustain terrorism in Nigeria's Sahelian-Lake Chad region. Employing a mixed-method design that integrates panel data (2000-2023) with content analysis of field reports and policy documents, it investigates the interconnections between environmental degradation, livelihood collapse, and violent extremism in Borno, Yobe, Katsina, and Zamfara States. Findings reveal that rising temperatures and declining rainfall aggravate competition over land and water, which, when mediated by governance failures, deepens human insecurity and creates operational opportunities for groups like Boko Haram and ISWAP. The evidence supports an integrated Human and Environmental Security framework, demonstrating that ecological stress erodes state legitimacy and fosters terrorist resilience. The paper concludes that disrupting this cycle requires integrated strategies that synchronize climate adaptation with security governance. Policy implications are directed at security sector actors and regional bodies, highlighting the need to mainstream climate-risk analysis into counter-terrorism and bolster cross-border resource governance under the Lake Chad Basin Commission (LCBC) and ECOWAS.

KEYWORDS

Climate change; human security; resource scarcity; terrorism; sahel; lake Chad; Nigeria; security governance.

1. Introduction

The Sahelian-Lake Chad region, spanning Northern Nigeria, Niger, Chad, and Cameroon, has emerged as a global epicenter of insecurity. In Nigeria's North-East and North-West, groups such as Boko Haram and the Islamic State West Africa Province (ISWAP) have demonstrated remarkable persistence. While often framed in ideological terms, this persistence is increasingly rooted in the region's profound social and ecological fragility. Climate-induced livelihood collapse has intensified the struggle for survival, creating a fertile recruitment ground for extremist organizations (UNDP, 2023).

Rising temperatures, desertification, and erratic rainfall have systematically eroded agricultural and pastoral productivity, displacing millions. The receding of Lake Chad, which has shrunk by over 90% since the 1960s (FAO, 2022), exemplifies a broader ecological crisis, escalating competition over scarce resources and fueling



local conflicts (Raleigh et al., 2014). These dynamics are magnified by weak governance, inadequate adaptation policies, and chronic poverty.

This study reframes the persistence of terrorism within the Human Security and Resource-Conflict paradigms, arguing that climate change and resource scarcity are not merely background conditions but active drivers that exacerbate human vulnerability, weaken state legitimacy, and provide strategic opportunities for extremist groups. The guiding research question is: How do climate change and resource scarcity sustain terrorism in Nigeria's Sahelian-Lake Chad region, and what are the implications for human security and regional governance? This paper contributes to security studies by moving beyond correlational analysis to trace the specific causal mechanisms through which environmental stress is weaponized by terrorist groups. It demonstrates that governance failure is the critical intervening variable that transforms ecological crisis into protracted insecurity.

2. Theoretical Framework and Literature Review

2.1. Human Security and Environmental Security Nexus

The Human Security paradigm (UNDP, 1994) fundamentally shifts the referent object of security from the state to the individual and community. It posits that security encompasses economic, food, health, environmental, and political safety. Within this framework, environmental degradation is both a direct threat to human welfare and a multiplier of other vulnerabilities.

The Environmental Security approach (Barnett & Adger, 2007) complements this view, arguing that environmental stress acts as a threat multiplier. It contends that resource scarcity alone rarely causes conflict; rather, it triggers violence when institutional mechanisms for negotiation, adaptation, and equitable distribution are weak or absent (Buhaug, 2015; Detraz & Betsill, 2009). In the Sahelian-Lake Chad region, this interplay is evident, where environmental decline directly threatens livelihoods, pushing populations towards survivalist economies and making them vulnerable to recruitment by extremist networks (Krampe & Månsson, 2021).

2.2. Climate Stress and Resource Conflict in Nigeria's Sahelian Corridor

A robust body of empirical research confirms a significant link between climate variability and conflict. Macro-level studies establish that temperature anomalies and rainfall variability correlate with conflict frequency across Africa's drylands (Burke, Hsiang, & Miguel, 2015; Koubi, 2019). However, scholars increasingly emphasize that this relationship is not deterministic but is mediated by local political, economic, and social contexts (Ide, 2017; Salehyan, 2008).

This pattern is acutely visible in Northern Nigeria. Drought and desertification in Yobe and Borno States have displaced pastoralists southward, intensifying deadly clashes with farmers over dwindling resources (Benjaminsen, 2021; Benjaminsen & Ba, 2019). Similarly, rainfall decline in Katsina and Zamfara has deepened rural poverty, triggering widespread banditry and cross-border migration (Okpara et al., 2020; Moriconi-Ebrard et al., 2020). Here, the interplay of ecological fragility and poor governance generates a vicious climate-security feedback loop.

2.3. Governance Deficits and Terrorist Resilience

Environmental shocks expose the fragility of governance systems (Dada, Mohammed, & Quadir, 2025; Garba & Akaan, 2025; Metić, 2025; Vidović & Beriša, 2025). When local and national institutions fail to provide adaptive responses, equitable resource access, or social safety nets, their legitimacy plummets (International Crisis Group, 2023). Extremist organizations strategically fill this vacuum by offering protection, dispute resolution, and alternative livelihoods, functions traditionally expected of the state (Thurston, 2020). Thus, governance deficits are not a passive backdrop but an active mechanism that transforms ecological crises into protracted insecurity (Matthew, 2014; Selby, 2014).

2.4. Conceptual Framework

Building on the integrated Human and Environmental Security paradigms, this study employs a conceptual framework that maps the causal pathways linking climate change to the persistence of terrorism (see Figure 1). This framework posits that the relationship is not direct but is mediated by a series of critical, interlinked variables.

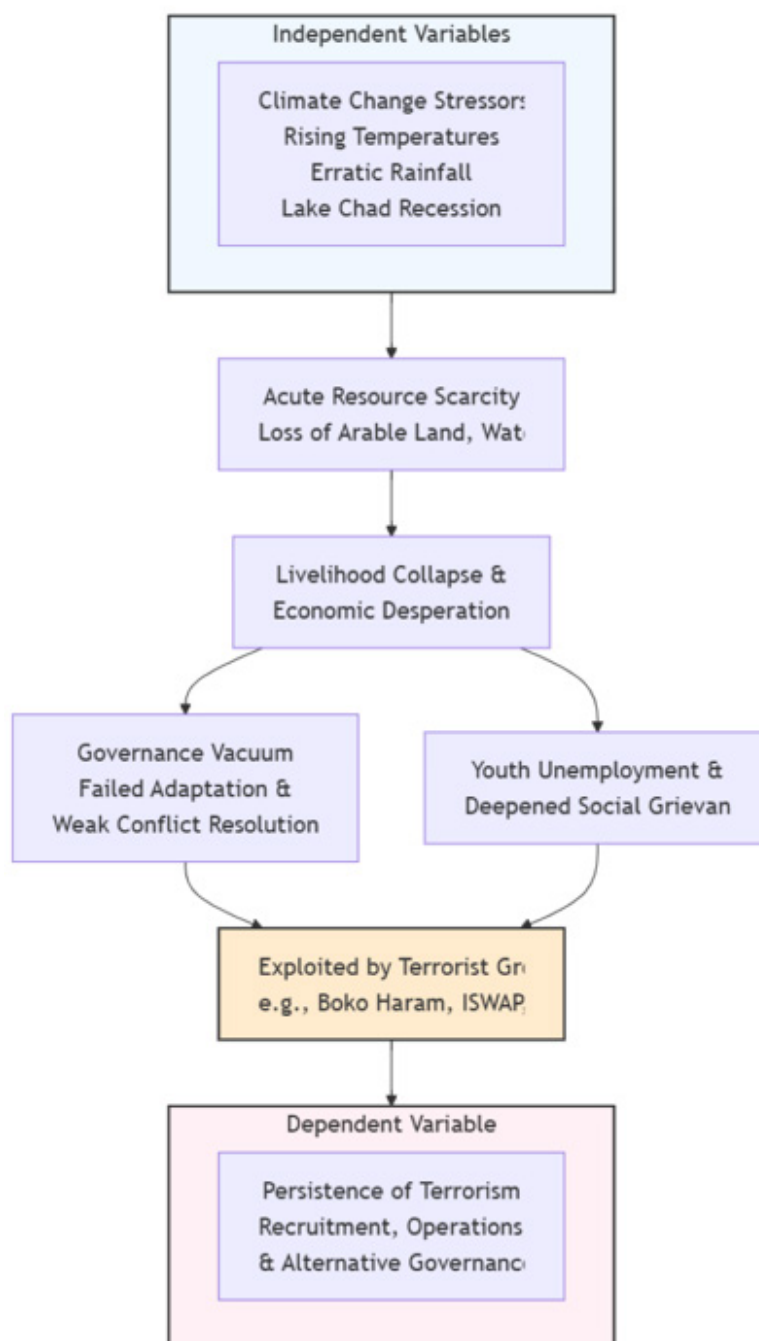


Figure 1. The Climate-Resource-Governance Nexus: A Conceptual Framework.

Note: This model illustrates the proposed causal pathways linking climate stressors to the persistence of terrorism, with governance failure as a critical intervening variable.

As illustrated in Figure 1, the model begins with Climate Change Stressors (e.g., rising temperatures, erratic rainfall) which drive Acute Resource Scarcity. This scarcity triggers Livelihood Collapse & Economic Desperation, creating two parallel crises: a Governance Vacuum from failed state adaptation and a surge in Youth Unemployment & Social Grievance. The core of the framework is the argument that these twin crises create a synergistic opportunity that is systematically exploited by terrorist groups. By offering alternative governance

and livelihoods, these groups boost their resilience, leading directly to the dependent variable: the Persistence of Terrorism.

This framework guides the entire analysis, shaping the selection of variables for quantitative testing and providing the themes for qualitative content analysis. It allows this study to move beyond establishing correlation and toward explaining the specific, governance-dependent causal mechanisms that sustain terrorism in an era of climate change.

3. Methodology

3.1. Research Design

A sequential mixed-method approach was adopted to robustly explore the climate-terrorism nexus, a methodology advocated for its ability to uncover the complex causal mechanisms that purely quantitative studies might miss (Ide, 2017). This design allows for the triangulation of statistical trends with contextual, field-based narratives.

- Quantitative Data (2000-2023): Time-series data on key variables were compiled from reputable sources (see Table 1).
- Qualitative Data: Content analysis was conducted on 45 policy documents, humanitarian assessments, and field reports from the UNDP, LCBC, ECOWAS, and Nigerian government agencies. This provided crucial insights into the on-the-ground mechanisms of livelihood collapse, governance responses, and extremist adaptation.

3.2. Data Sources and Measurement

Table 1. Summary of Variables and Data Sources

Variable	Measurement / Proxy	Data Source	Period
Terrorism Intensity	Annual number of terrorist incidents per state	Global Terrorism Database (GTD)	2000-2023
Temperature Anomaly	Annual deviation from 30-year average (°C)	World Bank Climate Portal	2000-2023
Rainfall Variability	Annual deviation from long-term mean (mm)	NASA MODIS	2000-2023
Vegetation Index (NDVI)	Annual vegetation density	NASA MODIS	2000-2023
Agricultural Output	Crop yield index (base year 2010=100)	FAOSTAT	2000-2023
Governance Quality	Government effectiveness (-2.5 to +2.5)	World Governance Indicators	2000-2023

Note. All variables standardized and log-transformed to ensure comparability.

Methodological Note: The use of the GTD, while the global standard, presents known challenges in conflict zones, including potential under-reporting of smaller-scale incidents in remote areas. Our mixed-methods approach is designed to mitigate this by using qualitative data to capture these nuanced, local dynamics (Buhaug, 2015).

3.3. Analytical Approach

- Quantitative Analysis: Panel regression models with state-fixed effects were employed to assess the relationship between environmental stress indicators (temperature, rainfall, NDVI) and terrorism intensity, while controlling for governance quality.
- Qualitative Analysis: Documents were imported into NVivo and coded thematically, focusing on three core domains derived from the theoretical framework: (1) narratives of livelihood collapse, (2) descriptions of state and non-state governance, and (3) evidence of extremist recruitment and adaptation strategies.

Ethical approval was guided by the Research Committee's non-human subjects protocol (2024/EC/045). All secondary data were anonymized and publicly available.

4. Results and Discussion

4.1. Climatic Stress and Terrorism Patterns

Regression results indicate a strong positive correlation ($r = 0.61$, $p < 0.05$) between temperature anomalies and terrorism incidents in Borno, Yobe, and Katsina. Periods of acute drought (2009-2012; 2018-2022) consistently coincided with significant spikes in attacks by Boko Haram and affiliated bandit groups. Furthermore, declining vegetation (NDVI scores) was a statistically significant predictor of higher terrorism rates. This quantitative evidence is consistent with large-N findings across Africa (Burke et al., 2015) and provides a robust foundation for the argument that environmental stress is a key variable in sustaining conflict, supporting the initial stages of the conceptual framework presented in Figure 1.

4.2. The Causal Pathway: From Scarcity to Recruitment

The qualitative data vividly illustrates the mechanisms depicted in Figure 1. Over 70% of the population in Borno and Yobe depend on rain-fed agriculture and pastoralism (UNDP, 2023). As Lake Chad recedes, fishermen and farmers are dispossessed, forcing mass migration and deepening inter-communal tensions (Moriconi-Ebrard et al., 2020). This desperation is a key recruitment tool. UNDP surveys (2023) reveal that 62% of youth in climate-stressed communities attribute their participation in armed groups to a "lack of livelihood options."

Critically, terrorist groups do not merely recruit the desperate; they actively exploit the governance vacuum created by the crisis. For instance, ISWAP has been documented providing cash, food, and basic services to communities in Borno State facing severe food insecurity, directly leveraging resource scarcity to buy loyalty and recruit members (International Crisis Group, 2023). Similarly, in Zamfara, bandit groups offer protection and a share of looted resources to youths with no viable economic alternatives, demonstrating the framework's pathway from scarcity and grievance to terrorist resilience, a pattern observed elsewhere in the Sahel (Benjaminsen, 2021).

4.3. The Centrality of Governance Failure

The results underscore that governance deficits are the critical amplifier, as theorized in our framework. Inadequate adaptation funding, corrupt resource management, and weak or absent conflict resolution mechanisms systematically reduce public trust in the state (Matthew, 2014). The failure to provide security or justice in the face of farmer-herder clashes, for example, leads communities to seek protection from armed groups. Non-state actors thus fill the governance vacuum, not only with violence but with a parallel system of order, thereby eroding the state's legitimacy and monopoly on force (Thurston, 2020). The result is a dual crisis: environmental degradation and institutional capture, where conflict dynamics become detached from their initial climatic triggers (Selby, 2014).

4.4. Integrating Climate Resilience and Security Governance

The evidence strongly suggests that purely military counter-terrorism interventions are doomed to fail if they ignore the ecological and human security roots of the conflict. Programs like the Great Green Wall and the Lake Chad Basin Stabilization Strategy are promising but remain chronically underfunded and operationally fragmented. An effective response requires a fundamental rethinking of security to include environmental and livelihood dimensions, synchronizing climate adaptation, livelihood regeneration, and community-based security governance (Mobjörk et al., 2020).

5. Conclusion and Policy Implications

This study demonstrates that the persistence of terrorism in Northern Nigeria is not merely an ideological war but a governance crisis amplified by ecological collapse. The climate-resource-terrorism nexus reveals that extremist groups are as much governance actors as they are military threats, strategically filling the voids left by failing states.

To break this cycle, policymakers must integrate climate resilience directly into the heart of security policy. The following recommendations provide a targeted agenda for national and regional actors:

Table 2. Integrated Policy Recommendations

Policy Objective	Recommended Action for Security/Sectoral Actors
Mainstream Climate-Security Links	For Security Sector: Integrate climate-risk and resource scarcity analysis into national security strategy military planning and intelligence assessments.
Strengthen Resource Governance	For State/Natural Resource Management Agencies: Implement transparent community-involved land-use reforms and water management boards to reduce conflict triggers.
Reduce Recruitment Vulnerability	For Development Agencies & State Governments: Invest massively in youth-centered livelihood programs (e.g. climate-smart agriculture vocational training) in high-risk zones.
Enhance Local Legitimacy	For All Tiers of Government: Integrate traditional institutions into climate adaptation and security planning to rebuild trust and improve local buy-in.
Foster Regional Cooperation	For LCBC & ECOWAS: Harmonize cross-border climate-security policies joint resource management and intelligence-sharing on terrorist movements.

Without this integrated approach that treats environmental governance as a core security imperative, Nigeria's Sahelian region will remain locked in a cycle of ecological stress and protracted violence.

6. Ethical Considerations and Study Limitations

This study relied on publicly available datasets and secondary reports, ensuring compliance with research ethics protocols. Its primary limitations include inherent data gaps in the GTD concerning unreported local conflicts and the reliance on proxy indicators for complex social phenomena like governance (Buhaug, 2015). Future research would benefit significantly from integrating high-resolution remote-sensing data with targeted household-level surveys to better capture the localized dynamics of climate vulnerability and recruitment, as called for in recent methodological literature (Ide, 2017).

7. References

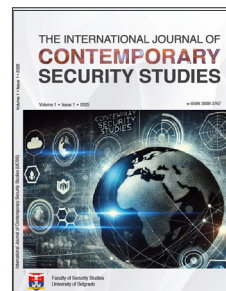
1. Barnett, J., & Adger, W. N. (2007). Climate change, human security, and violent conflict. *Political Geography*, 26(6), 639-655.
2. Benjaminsen, T. A. (2021). How herder-farmer conflicts evolve: The case of Fulani in Nigeria. *Political Geography*, 88, 102402.
3. Benjaminsen, T. A., & Ba, B. (2019). Why do pastoralists in Mali join jihadist groups? *Journal of Peasant Studies*, 46(1), 1-20.
4. Buhaug, H. (2015). Climate-conflict research: Some reflections on the way forward. *WIREs Climate Change*, 6(3), 269-275.
5. Burke, M., Hsiang, S. M., & Miguel, E. (2015). Climate and conflict. *Annual Review of Economics*, 7(1), 577-617.
6. Detraz, N., & Betsill, M. M. (2009). Climate change and environmental security: For whom the discourse shifts. *International Studies Perspectives*, 10(3), 303-320.
7. FAO. (2022). *Lake Chad Basin crisis response strategy*. Food and Agriculture Organization.
8. Ide, T. (2017). Research methods for exploring the links between climate change and conflict. *WIREs Climate Change*, 8(3), e456.
9. Ide, T. (2021). The impact of environmental change on armed conflict: Empirical evidence. *Current Climate Change Reports*, 7(1), 11-19.
10. International Crisis Group. (2023). *Violence in the Sahel: Africa's new epicentre of terrorism*. Report No. 317.
11. Koubi, V. (2019). Climate change and conflict. *Annual Review of Political Science*, 22, 343-360.
12. Krampe, F., & Månsson, K. (2021). *Climate change, peacebuilding, and sustaining peace*. SIPRI Insights, 2021(3).
13. Matthew, R. A. (2014). Integrating climate change into peacebuilding. *Climatic Change*, 123(1), 83-93.
14. Möbjörk, M., et al. (2020). *Climate-related security risks and peacebuilding in Somalia*. SIPRI.
15. Moriconi-Ebrard, F., Harre, D., & Heinrigs, P. (2020). *The Sahel and Lake Chad Region: A crucial geography*. OECD.
16. Okpara, U., Stringer, L. C., & Dougill, A. J. (2020). Resource scarcity and conflict dynamics in Northern Nigeria. *Land Use Policy*, 97, 104793.
17. Raleigh, C., Choi, H. J., & Kniveton, D. (2014). Conflict, food price, and climate variability in Africa. *Global Environmental Change*, 22(2), 323-335.
18. Salehyan, I. (2008). From climate change to conflict? No consensus yet. *Journal of Peace Research*, 45(3), 315-326.
19. Selby, J. (2014). The geopolitics of climate change and violence in the Middle East. *Geopolitics*, 19(3), 707-723.
20. Thurston, A. (2020). *Jihadists of North Africa and the Sahel*. Cambridge University Press.
21. UNDP. (1994). *Human Development Report 1994: New dimensions of human security*. Oxford University Press.
22. UNDP. (2023). *Human Security and Climate Resilience in the Sahel*. United Nations Development Programme.
23. World Bank. (2023). Climate Data Portal. Retrieved from <https://climateknowledgeportal.worldbank.org>
24. Dada, K. S. J., Mohammed, H. A., & Quadir, R. O. (2025). Disaster risk management in academic institutions: An assessment of preparedness and recovery at Kashim Ibrahim Library, Nigeria. *International Journal of Contemporary Security Studies*, 1(1), 1-15.

25. Metić, A. (2025). The Significance and Role of Police Officers in Building the School as a Safe Environment for All Students. *International Journal of Contemporary Security Studies*, 1(1), 17–24.
26. Garba, T. M., & Akaan, R. (2025). The Socioeconomic and Psychological Implications of Polygamy: A Quantitative and Qualitative Analysis Concerning Disaster Risk Reduction and Management (DRRM) in Nigeria. *International Journal of Contemporary Security Studies*, 1(1), 25–34.
27. Janković, L., Cvetković, V. M., Gačić, J., Renner, R., & Jakovljević, V. (2025). Integrating psychosocial support into emergency and disaster management and public safety: The role of the Red Cross of Serbia. *International Journal of Contemporary Security Studies*, 1(1), 99–124.
28. Vidović, N., & Beriša, H. (2025). Economic aspects of cyber security: Socio-financial consequences of cyber attacks. *International Journal of Contemporary Security Studies*, 1(1), 149–162.





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Research article

Hybrid Policing: The New Structure of Policing for Crime Control in Contemporary Nigeria

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ABSTRACT

The internal security crisis remains one of the most pressing challenges in Nigeria, where rising incidences of armed robbery, kidnapping, terrorism, communal violence, and banditry overwhelmed the capability of the formal state security. However, several serious concerns have engaged the minds of scholars and well-meaning individuals in the country, namely that state policing is insufficient, mistrusted, and lacks legitimacy. These concerns include Nigeria's weak security infrastructure, with the lowest police-to-population ratios globally. This has created a policing gap that hybrid structures attempt to fill. It then became imperative that hybrid policing is the non-state actor that understands the cultural and religious dynamics of the communities. The hybrid policing is not a replacement for state policing but a complementary mechanism shaped by Nigeria's weak security infrastructure, cultural systems, and governance realities. By institutionalizing, hybrid policing may gather intelligence more effectively than the formal state security. The methodology used in this study was a desk-based library method, in which the knowledge gained from various literature, as well as conceptual, theoretical, and empirical studies reviewed, forms the basis for the conclusions and recommendations. The paper recommended that hybrid policing actors should be allowed to operate within the framework of law. Also, the Governments should adopt it as a practical response to security crises, balancing limited formal state security capacity. To this end, peace, safety, and security are necessary for development and the attainment of a good quality of life in any human society.

KEYWORDS

Crime control; community; hybrid policing; non-state security actors; state security.

1. 1. Introduction

The internal security crisis remains one of Nigeria's most pressing challenges. This critical challenge resulted in rising incidences of armed robbery, kidnapping, terrorism, communal violence, and banditry. This also overwhelmed the capability of the formal state security agencies, particularly the Nigeria Police Force (Alemika, 2021; Ojedokun & Adepoju, 2023).

However, several serious concerns have engaged the minds of scholars and well-meaning individuals in the country. They observed that the state policing is insufficient, mistrusted, and lacks legitimacy (Bamidele, 2020).



These concerns include Nigeria's weak security infrastructure, with the lowest police-to-population ratios globally.

The United Nations Congress on Crime Prevention and Criminal Justice compares the size of police forces and the number of police per head worldwide. In 2006, an analysis indicated an approximate median of 300 police officers per 100,000 inhabitants. The highest median number of police officers, around 400, was observed in Western Asia, Eastern, and Southern Europe. The median number of police officers per population remained stable between 2002 and 2006, after increasing between 1995 and 2002.

In fact, according to Ripples Nigeria. (2022, May 17), The states with the lowest police-to-population ratios in Nigeria from 2016 to 2018 were Sokoto, Abia, and Bauchi. Also, in 2024, Ripples Nigeria analyzed data from the Nigeria Police Force (NPF) and observed that the number of police officers has been declining since 2016. In 2016, NPF had 244,756 police officers, protecting over 140 million Nigerians. In 2017, the number of police officers dropped drastically to 225,339, and again to 221,936 in 2018. The police–population (police-to-citizen) ratio within Nigeria's state security architecture does not meet the standard of officers per 100,000 population used in international datasets.

The Lapses are inadequacies in policing capacity, policy, and legitimacy (Lar, 2018; Abdullahi & Chukwuma, 2022; Alemika, 2021; Ojedokun & Adepoju, 2023).

Much of the concern is the contemporary security crisis of insurgency in the northeast, banditry and kidnapping in the northwest, and north-central. Others were the communal and resource conflicts in the Middle Belt, and rising organised crime and cyber threats. These crises signalled the structural and operational weaknesses of Nigeria's state security architecture.

In the Northeast, the security crisis persisted for over a decade. The activities of the Boko Haram insurgency and its splinter groups, such as the Islamic State West Africa Province (ISWAP), have destabilized the region through terrorism, mass displacement, and socioeconomic problems (Adeleke & Musa, 2022). The Insurgency transcends national borders and merges with the broader Sahelian insecurity. The jihadist networks linked to Mali, Niger, and Chad (Institute for Security Studies [ISS], 2023).

Since the late 2010s, the Northwest states such as Zamfara, Katsina, Kaduna, and Niger have had escalated attacks by heavily armed criminal groups labelled "bandits" by the late Buhari administration. However, in fact, the criminal groups are Terrorist bandits (Ikelegbe & Ukeje, 2022). These groups engage in cattle rustling, kidnapping for ransom, abductions of schoolchildren, and attacks on villages. They cause large-scale internal displacement and disrupt agricultural and market activities (Onuoha, 2020).

The Kidnapping across North-Central Nigeria (Plateau, Benue, Niger, and southern Kaduna) reflected both criminal entrepreneurship and political instability. The National Bureau of Statistics' Crime Experience and Security Perception Survey (CESPS) covering May 2023–April 2024, reported that over 51 million crime incidents and an estimated 2.24 million kidnapping incidents took place in those 12 months, with an estimated N2.23 trillion paid in ransoms (National Bureau of Statistics, 2024). In this region, the Kidnapping moved beyond high-profile mass abductions to a steady stream of targeted abductions of schoolchildren, commuters, and traders (Ikelegbe & Ukeje, 2022).

The Middle Belt of Nigeria (North-Central) has the highest consequences of internally displaced persons (IDPs) and threats to food security in such states as Benue, Plateau, Niger, and Kaduna. In fact, it is the focal point of a complex, recurring violent conflict of a broader security crisis. Thousands of fatalities, mass displacements, and severe disruptions to livelihoods were the order of the day (Lar, 2018; Abdullahi & Chukwuma, 2022).

Studies by (ACLED, 2023) observed that multiple forms of armed violence, such as farmer–herder clashes, communal vigilante and militia mobilizations, banditry and cattle rustling, and episodic spillover from Islamist insurgency tactics now coexist. The activities of these criminal groups remain the major drivers of fatalities and displacement in Nigeria. Ripples Nigeria (2025) reported that, within the second quarter of 2025, between April–June 2025, Northern states bear the brunt of the killing of over 3,132 people by terrorism, banditry, and communal clashes. The most affected states were Borno (571), Benue (548), and Zamfara (339). The casualties within the regions were North Central (1,016 deaths), North West (928), and North East (908).

2. 2. Conceptual literature on hybrid policing

2.1. Conceptual Framework

Hybrid policing has emerged over the past three decades as a key conceptual lens for understanding the pluralization and re-ordering of security provision in both the Global North and the Global South. Rather than treating policing as the exclusive preserve of public police forces, the hybrid policing concept highlights configurations in which multiple publics, private, customary, and community actors sometimes, with overlapping, co-produce order and safety (Ikelegbe & Olanrewaju, 2019; Alemika, 2021).

Hybrid policing refers to a security model that integrates formal state policing agencies (Dada et al., 2025; Garba & Akaan, 2025; Janković et al., 2025; Popović Mančević, 2025). It comprises the Nigeria Police Force, along with informal or non-state security actors such as vigilante groups, traditional rulers' security outfits, and community-based organizations. The idea no longer allows the formal state police alone to maintain order; it involves multiple actors—public, private, and community-based — working together to maintain law, order, and security. Examples included the Amotekun Corps in the Southwest, Hisbah in the North West, and EbubeAgu in Eastern Nigeria (Alemika, 2021; Onapajo & Okeke-Uzodike, 2022).

Hybrid policing recognizes that safety provision in society has become diversified across formal state police. It goes across private security companies, vigilante groups, traditional institutions, and community-based organizations (Loader & Walker, 2007).

Hybrid policing has emerged as a pragmatic approach to maintaining law and order when formal state security policing is weak and lacks public trust. In the same context, Nigeria, with its vast population, multi-ethnic composition, and history of insecurity, offers fertile ground for the application of hybrid policing (Alemika, 2021).

Bamidele (2020) explores the dynamics of vigilantism as a form of hybrid security governance in Nigeria. He focuses on how community-based structures supplement formal policing. The work argues that, in a context of state failure, weak law enforcement capacity, and pervasive insecurity, informal and vigilante groups emerge as legitimate security actors, filling gaps left by formal institutions (Bamidele, 2020).

Empirical studies and case reports show mixed but promising outcomes. There were reductions in opportunistic thefts and increased perceived safety in areas with organized local corps, especially in some Southwest states, following the deployment of Amotekun. There were also improvements in community reporting and occasional successes against kidnapping activities. However, measurable impact varies across contexts and over time, and rigorous long-term evaluations remain limited (Onapajo & Ozden, 2023).

2.2. Theoretical Framework

2.2.1. Communitarian Theory

The communitarian theory is based on the fact that security must not be solely the responsibility of the state, but must actively participate with the communities. It emphasizes that communities ensure the welfare and safety of their members through moral and social responsibilities (Ikelegbe & Olanrewaju, 2019). In the context of hybrid policing, the theory asserts that security must be a shared responsibility between the state's formal security agencies, such as the police, and informal or community-based actors, such as vigilante groups, traditional rulers, or neighbourhood watch groups (Loader & Walker, 2007).

The central idea is that the state should not monopolize policing. This is because the local communities possess the indigenous knowledge, social networks, and cultural legitimacy that can enhance crime prevention (Brogden & Nijhar, 2005). On that note, the scholars argued that Collective participation fosters trust, social cohesion, and accountability in security provision.

Amitai Etzioni formulated the Core tenet of communitarian theory in his seminar work "The Spirit of Community: Rights, Responsibilities, and the Communitarian Agenda" in 1993. The aim of Amitai Etzioni's theory was that balanced social order requires mutual responsibilities between individuals and the community. He argues that, from a communitarian perspective, law enforcement and public safety are partly social products

of community norms, membership, and reciprocal obligations (Etzioni, 1993). Therefore, a communitarian theoretical framework was centred on community values, obligations, and social norms, which are the foundation for social order and collective action. These also provide the normative and analytical concepts for understanding how hybrid policing can be organized, justified, and evaluated.

In Nigeria, communitarianism supports the coexistence of formal and informal policing institutions to address insecurity, particularly when state police are under-resourced or distrusted (Ikelegbe & Olanrewaju, 2019). Hybrid policing thus becomes a pragmatic response to the state's weaknesses and the failure of centralized policing in many developing contexts, such as Nigeria, Kenya, and South Africa (Baker, 2008).

2.2.2. Democratic theory

The democratic theory is rooted in the idea that security and law enforcement should operate under democratic norms. These democratic norms include transparency, accountability, participation, and respect for human rights. It assumes that policing should not be monopolized by the state but shared with community-based, traditional, and informal actors. These arrangements uphold the rule of law and citizen consent (Ikelegbe & Olanrewaju, 2019).

Thus, democratic theory promotes citizen-centred policing, in which both state and non-state actors are accountable to democratic values. It also operates within a framework that guarantees equity, justice, and inclusivity. It is a democratic policing enshrined in normative and institutional ideals that ties policing to democratic values. The building blocks emphasised that police must be accountable to the law and to citizens. The policing practices must be procedurally fair and rights-respecting. The institutions must foster recognition and a sense of belonging to secure public legitimacy (Bayley, 2001).

David H. Bayley formulated the core tenet of democratic theory in his seminar work on “policing structures and reforms” in 2001. David Bayley's theory aimed to analyse the changing forms of policing to situate hybrid/plural policing arrangements and their democratic consequences. Central to his view was that Policing must be accountable to the law and not to the government; Police should protect human rights and citizen freedom; and must serve the entire community equally, not specific interests.

The empirical implications and application to Nigeria have shown that the contemporary policing in many states no longer fits the simple model of a single, monopoly public police force exercising coercive authority on behalf of a unitary sovereign. Instead, there has been a regional plurality of security actors, such as the formal police, private security companies, community vigilantes, paramilitary forces, and technology firms. These operate together or in parallel, producing hybrid policing arrangements (Ikelegbe & Olanrewaju, 2019). Democratic theory provides the normative lens for evaluating hybrid arrangements. It could be about the rule of law, equality, legitimacy, and civil liberties (Ikelegbe & Olanrewaju, 2019).

Therefore, the theory on hybrid policing promotes citizen participation in security governance. It also demands accountability and oversight of both state and non-state actors. It ensures legitimacy through adherence to democratic values and bridges the gap between the state police and community security structures. In essence, it transforms policing from a state-dominated force into a collective democratic enterprise for public safety (Bayley, 2001).

3. Issues of crime control and effective contemporary policing in Nigeria

Drawing on the recent empirical literature, it argues that Nigeria's crime-control landscape in the 2020s presents a complete paradox. First, Nigeria experienced a dramatic escalation in organized criminality. The criminality ranges from large-scale armed banditry and mass kidnapping for ransom to insurgency, violent communal conflicts, and emerging cyber-enabled crimes (Ikelegbe, 2005).

The formal institutions charged with preventing and responding to crime have repeatedly struggled to contain, investigate, and prosecute these threats. Most notably, the mass school abductions and recurrent attacks in the northwest and northeast focused attention on systemic failures in intelligence, policing, and governance (Aina, 2024). The result is a vicious cycle that, in turn, erodes public trust and fuels alternative security.

In response to the perceived police failure, there is a growing reliance on the Proliferation of non-state security actors and on hybrid policing. Communities organize vigilante groups, local neighbourhood watches, and other hybrid security formations. These groups play mixed roles. They sometimes deter petty crime and offer rapid local responses. Nevertheless, they operate under inconsistent oversight, uneven training, and occasional rights abuses (Okoka & Kheswa, 2024).

Recent security governance scholarship emphasized that hybridity is the entanglement of formal state institutions and informal, private, and non-state actors in security provision. This is a valuable framework that understands contemporary Nigerian policing. Hybridity highlights that security outcomes are co-produced by a mix of actors operating under layered norms and incentives (Ikelegbe & Olanrewaju, 2019).

4. Methodology

This research employed descriptive and phenomenological approaches. It also used primary and secondary sources to obtain data. The primary source involved oral interviews, while the secondary source included books, journals, and internet materials. These furnished me with the basic information necessary for the comprehension, insight, and analysis of the relevant issue x-rayed in this paper.

5. Results/findings

The NPF Vision Statement above captures a devastating statistic on the deaths and loss of property in Nigeria within less than one year, between January and August, 2021. It becomes evident that the grip of security crises in Nigeria was appalling, shocking, and disturbing. The fundamental function of the Nigerian Police Force to protect life and property became very difficult to achieve. Nigeria is now relatively safe due to the reduction in various attacks and incidents of killings.

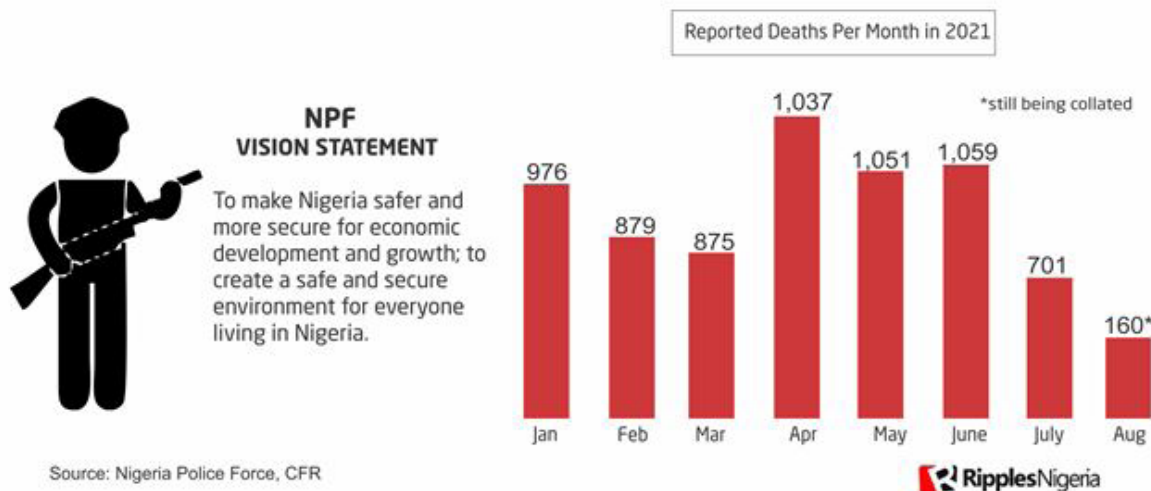
David & Salifu (2020) argued that the security system is highly centralized at the federal level, while contemporary threats occur in localized areas. To them, the formal state security system does not align with contemporary policing models because it was perceived as ineffective, had parallel authority structures, and could not effectively manage security.

This establishes that a security crisis requires multi-scalar and multi-sectoral strategies and hybrid policing, thus filling the gap. Hybrid was effective in Nigeria because it pragmatically addresses gaps in formal state capacity while drawing on local legitimacy and knowledge. Hybrid policing describes a situation where both formal police institutions and informal community-based security actors work together to maintain law and order.

The study observed failures in the institutions' efficacy, the adequacy of resources, and the legitimacy of the force in the eyes of the public. The lack of investment in social development and good governance contributed to the sobering nature of insecurity in Nigeria.

The current centralised policing system does not meet the public's security needs. Some key structural deficits, including capacity, funding, and accountability, led to significant gaps in policing performance.

PROTECTING LIVES AND PROPERTY IS BECOMING MORE DIFFICULT FOR THE NIGERIA POLICE FORCE



The findings establish that citizens are not protected. We discovered that the northern parts of the country are effectively under the control of non-state actors such as the bandits, terrorists, kidnappers, and Fulani herdsman, who contributed to the mass killing of Christians in the area. The rising burden of insecurity has also resulted in the displacement, disruption of schooling, loss of livelihoods, and breakdown of community trust.

The study discovers that the failure of the policing system was linked to the activities of the Boko Haram terrorist group and its splinter groups, such as the Islamic State West Africa Province (ISWAP) in the Northern part of Nigeria.

We observed the informal mobilization of vigilante groups, community watches, which, regionally, constituted security outfits such as Amotekun in the Southwest, Ebubeagu in the Southeast, and Hisbah in the North, but without adequate modes of operation and informal rule of law.

In summary, the findings indicate that the formal police institution is no longer effective in crime control, but the security crisis requires multi-sectoral strategies.

6. Conclusion

In conclusion, therefore, we established that an effective contemporary policing in Nigeria requires a holistic approach. This approach emphasises collaborative policing, an umbrella term that encompasses community policing, inter-agency partnerships, and hybrid arrangements between formal state police and local security actors (vigilantes, community watch, private security).

In addition, it does not necessarily replace state policing but complements it. Scholars argue that hybrid policing emerges when state policing is insufficient, mistrusted, or lacks legitimacy. Hybrid policing is visible through community vigilante groups, hunters' associations, traditional rulers' security networks, and regional formations.

In the Nigerian context, hybrid arrangements include the informal mobilization of vigilante groups, community watches, traditional institutions, and regionally constituted security outfits such as Amotekun in the Southwest, Ebubeagu in the Southeast, and Hisbah in the North. This summarizes current scholarship on why hybrid policing is applicable in Nigeria and the principal factors that have accounted for its perceived successes.

7. Recommendation

We therefore recommend an Operational modernization of policing in the following:

- Invest in national crime databases, open-access research partnerships, and regular independent assessments of reform progress.
- Prioritize forensic labs, digital case-management systems, and crime-analysis capacities.
- Professionalize the force through merit-based promotions, continuous training, and improved living-wage compensation to reduce petty corruption.
- Formalize the relationship between police and community security actors.

Nevertheless, regionally constituted security outfits such as Amotekun in the Southwest, Ebubeagu in the Southeast, and Hisbah in the North operate without adequate operational modes and an informal rule of law.

Author contribution: The paper has been presented at the Annual Conference of the Nigerian Anthropological & Sociological Practitioners Association (NASA).

Conflict of Interest: The author declares no conflict of interest.

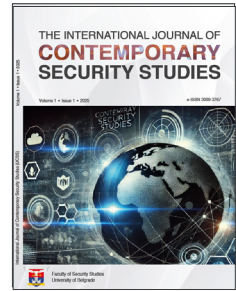
8. References

1. Abdullahi, M., & Chukwuma, I. (2022). *Police reforms and manpower challenges in Nigeria: A review of policy gaps*. African Journal of Criminology and Justice Studies, 15(2), 45–62.
2. Abubakar, L. (2024). *The evolving dynamics of Boko Haram and ISWAP in Nigeria's counterterrorism landscape*. African Security Review, 33(2), 145–162.
3. Adeleke, T., & Musa, I. (2022). *Governance failure and the politics of insecurity in Northern Nigeria*. Journal of Contemporary African Studies, 40(1), 23–41.
4. Aina, F. (2024). *Politics of "localised legitimacy", vigilantism, non-state security and local governance in northwest Nigeria*. Retrieved from <https://doi.org/10.1080/19361610.2023.2240281>.
5. Alemika, E. E. O. (2021). *Policing and human rights in Nigeria: Issues and prospects*. Nigeria Journal of Social Sciences, 18(1), 1–20.
6. Armed Conflict Location & Event Data Project (ACLED). (2023). *ACLED dataset and analysis: Nigeria*. Retrieved from [https://www.acleddata.com/...](https://www.acleddata.com/)
7. Baker, B. (2008). *Security in post-conflict Africa: The role of non-state policing*. CRC Press.
8. Bamidele, O. (2020). *Vigilantism and hybrid security governance in Nigeria: A community-based approach to insecurity*. African Journal of Criminology, 12(1), 89–107.
9. Bayley, D. H. (2001). *The new structure of policing: Description, conceptualization, and research agenda* (NCJ 187083). U.S. Department of Justice, National Institute of Justice.
10. Brogden, M., & Nijhar, P. (2005). *Community policing: National and international models*. Cullompton: Willan Publishing.
11. Dada, K. S. J., Mohammed, H. A., Mallam, D., & Ajayi, E. O. (2025). Security of information resources in Federal College of Education libraries in Northwest Nigeria. *International Journal of Contemporary Security Studies*, 1(1), 85–98.
12. David, D., & Salifu, A. M. (2020). *Security architecture, internal policing, and agitations for state police*. Arts and Social Science Research. Retrieved from ResearchGate.
13. Etzioni, A. (1993). *The spirit of community: Rights, responsibilities, and the communitarian agenda*. New York: Crown Publishers.

14. Garba, T. M., & Akaan, R. (2025). The Socioeconomic and Psychological Implications of Polygamy: A Quantitative and Qualitative Analysis Concerning Disaster Risk Reduction and Management (DRRM) in Nigeria. *International Journal of Contemporary Security Studies*, 1(1), 25–34.
15. Ikelegbe, A., & Olanrewaju, F. (2019). *Hybrid security institutions and informal policing in Nigeria*. *Journal of Contemporary African Studies*, 37(4), 511–528.
16. Ikelegbe, A., & Ukeje, C. (2022). *Insurgency and regional instability in the Lake Chad Basin*. *Journal of Conflict Transformation*, 5(1), 1–18.
17. Institute for Security Studies (ISS). (2023). *Cross-border insurgencies in the Lake Chad Basin: Policy options for regional stability*. ISS Policy Brief No. 242.
18. Janković, L., Cvetković, V. M., Gačić, J., Renner, R., & Jakovljević, V. (2025). Integrating psychosocial support into emergency and disaster management and public safety: The role of the Red Cross of Serbia. *International Journal of Contemporary Security Studies*, 1(1), 99–124.
19. Lar, J. (2018). *Policing actors, plural processes and hybridisation: Histories of everyday policing practice in central Nigeria*. Stability: International Journal of Security & Development.
20. Loader, I., & Walker, N. (2007). *Civilizing security*. Cambridge University Press.
21. National Bureau of Statistics. (2024). *Crime Experience and Security Perception Survey (CESPS)* [Summary and datasets]. Retrieved from news and NBS releases summarizing CESPS.
22. Ojedokun, A. J., & Adepoju, A. (2023). *The manpower deficit of the Nigeria Police Force and its implications for internal security*. *International Journal of Policing and Society*, 6(1), 88–104.
23. Okoka, H., & Kheswa, J. G. (2024). *Community policing practice in the Nigerian Police: Implications of employee burnout*. *Journal of Police and Criminal Psychology*. Retrieved from <https://doi.org/10.1007/s11896-024-09711-9>.
24. Omilusi, M. (2023). Civil-military relations and security governance in Nigeria's counterinsurgency operations. *Journal of Security Studies*, 18(1), 77–94.
25. Onapajo, H., & Ozden, K. (2023). Hybrid policing and state legitimacy in Africa: Lessons from Nigeria. *Third World Quarterly*, 44(1), 142–160. Retrieved from <https://doi.org/10.1080/01436597.2022.2111927>
26. Onapajo, H., & Uzodike, U. O. (2022). *Hybrid security governance and the dynamics of policing in Nigeria*. *African Security Review*, 31(1), 33–49.
27. Onuoha, F. (2020). *Understanding Boko Haram insurgency: Issues and trends*. *African Security Review*, 29(1), 1–18.
28. Popović Mančević, M. (2025). Non-Traditional Roles of Military Actors: NATO's Engagement in Natural Disaster Response. *International Journal of Contemporary Security Studies*, 1(1), 75–84
29. Ripples Nigeria. (2022, May 17). ICYMI... RipplesMetrics: Sokoto has the worst police-to-citizen ratio. Where does your State rank? Retrieved October 2, 2025, from <https://www.ripplesnigeria.com/ripplesmetrics-sokoto-has-the-worst-police-to-citizen-ratio-where-does-your-state-rank/>.
30. Ripples Nigeria. (2025, July 31). *RipplesMetrics: Over 3,100 killed in Nigeria in Q2 2025 as northern states bear the brunt*. Ripples Nigeria. Retrieved from <https://www.ripplesnigeria.com/ripplesmetrics-over-3100-killed-in-nigeria-in-q2-2025-as-northern-states-bear-the-brunt/>.



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Research article

Insurgency and Armed Banditry in Central Nigeria: Dissecting the Existing Policy Options

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ABSTRACT

This study examines the security challenges posed by insurgency and armed banditry in Central Nigeria and proposes policy options to mitigate these issues. A secure nation ensures development. Unfortunately, Central Nigeria is drifting apart in this aspect because of the activities of insurgency and armed banditry. Although providing a peaceful and secure nation is enormous, especially in a heterogeneous geopolitical zone such as Central Nigeria, the government's efforts yield little result. This paper reviews the security architecture in place to stop this menace. In terms of methodology, secondary data were used; the paper opined that insurgency and armed banditry affect socio-economic development in the Central Nigeria complex, while content analysis was conducted on the data. The paper further reviews that insecurity is one of the main destructive tools to socio-economic development in Central Nigeria. The paper, therefore, concludes that a safe and secure Central Nigeria ensures not only development but also creates an avenue for all-around development. Thus, it recommends that to ensure development in Central Nigeria, combating insurgency and armed banditry in the region should be the starting point, which can be achieved through education and advocacy.

KEYWORDS

Armed banditry; insurgency; insecurity; socio-economic development; policy options.

1. Introduction

The government's primary duty to its people is to protect them and their property. The social compact between the people and the government is based on the protection of people's lives and property. The social contract voluntarily entered into by citizens guarantees their survival through the state. Thus, a secure state from the social contract perspective reduces tension, ensures a non-violent, conflict-free society, and guarantees socio-political and economic development. One of the basic roles of a social contract is to ensure a secure state, promote national cohesion, peace, and sustainable development. A bridge in the social contract begot an insecure state. Unfortunately, the activities of the insurgency group and armed banditry have constituted a challenge to the socio-economic development of Central Nigeria. For example, the death toll and property damage nationwide, particularly in Central Nigeria, constitute a bridge to the social contract. The security challenges



in Central Nigeria are growing in strength, capability, and sophistication, making them difficult to combat. The security situation in Nigeria is getting complicated by the day, as captured by Igbini (2020:76): Ironically, political violence on some occasion, inherited tribalism, and corruption, as well as nepotism, the activities of Boko Haram and its associated groups have been complicated by a lack of discipline in nearly every area of public life, kidnappings and kidnappings, armed robberies, murder, extortion, and bombings of places of worship and innocent Nigerians.

The continuous crisis of security in Central Nigerians has been attributed to the incidents of armed robbery and cattle rustling, and the competition for scarce resources such as land between the local collaborates the position of Akinwotu and Sahabi, by stating further that there is no denying, however, that the rapid population growth and climate change pose a double threat to the Fulani nomadic pastoralists who inhabit West Africa. These factors have reduced the amount of available land, which has regrettably led to their migration from the northern to the southern regions of the country in search of verdant pastures for their cattle. Scholars have proposed that the trustworthy source of the conflict between the Fulani herders and the host people in the south is not migration, but rather the invasion of private farmlands and destruction of crops. The activities of the insurgency group and armed banditry have led to a series of violent assaults, random shootings of defenseless people, arson of police buildings and places of worship, numerous kidnappings, rapes, armed robberies, and killings. According to the World Bank report "Conflict, Security and Progress," more than 1.5 billion of the world's estimated 7 billion people live in nations where political and criminal violence has exacerbated human suffering and hampered socioeconomic progress. Insurgency and armed banditry are costing Central Nigeria a great deal of fortune (World Bank, 1993). The consequences of these groups' activities thus demand new initiatives to tackle this menace in the region.

No doubt, development in Central Nigeria has been affected by security issues. The level of insecurity in Central Nigeria today is unimaginable. This remains a core issue for the government, which has deemed it necessary to increase the nation's security budget allocation to curb this menace without improvement (Achumba, Ighomereho, & Akpor-Robaro, 2013). Despite the increase in budgetary provision to the security sectors, which has manifested in the acquisition of more security facilities, partial installation of Closed Circuit Television cameras, intense investigation of a criminal offense, and increased security awareness, unfortunately, the much-needed serene atmosphere for socio-economic development has not been achieved (Achumba, Ighomereho, & Akpor-Robaro, 2013). The security challenge remains due to the activities of armed banditry and insurgency, with significant consequences for the socio-economic growth and development of the nation. A secure and peaceful society promotes socio-economic development for the benefit of the citizens and the state at large. A secure society also fosters peaceful coexistence, guaranteeing the free movement of people and goods without hindrance. The ability of any nation to adequately secure the lives and property of its citizens promotes growth in the country's socio-economic sector. It attracts foreign investors, which is much needed in central Nigeria. Unfortunately, the group's insurgent operations and armed banditry in Central Nigeria have spread like wildfire across every state in the geopolitical zone, and the increasing number of cases of these groups' activities has become a significant threat to the region's corporate existence (Ocheni & Jacob, 2019). **The activities of the insurgency group** and armed banditry in Central Nigeria led to emotional and psychological trauma, loss of life and properties, and have degenerated the social relations of the people, especially among women and children.

Security is the foundation for socio-economic development and its sustenance; equally, insecurity undermines such development (Davies, 1995). The unprecedented cases of kidnapping, rape, cattle rustling, abduction for ransom, and robberies as a result of worsening insecurity in the geopolitical zone have constituted a hindrance to the socio-economic development of the geopolitical zone. The activities of these groups have brought an extra dimension to security crises in central Nigeria. Thus, insecurity is the greatest challenge hindering the region's stakeholders and the government's initiatives. The activities of the insurgency group and armed banditry have further heightened the existing economic insecurity in Central Nigeria. Hence, this work blends existing knowledge on insecurity in Nigeria to explore the challenges it poses to nation-building. A substantial body of literature on armed banditry exists; most of it focuses on historical accounts of gold mining and cattle rustling in Nigeria's northwest and other places. An atmosphere favorable to armed banditry is created by cattle theft by criminal organizations, as well as by the illegal exploitation and rivalry among non-state actors over natural resources, including gold (Ojo, Oyewole, & Aina, 2023). Furthermore, several academic publications have addressed the topic, presenting arguments that highlight Fulani-pastoralists as significant participants in banditry and other criminal activities (Ojo, Oyewole, & Aina, 2023). The paper begins with

the introduction, followed by the conceptualization of security, insecurity, and nation-building. Subsequent sections are Nigeria's difficulty in building a nation due to insecurity, the Nigerian experience, the way forward, and the conclusion. What is the impact of insurgency and armed banditry in central Nigeria? What policy options can ensure adequate security in central Nigeria?

2. Conceptual clarification

Banditry: According to White (1981), a bandit is a person who has been forced to become an outlaw by robbing wealthy people and donating to the underprivileged. He went on to say that the rich people's attitudes and actions in society, which lead to robbing the affluent to feed the poor, are largely to blame for the oppressed people's impoverished condition. In Nigeria, banditry is not a recent development. It had been widespread across the nation in various forms before the 1980s. It is a violent crime that has become increasingly fatal from an antiquated custom into a highly coordinated, expertly executed act of criminal activity. These days, it is marked by the employment of contemporary weapons together with organized attacks on towns and villages, rape, armed robberies, kidnappings, and livestock rustling (Madubuegwu & Abah, 2023). According to Williams (1998), bandits are international gangs and criminals who use bribery, extortion, and intimidation to control people and organizations, thereby furthering or enabling their own illicit activities. Therefore, in the globalized world, bandits are more than just outlaws and rural groups.

The activities of banditry over time evolved in both context and geography worldwide. Stimulants have been the basis of its progress, ensuring its expansion, development, and mechanization, particularly in recent times. In the past, banditry involved planning an act in dilapidated homes, structures, or even straightforward hiding places before carrying it out (Okoro, 2024). It developed into using supporters' homes, where the bandits could be hidden and their activities kept under wraps. Subsequently, as elitism gained power, the act was transformed into an action whose plans were methodically coordinated at the periphery of rural locations, making use of the rough, occasionally sloping terrain as obvious barriers essential to their movement and escape to safety (Okoro, 2024).

Security: Security is the aftermath or by-product of entrenched measures to ensure people's protection, property, and information against hostility from individuals or groups. Security is ensured when citizens and non-citizens of a particular country can live in a serene environment free from crime, violence, and other social problems (Onimisi, 2014). According to Achumba (2013), security is the ability to support oneself, predictability in day-to-day activities, stability, safety from criminal activity, and an absence of psychological trauma. Security is fundamentally proactive and preventive, to safeguard the nation and its residents from dangers. Dangers are detected and evaluated by law enforcement, intelligence, and risk assessments based on actual prior events. Security is the maintenance of institutions that promote core values. According to Imobighe (2013), Security is the absence of any threat or risk to a nation's ability to defend and grow, to further its legitimate interests and basic values, and to enhance the welfare of its people. Thus, internal security is viewed as the absence of liberty or freedom from tendencies that could jeopardize national cooperation, internal cohesion, and the nation's ability to preserve the institutions necessary to advance its fundamental goals and achieve its sociopolitical and economic goals while also satisfying the justifiable aspirations of its citizens. Liberation from threats to one's life and well-being is another aspect of internal security. Security is one of the basic needs of life. Security remains a basic value in human societies and promotes and guarantees socio-economic development. Security is a basic need that human beings guarantee for themselves and create a niche for it. Scholars in the social sciences critically analyze the concepts of security and insecurity, concluding that the lack of consistent definitions, theoretical development, and prerequisite empirical testing of hypotheses in this area is due to the vague and tendentious nature of the concept.

Insecurity: As it stands, insecurity can be viewed differently by different people. To some, it is an absence of safety and uncertainty; others see it as a danger, a hazard, and a complete lack of security in and around the environment. Ewetan & Ese, in their study of *"Insecurity and Socio-economic Development in Nigeria"*, captures the conceptualization of security as provided by Achumba, Ighomereho, & Akpor-Robaro (2013:5), with a further explanation thus: First of all, being open to risk or the possibility of danger is the state of being insecure, whereas danger is the state of being susceptible to harm or injury. Being exposed to risk or experiencing worry, a vaguely uncomfortable emotion felt in anticipation of some calamity, is the second definition of insecurity.

ty. This understanding of insecurity highlights a crucial point: those who experience it are not only unsure of what might happen but also susceptible to risks and dangers when they materialize.

Insecurity is a situation of perpetual anxiety or fear arising from an unprotected environment (Achumba, Ighomereho, & Akpor-Robaro, 2013; 5). Insecurity exists when the sanctity of human life is absent, where property and criminality remain the order of the day. The level of insecurity and its effects on economic and socio-political development in Central Nigeria warrant concern among researchers and policymakers. A secure nation ensures the social contract entered into by the people voluntarily with the government, and it guarantees their survival. Within the scope of this work, insecurity is the decreased limit and the inability of the government to effectively defend and ensure the safety of citizens, property, and against assaults from armed banditry and insurgency in Central Nigeria.

Insurgency: Insurgency is a conflictual phenomenon that takes the form of cellular development of resistance against the perceived enemy of a political regime and an expanded form of subversion-infiltration through a persistent intermediate stage of overt resistance, which eventually leads to civil war, beginning with small armed bands and insurrection (Béland, 2005; Pustay, 1965). Insurgency is a revolution, revolt, rebellion, riot, or mutiny carried out against the state and its citizens. Insurgency groups in Central Nigeria use arms and other sophisticated equipment to carry out their plans (Fjäder, 2014). Insurgencies are a group of political struggles, not a military struggle, which requires a political solution, not necessarily a purely military solution, because military involvement may resort to brutality and attack some innocent Nigerians. Insurgency is an organized movement that seeks to overthrow a government through subversion and armed conflict. An organized armed group or group of people waging war against the established political order in order to take control of a territory through violence and subversion is known as an insurgency. Through the use of force such as political mobilization, guerrilla warfare, terrorism, coercion or intimidation, propaganda, and subversion, insurgents frequently aim to overthrow or subvert an established government in order to gain full or partial control over the resources and population of a given geopolitical area (Abdu & Shehu, 2019; Ibidapo-Obe, 2008).

3. Methodology

This article relied on qualitative methods, and a case study design was adopted because it enabled pragmatic inquiry into the study participants' life experiences (Creswell, 2003). The data for this paper were sourced from scholarly journal articles. A total of 20 articles were found and used, sourced from scholarly search engines such as Sage and Google Scholar. The data were analyzed using content analysis, and themes were identified in some of the articles. The analysis focused on phenomena including insurgency and armed banditry in central Nigeria. This paper's data came from academic journal articles. About 25 academics using systematic review methods, with an emphasis on secondary data sources, were identified through Web of Science, Sage, Google Scholar, and other scholarly search engines. In the analysis, the researchers use categories to identify the key point and to more readily identify facts when coding is concluded. Text might be edited to remove errors and incorporate all available data that were considered valid.

4. Theoretical framework

Conflict transformation theorists use a broad range of conceptual building blocks, some of which are ancient, some of which are more recent, and some of which are borrowed from other schools. Different perspectives and different kinds of intervenors (state and non-state, internal and external) are reflected in the theories of conflict transformation. One intellectual source that contributes to the field of conflict transformation is the functionalist school of thought, exemplified by Georg Simmel and Lewis Coser. Both thinkers emphasized the constructive societal role of conflict. Simmel stated that conflict has an integrative quality, as it unites opposing and divergent elements in his 1955 essay "Conflict". He viewed it as a source of creativity and social cohesiveness. According to Coser (The Functions of Social Conflict, 1956), conflict has certain beneficial social purposes. Conflict transformation theory, which encompasses the concepts of conflict generation and analysis, is yet another school of thought that sheds light on the topic. Johan Galtung's work was the most influential in this school of thought. Nonviolence thinkers like Gene Sharp have made a substantial contribution to the field

of conflict transformation. One potential strategy for bringing about peace and justice is nonviolent resistance, which is regarded as an essential component of conflict transformation.

Nigeria's security environment is getting more complicated and unpredictable. Recent years have seen the emergence and consolidation of coercive power by several non-state armed groups to terrorize the Nigerian populace. Examples of these groups include criminal gangs, armed bandits, and separatist organizations. The Nigerian media often refers to Islamic fundamentalists, unclear kidnappers, and several other individuals as "unknown gunmen" (Ojo, Oyewole, & Aina, 2023). These actors have different objectives, approaches, and operational simulations. Over 8.7 million people in the nation today need essential humanitarian relief due to the actions of non-state armed organizations that target civilian populations and the ensuing security repercussions (Global Center for Responsibility to Protect, 2022). The situation has gotten worse in recent years due to a rise in bandit attacks, which have caused significant relocation throughout the region. Inter-communal violence in northern Nigeria, especially in the northwest states, has been increasing since 2011. Growing violence in farming and herding communities has been attributed to an increase in armed groups and gangs. These armed organizations carry out coordinated attacks that include rape, kidnapping, murder, stealing, pillage, and rustling cattle. In the Northwest, armed banditry caused hundreds of thousands of internally displaced persons (IDPs) and at least 4,900 deaths between 2018 and 2020 (IOM, 2022).

Public and national security concerns have been raised by the widespread armed banditry and the human security risks it presents in the North-West region of Nigeria, particularly in the states of Zamfara, Katsina, Kaduna, and Sokoto, and in the North-Central region in Niger State. To reduce the threat that armed banditry poses to peace and security in the affected states, effective measures are needed given its recurring nature and the multiple layers of crime it involves (Madubuegwu & Abah, 2023). As if to highlight the gravity of this massive menace even further, Rufai (2021) disclosed that over 10,000 armed bandits are active throughout Zamfara state. Between 2011 and 2021, these gangs are estimated to have killed over 12,000 people and taken over 25,000 cattle. About 50,000 people were internally displaced or forced to flee to the neighboring Niger Republic, while over 120 villages were devastated. The government's efforts to curb insurgency and armed banditry in Nigeria, Adedire, Ake, & Olowojolu (2016:70). Thus, since the start of the insurgency and terrorism in Nigeria, the government has implemented several measures to stop Boko Haram's operations. First, there is the deployment of nearly 8,000 troops into affected areas of northern Nigeria and the use of excessive force against rebel groups—all without a clear Military Code of Justice for the operation. For instance, the slaughter and incursion by Nigerian soldiers on Sunday, April 21, 2013, in the Baga community in Borno state... The creation and procurement of more advanced, suitable, and acceptable military gear, as well as the African Union's recent approval and the formation of an extensive international coalition to work with our armed forces, come in second. Third, is the consent granted by international organizations to bordering countries (Chad, Niger, and Cameroon) allowing them to lawfully station military forces on Nigerian territory? The Nigerian military also operates across national borders to track down escaping terrorists and eliminate their sanctuary. The fourth step involves the proclamation of a state of emergency in Adamawa, Borno, and Yobe, the three northern states most severely impacted. However, the number of victims in Northern Nigeria has escalated much more due to the lack of a particular Military Code of Justice that would protect civilians and explicitly designate targets. Fifth, the government supports the people and media in providing information on terrorist organizations and their operations.

However, the activities of armed banditry and acts of insurgency in Central Nigeria have continued, and the actions of these groups against citizens remain unabated. It is important to understand that banditry in Nigeria did not just commence, as we can trace it to the pre-civil-war era, following the deterioration of government in some parts of the then old Western Region. The deteriorating situation because of armed banditry led to political violence, crime, and organized insurgency groups taking over certain areas (Odinkalu, 2018). Some bandits were allegedly involved in stealing domestic animals during the country's civil war period. The activities of an armed bandit in Central Nigeria have been worrisome because of the acts perpetrated by them, which include killing their victims as part of their method of operation. It comprises kidnapping, murder, robbery, rape, and cattle rustling (Mustapha, 2019). They also mobilized themselves and attacked citizens and residents via the forests by riding on fast motorcycles both at night and day, shooting at will, and unleashing harm in the societies/communities. The activities of the insurgency group have led to people being rendered homeless, many orphaned children, an increasing number of women becoming widows overnight, and food security has made life unbearable for many citizens in Central Nigeria. One admits that the initial government reaction was to bombard the bandits' hiding places with police and military forces. However, it seems the much-needed

result was not achieved, yielding no significant results. The governor of the state of Niger, Abdulkadir Hassan, the president of the Chamber of Commerce, Industry, Mines, and Agriculture, attributed the low attendance at the National Trade Fair in May 2019 to potential attendees' fears of armed bandit attacks and kidnapping (Madubuegwu & Abah, 2023). The disposable income of the comparatively affluent households in the area has also declined: in Zamfara, the average number of individuals who could afford to make the pilgrimage to Mecca and Medina dropped from 4,500 in previous years to 1,500 in 2019 (Umar, 2020).

The activities of various militia groups, such as armed bandits and insurgents, have great consequences for governance in Central Nigeria. Due to these parties' actions, GDP is growing slowly, and few domestic and foreign investors are contributing to the economic development of the geopolitical zones. The challenges posed by insecurity in Central Nigeria appear in various phases. Conspicuous among them are the challenges posed by the insurgency group's activities, the increasing socio-economic inequalities, and poverty. Unfortunately, the socio-economic inequalities and increased poverty in Central Nigeria translate to a high level of insecurity in the country and thus pose an undeniable challenge to the development of the region. Another security challenge to nation-building comes from the aspect of institution-building (Onimisi et al., 2017). The institutions of government responsible for the security of the lives and properties of the citizens and residents in Central Nigeria appear to be weak. The institution cannot fully discharge its mandate of securing lives and property, as it itself threatens the peaceful coexistence of citizens.

The issue of persistent insecurity caused by activities of insurgency and armed banditry in Central Nigeria remains a threat to the harmonious and continuous co-existence of Nigeria (Mustapha, 2019). The security situation in the region threatens the fundamental rights of the people. The region's security challenges were further polarized by mutual suspicion (Salawu, 2010). Insurgency and armed banditry appear to be destructive forces in the region's socio-economic development, especially in Central Nigeria. The activities of these groups have damaged the image of Central Nigeria as well as created a great humanitarian disaster. The violent activities of groups often lead to loss of property or infrastructure, death, destruction, and cause fear among the residents and citizenry. Security challenges arising from different groups in Nigeria hinder harmonious relationships within the region and the entire country. This challenge has further heightened tension in the region, fueled by mutual suspicion and fear amongst many ethnic groups. Unfortunately, mutual suspicion and distrust often lead to a violent confrontation in Central Nigeria. The selfish, parochial, non-nationalistic, and unpatriotic activities of these groups have caused Central Nigeria many issues that will take decades to recover from. Security challenges arising from a lack of institutional capacity are another hindrance to socio-economic development in Central Nigeria. The inability of governmental entities to establish a framework that provides an adequate and safe environment for citizens and residents of the region is a concern. Invariably, insecurity in Central Nigeria results from the government's failure to deliver one of the basic social needs of man: the security of lives and property, and it is disturbing (Salawu, 2010). The failure of the failed institution of government to provide the basic security needs of its citizens can be frustrating. Collaborating this position are scholars who argue that the lack of necessities among people in Nigeria has created a pool of frustrated people who are easily ignited by any event and prone to violence (Achumba et al., 2013).

5. Insurgency and armed banditry: understanding the security issues in central Nigeria

Nigeria's security environment is getting more complicated and unpredictable. Recent years have seen the emergence and consolidation of coercive power by several non-state armed groups to terrorize the Nigerian populace. Examples of these groups include criminal gangs, armed bandits, separatist organizations. The Nigerian media often refers to Islamic fundamentalists, unclear kidnappers, and several other individuals as "unknown gunmen" (Ojo, Oyewole, & Aina, 2023). These actors have different objectives, approaches, and operational simulations. Over 8.7 million people in the nation today need essential humanitarian relief due to the actions of non-state armed organizations that target civilian populations and the ensuing security repercussions (Global Center for Responsibility to Protect, 2022). The situation has gotten worse in recent years due to a rise in bandit attacks, which have caused significant relocation throughout the region. Inter-communal violence in northern Nigeria, especially in the northwest states, has been increasing since 2011. Growing violence in farming and herding communities has been attributed to an increase in armed groups and gangs. These armed or-

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6. Insurgency and army banditry in central Nigeria: implications for socio-economic development of the region

Central Nigeria, like most heterogeneous societies, has religious, racial, cultural, and ethnic diversity, which has contributed to continuous repression, violence, and tension in the region (Ojo & Adebayo, 2005). The complexity of Central Nigeria is further reflected in its many ethnic groups, whose citizens subscribe to diverse religious beliefs. Central Nigeria has a cross-cutting, interlocking divide along ethnic and religious lines. Central Nigeria has had its share of insurgency and armed banditry over the years. A look at the activities of insurgency and armed banditry shows that on December 18, 1999, churches were attacked in Ilorin, Kwara state, and looted, and several people, including the priest, were killed. In 1999, Central Nigeria saw an increasing viciousness in the activities of insurgency and armed banditry. There were cases of strict savagery in Jos and Abuja in February and September 2001; Abuja and Jos again in 2006 witnessed severe attacks from the insurgency and armed banditry. The properties and lives of the people were decimated because of the strict brutality of religious extremists in Nigeria between 1999 and 2003, especially in 2014, when many lives were lost in Plateau State.

How the government addresses security in Central Nigeria has thrown up additional security and socio-economic development issues across the country. Administrative lapses, inefficiencies, and poor governance contribute to security issues in the region. The series of damages because of the insurgency and armed banditry in Central Nigeria is remarkably high, and it threatens the cooperative existence of Nigeria. And these insurgent groups and armed bandits have destabilized and threatened the region's peace and safety. The activities of the insurgent group and armed bandits have hampered the region's socio-economic development. The loss in human lives occasioned by the insurgency, the economic, social, and psychological costs on the citizen and resident are unquantifiable, as their act has reduced the commercial activities in the region, while the socio-economic development was adversely undermined, human capital and investment were affected by incessant attacks (Awojobi, 2014). Economic growth, development, and sustenance can only be guaranteed in a secure environment. The insurgency and armed banditry have disrupted the development plans of Central Nigeria and hindered foreign investment. No foreign investor will come to put resources in Central Nigeria with the present security challenges bedeviling the region.

The activities of an insurgent group and armed bandits remain a great threat to the very peaceful coexistence of the region. The sharp increase in herdsmen conflict, kidnappers, armed robbers, and smugglers has devoured the peaceful existence of the citizens and residents of Central Nigeria. The absence of peace in the region creates a feeling of frustration and psychological trauma. The activities of these groups create mental injury and psychological trauma to people in the region. The psychological trauma that the activities of these elements have caused the people cannot be measured. The impact of these groups has disrupted the academic calendars of most regions and states. The activities of these groups do not disrupt the academic calendar of the schools in the region; they have equally led to the looting of educational materials and the vandalization of school buildings. Also, students in Central Nigeria have been psychologically traumatized as a result of the loss of loved ones and fellow students.

The nature of insecurity in Central Nigeria differs from that in other regions. The Boko Haram group attacking most of the Northern geopolitical region, especially the Northeast states, while kidnappers and the activities of the secessionist group are in the South-eastern part of the country, in Niger-Delta militant vandalism and vandalism remains the order of the day, in Central Nigeria insurgency and armed banditry are causing severe damage to the region, and politically motivated killings across the country (Oladiran, 2014). These security challenges come with implications. For example, investors are moving out of the region to neighboring African countries where relative peace exists. Investors are leaving the region because they want to invest where their investment and even their life are not secure (Okonkwo et al, 2015). In Central Nigeria, armed robbery is a persistent issue. The guardian in Central Nigeria, which would have been used to stimulate the region's economic growth and development, is, unfortunately, invested in security to curtail the activities of insurgency and armed banditry. Numerous foreign investors are reluctant to allocate capital in the region due to the actions of these groups. In Central Nigeria, kidnapping—the act of removing a person from their will or from the authority of parents or guardians—has become a prevalent occurrence. Kidnapping also refers to the abduction of someone under duress, typically by force, violence, threats, or intimidation, in a situation where the victim is deprived of their freedom of movement and has no influence over the development and growth of the economy. Armed bandits have made kidnapping a business venture as they make those captures to pay a ransom, while some are sexually abused. Kidnapping in Central Nigeria is widespread and has thus dented the image of the region (Onimisi, 2018; Onimisi, 2014).

Because of the activities of insurgency and armed banditry, poverty is rapidly increasing in Central Nigeria, and the region is also placed poorly on socioeconomic indices, including life expectancy, crime rate, access to water, death rate, poverty rate, and mortality rate (Azazi, 2011). Central Nigeria is recognized as a poor region despite abundant human and natural resources across the states that make up the zone (Azazi, 2011). Insurgency and armed banditry have contributed to the decades-long security issues that have plagued the area, seriously harming its socioeconomic development. It is crucial to remember that in a setting of social and physical instability, Central Nigeria can barely hope to achieve socioeconomic progress. They have also attributed the increasing challenges posed by insurgency and armed banditry in Central Nigeria to the failure of leadership to deliver good governance, ensure equality, secure citizens' welfare, and promote justice. The country's constitution, which provides for citizens' right to life, acknowledges that the government has failed to guarantee these rights. In Central Nigeria, the inability of the government to provide a secure and safe environment free from insurgency and armed banditry, and protect the citizens' lives and properties, as well as the conduct of business and economic activities, has led to resentment and disaffection in the region. The destruction of lives and properties disrupted businesses, and economic activities in Central Nigeria have retarded the economic growth and development of the region. The socio-economic development of Central Nigeria, one of the government's primary objectives, has taken a back seat due to insurgency and armed banditry (Muzan, 2014). The activities of insurgency and armed banditry have destroyed the economic, human, and social capital structure of the region. These groups in Central Nigeria have almost crippled economic activities in the region. The insurgency and armed banditry have led to security crises in different parts of Central Nigeria, destroying existing infrastructure and preventing a peaceful environment needed for the socio-economic development of the region.

7. Policy options

Central Nigeria's quest for peace and development can be achieved through the committed efforts of all stakeholders through various peace-building initiatives, networks, and an effective local security outfit. For

Central Nigeria to ensure comprehensive security of life and property, the citizens and residents, the fight against insurgency and armed banditry should be prioritized. Civil society plays an important role in ensuring the security of Central Nigeria. Civil society can draw the government's and stakeholders' attention to the social menace posed by these groups. Civil society can help create an enabling environment through advocacy. Ethno-religious tolerance is another prominent factor that can help promote security in the environment. Central Nigeria is a highly heterogeneous society with diverse ethnic groups, religious beliefs, and different political and social affiliations. These can help create the secure environment we are looking for. Tolerance among the people of Central Nigeria is the key to upholding security in Nigeria and, in the long run, promotes development in the country.

The provision of employment opportunities and poverty alleviation in Central Nigeria is another way of reducing tension and rising in the zone. A situation where people cannot afford their basic needs like shelter, clothing, and food, and thus, they turn to criminality for survival. Some claim to commit crimes in society to make ends meet; thus, the government should prioritize the welfare and well-being of youth to curb the menace of insecurity in Central Nigeria. Ensuring adequate welfare, equal and proper allocation of wealth, and making the youth a priority will go a long way in reducing the causes of insurgency and armed banditry in Central Nigeria. The reduction in the unfair and unequal allocation and distribution of wealth among the people of Central Nigeria can help reduce social manance in the region. The strict application of rules and policies guiding the owners of light weapons would help reduce the activities of insurgency and armed banditry in Central Nigeria. The governments at all levels in Central Nigeria should intervene more decisively to stem this ugly trend since the proliferation of small arms and light weapons is dangerously becoming a transnational organized crime, thus creating a threat to security and development in the region. Policies on the security of Central Nigeria should be redirected to make it more difficult to access small arms and light weapons in the country.

The government of Central Nigeria should also address the herders-farmers conflicts that have degenerated into a serious crisis for the region. Region. Armed banditry in Central Nigeria requires serious attention because these groups' activities affect the production of goods and services and the nation's development. The region, which is home to Nigeria's food basket, remains impoverished due to the neglect of security challenges. Education is an important tool for fighting insecurity. The importance of education to national security cannot be overemphasized, as it helps achieve the significant task of ensuring the security of life and property when used effectively and in the right direction. Educating youth and vulnerable people in moral ethics, for example, by fostering trustworthiness, duty, and regard for others, would be an effective tool against insecurity. Sound educational training is an important starting point for educating young minds against social menace. Providing sound educational policies and the provision of quality education will go a long way in fighting insecurity and reducing the incidence of armed banditry in Central Nigeria. Including key stakeholders such as traditional rulers, leaders of all religious organizations, community leaders, youth-based organizations, non-governmental organizations, and civil society in advocacy and enlightening the public about the danger of involvement in insurgency and armed banditry, and the implications of these groups would be helpful in the fight against this social menace. These key stakeholders can also engage those perpetrating this mayhem in Central Nigeria. The leaders of religious organizations should be encouraged and engaged to reach out to the people by organizing events that focus on moral issues. *The National Security Strategy (2019), the Small Arms and Light Weapons Control Policy, and regional initiatives such as the Multinational Joint Task Force (MNJTF) documents should be consulted and used to enhance the security of central Nigeria and the country in general.*

8. Conclusion

Only the living can develop a nation. Hence, the security of the lives and property of citizens and residents can help promote the nation's socio-economic development. A secure Central Nigeria ensures peace, co-existence, unity, and infrastructural development. Insurgency and armed banditry hinder the region's socio-economic development. There is a need for serious action toward curbing this menace. The activities of the insurgency and armed banditry in Central Nigeria fuel disunity and fear of the unknown; thus, there is a need for the government to nip it in the bud. Insurgency and armed banditry in Central Nigeria are a major threat to socio-development and nation-building. Thus, fixing the insurgency and armed banditry would promote meaningful social, cultural, economic, and political development in Central Nigeria. Fostering a responsible and transparent approach in dealing with it is a panacea for solving the challenges of insurgency and armed

banditry in Central Nigeria. To accelerate the region's socio-economic development, the government and relevant stakeholders should pursue advocacy for ethnic and political tolerance. Also, all the levels of government in Central Nigeria should create the needed opportunities for the youth, as this will reduce youth restiveness and poverty. Finally, good governance is a panacea for insurgency and armed banditry in Central Nigeria, thus paving the way for sustained socio-economic development.

9. References

1. Abdu, A., & Shehu, S. S. (2019). The Implication of Boko Haram Insurgency on women and girls in North east Nigeria. *Journal of Public Administration and Social Welfare Research*, 4(1), 9-21.
2. Achumba, I. C., Ighomereho, O. S., & Akpor-Robaro, M. O. M. (2013). Security challenges in Nigeria and the implications for business activities and sustainable development. *Journal of economics and sustainable development*, 4(2).
3. Adedire, S. A., Ake, M., & Olowojolu, O. (2016). Combating terrorism and insurgency in Nigeria: An international collaborations against Boko Haram. *Fountain University Journal of Management and Social Sciences*: 5(1) P70
4. Akinwotu, E., & Sahabi, H. (2020). Waves of 'bandit' massacres rupture rural life in north-west Nigeria. *The Guardian Nigeria*.
5. Awojobi, O. N. (2014). The socio-economic implications of Boko Haram insurgency in the north-east of Nigeria. *International Journal of Innovation and scientific research*, 11(1), 144- 150.
6. Azazi, A. (2011). Responding to the emerging trends of terrorism in Nigeria. In *5th Policing Executive Forum Conference Proceedings organized by CLEEN Foundation* (Vol. 5).
7. Béland, D. (2005). *The political construction of collective insecurity: From moral panic to blame avoidance and organized irresponsibility*. Minda de Gunzburg Center for European Studies, Harvard University.
8. Blog, Strife, and Strife Writing Fellows. "The Academic Blog of the Department of War Studies, King's College London."
9. Checkland, P. (2000). "Soft systems methodology: a thirty year retrospective." *Systems research and behavioral science* 17, no.S11-S58.
10. Davies, A. E. (1995). "Secularity and state practices in Nigeria." *Contemporary Issues in Nigerian Affairs*. Ibadan: Sunad Publishers Ltd
11. Fjäder, C. (2014). The nation-state, national security and resilience in the age of globalisation. *Resilience*, 2(2), 114-129.
12. Garba, T. M., & Akaan, R. (2025). The Socioeconomic and Psychological Implications of Polygamy: A Quantitative and Qualitative Analysis Concerning Disaster Risk Reduction and Management (DRRM) in Nigeria. *International Journal of Contemporary Security Studies*, 1(1), 25-34.
13. Global Center for Responsibility to Protect, Nigeria: Population at Risk, March 1, 2022. Accessed February 20
14. Ibidapo-Obe, A. (2008). The Utility of Closed-Circuit Television (CCTV) in Intelligence Gathering by Security Operatives in Nigeria. In *Proceedings of conference on intelligent security*, Lagos.
15. Ifeoma, O. R., Purity, N. O., & Anagbogu, T. (2015). Security challenges and the implications for business activities in nigeria: A critical review. *Journal of Policy and Development Studies*, 289(1850), 1-12.
16. Igbini, M. D. (2020). Insurgency in Nigeria: The prognosis and its effects on the Nigerian politics. *Acta Universitatis Danubius Relationes Internationales*, 13(2), 75-96.
17. Imobighe, J. (2013). Security and national development in Nigeria: The threat of Boko Haram. *International Journal of Humanities and Social Science* 3, no. 4 (2013): 285- 291.
18. IOM, FLASH REPORT #86 (2022). Population Displacement North-west Nigeria: Zamfara State. International Organization for Migration, January 06-17

19. Madubuegwu, C. E., & Abah, N. C. (2023). Armed Banditry and National Security in Nigeria: An Exploratory Analysis. *Socialscientia: Journal of Social Sciences and Humanities*, 8(4).
20. Mustapha, U. N. (2019). Armed banditry and internal security in Zamfara State. *International Journal of Scientific & Engineering Research*, 10(8), 1219-1226.
21. Mustapha, U. N. (2019). Armed banditry and internal security in Zamfara State. *International Journal of Scientific & Engineering Research*, 10(8), 1219-1226.
22. Muzan, A. O. (2014). Insurgency in Nigeria: Addressing the causes as part of the solution. *African Human Rights Law Journal*, 14(1), 217-243.
23. Ocheni, M. M. & Jacob, E (2019). Boko Haram Terrorism and the Challenges of National Security in Nigeria's Fourth Republic in Ovwasa, O. L. (ed) *Perspectives on Research and Sustainable Development in the 21st Century Nigeria* (2019).
24. Odinkalu, C. A. (2018). Banditry in Nigeria: A brief history of a long war. *The Punch Newspaper*.
25. Ojo, J. S., Oyewole, S., & Aina, F. (2023). Forces of terror: Armed banditry and insecurity in North-west Nigeria. *Democracy and Security*, 19(4), 319-346.
26. Ojo, O. E. & Adebayo, F. P. "Freedom of Worship: A Comparative Study of the U.S and Nigeria" in Ejituwu, C. N. et al (ed) *The American Society Since the Four Freedoms*. Published by ASAN & Mindex Publishing Ltd. (2005).
27. Okoro, A. O. D. (2024). The Dynamics and Nature of Banditry in Nigeria. LAJOP Vol 5, No 1
28. Oladiran, A. (2014). Security challenge and development in Nigeria: Leadership to the rescue. *International Journal of Academic Research in Public Policy and Governance*, 1(1), 49- 58.
29. Olumuyiwa, A. O. (2015). Patriotism in nation-building: A Study of Brigadier-General Benjamin Adekunle, also known as the Black Scorpion. *European Journal of Economics, Finance and Administrative Sciences*, (71).
30. Onimisi, T. (2014). Globalisation and the Nigerian national security: An overview. *Journal of Good Governance and Sustainable Development in Africa*, 2(2), 80-85.
31. Onimisi, T. (2018). Trends of human rights abuse in Nigeria: 1996-2013. *International Journal of Advanced Studies in Social and Innovation*, 2(2), 70-79.
32. Onimisi, T. (2025). Improved security and education: Pathways to national development. *International Journal of Contemporary Security Studies*, 1(1), 205-212.
33. Onimisi, T., Samsu, K. H. K., Ismail, M. M. B., & Mohd Nor, M. B. W. (2017). Application of federal character policy: Role and constraint of the civil society in Nigeria. *Journal of Policy and Development Studies*, 11(3), 73-80.
34. Pustay, J. S. (1965). *Counterinsurgency warfare*. New York: Free Press
35. Rufai, M (2021). I AM A BANDIT: A Decade of Research in Zamfara State (Bandit's Den). Sokoto: Usman Danfodio University Press.
36. Salawu, B. (2010). Ethno-religious conflicts in Nigeria: Causal analysis and proposals for new management strategies. *European journal of social sciences*, 13(3), 345-353.
37. White, R. (1981). "Outland Gangs of the Middle Border: American Social Bandits," *The Western Historical Quarterly* 12 (4): 387 – 408.
38. Williams, G. (1980). *State and Society in Nigeria*, Ondo: Afrografika Publishers.
39. World Bank (1993). *Governance*. Washington, D.C.: World Bank.



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Article

Intelligence Gaps and Inter-Agency Rivalry in the Sahelian Theatre: Evidence from the Lake Chad Basin and Northern Nigeria

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ABSTRACT

Persistent insurgency in the Sahel-Lake Chad region highlights a paradox: extensive security investment yet limited operational success. This study examines how inter-agency rivalry, lack of information sharing, and institutional mistrust among Nigeria's security and intelligence agencies contribute to the protraction of terrorism in Northern Nigeria. Employing a qualitative-dominant mixed-methods design (2009–2023), including secondary data, declassified reports, media investigations, and semi-structured interviews, the study finds that intelligence fragmentation, driven by bureaucratic competition, leads to deliberate withholding and bureaucratic delays, which in turn cause operational failures. Case studies of the Rann airstrike (2017), the Dapchi abduction (2018), the Shiroro ambush (2022), and the Zamfara raids (2021) illustrate these dynamics. Findings are interpreted through the cyclical Intelligence-Trust-Effectiveness (ITE) Framework, showing that insecurity in the Sahelian theatre is sustained not only by militant capacity but also by institutional weakness. Policy recommendations advocate for a mandatory, civilian-led intelligence fusion cell, trust-building mechanisms, and enhanced regional intelligence fusion under ECOWAS and the MNJTF.

KEYWORDS

Intelligence sharing; inter-agency rivalry; counter-insurgency; human security; Lake Chad Basin; Nigeria; Sahel; terrorism.

1. Introduction

For over a decade, Northern Nigeria and the broader Sahelian corridor have been epicentres of Africa's most protracted insurgencies. Boko Haram and the Islamic State West Africa Province (ISWAP) have inflicted sustained violence despite successive military operations and substantial donor-funded security programmes (Akinyemi & Nwokoma, 2022; Onuoha, 2021). Nigeria's defence spending, averaging 0.6% of GDP annually between 2010 and 2022 (World Bank, 2023), has not translated into strategic security gains.

While analyses often focus on poverty, porous borders, and radical ideology, limited attention has been given to internal pathologies within the Nigerian security system, specifically, the absence of effective intelligence coordination. In the complex Sahel-Lake Chad environment, success requires rapid, reliable, and integrated intelligence flows among the military, intelligence, police, and paramilitary agencies. Evidence indicates these flows are fragmented, competitive, and politicised (Omale, 2021).



Research Question:

How have rivalry, mistrust, and inadequate information sharing between Nigerian security and intelligence agencies contributed to the protraction of terrorism in the Sahelian-Lake Chad region?

Study Contribution:

1. Reframes counter-insurgency effectiveness around institutional trust and coordination rather than mere resource allocation.
2. Links intelligence failures to measurable human and material costs through Nigeria-specific operational case studies using triangulated data.

2. Theoretical Framework and Literature Review

2.1. Cyclical Intelligence-Trust-Effectiveness (ITE) Framework

The study introduces the ITE Framework to conceptualise the ways in which inter-agency relations affect security outcomes. Drawing on Principal-Agent Theory (Lupia, 2006) and Organisational Learning Theory (Argyris, 1999), the framework posits that the effectiveness of intelligence depends on trust-based collaboration. Declining trust encourages parochial behaviour, information hoarding, and duplication of effort.

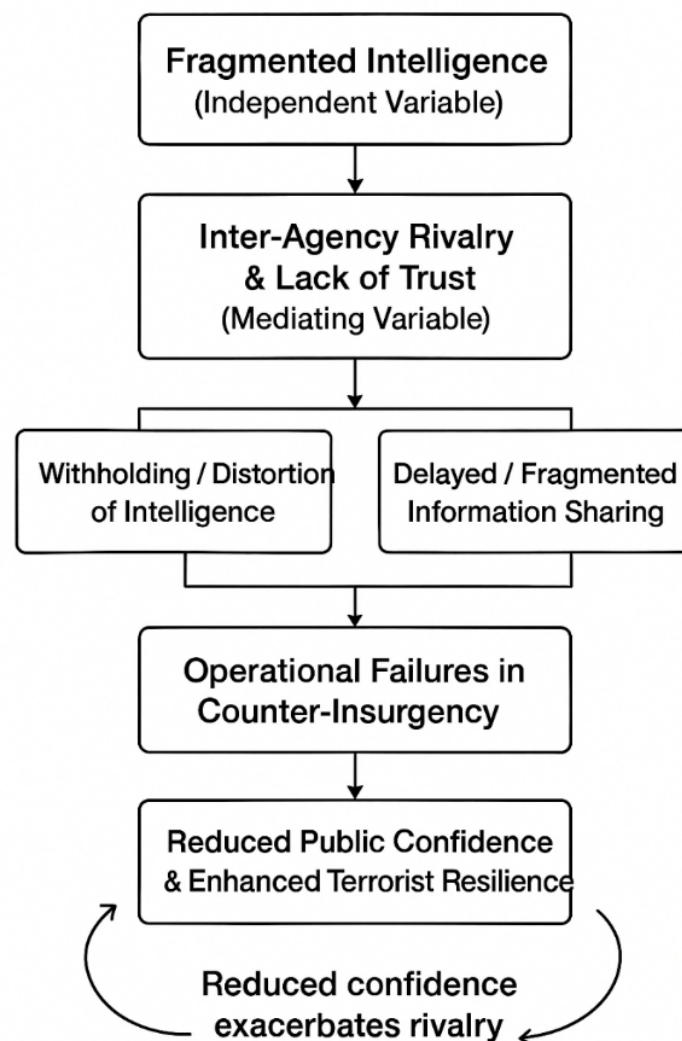


Figure 1. Cyclical Intelligence-Trust-Effectiveness (ITE) Framework. *Source:* Author's synthesis, 2025.

Narrative: This cyclical model demonstrates that operational failures not only stem from intelligence gaps but also reinforce mistrust, perpetuating rivalry, and further weakening counter-insurgency outcomes. Unlike linear models, it captures feedback loops and institutional pathologies that sustain insecurity. The empirical “Cycle of Dysfunction” identified in the findings (see Figure 2) operationalizes this theoretical framework within the Nigerian context.

2.2. Inter-Agency Rivalry and Information Sharing

Nigeria’s security sector operates in silos (Aghedo & Osumah, 2014). The Army, DSS, NIA, and Police often prioritise institutional credit over collaboration, exacerbated by unclear mandates and political interference (Ewi, 2020). Intelligence is frequently withheld to protect the agency’s reputation (Omale, 2021).

2.3. Consequences of Intelligence Failure

Intelligence fragmentation has led to:

- Mistaken airstrikes on civilian targets (Rann, 2017)
- Ambushes on military patrols (Shiroro, 2022)
- Mass abductions (Dapchi, 2018)
- Inadequate pre-emptive action against bandits (Zamfara, 2021)

Comparative studies from Afghanistan and Mali confirm that inter-agency rivalry exacerbates insurgent adaptability (Williams, 2020).

2.4. Literature Gap

Current scholarship emphasises military tactics and civilian protection but rarely examines the internal politics of intelligence failure. This study addresses this gap through a Nigeria-focused case analysis (2017-2023), using a robust mixed-methods approach to trace the causal mechanisms of failure.

Related Nigerian and regional scholarship also underscores that public safety outcomes depend on cross-institutional coordination in domains such as policing and safe schools, information-resource security, psycho-social support, and wider DRRM-linked social vulnerabilities—yet these insights are rarely integrated into analyses of intelligence fragmentation and inter-agency rivalry in counter-insurgency operations (Dada et al., 2025; Garba & Akaan, 2025; Janković et al., 2025; Metić, 2025; Popović Mančević, 2025).”

Table 1. Key Literature on Intelligence Coordination.

Author(s)	Focus Area	Relevance to Current Study
Aghedo & Osumah (2014)	Security agencies’ rivalry in Nigeria’s counterterrorism	Shows the historical roots of rivalry and duplication
Ewi (2020)	Regional security cooperation in West Africa	Highlights ECOWAS limits in intelligence sharing
Onuoha (2021)	Boko Haram intelligence failures	Documents communication gaps
Okoli (2022)	Military accountability in Nigeria	Connects blame culture to weak intelligence systems

Source: Author compilation, 2025

3. Methodology

3.1. Research Design

A qualitative-dominant mixed-methods design (Creswell & Plano Clark, 2018) was employed, integrating:

1. Documentary analysis of Defence HQ, DSS, National Security Adviser, MNJTF, and Senate reports (2017-2023).
2. Semi-structured interviews with eight anonymized security professionals (retired officers, intelligence analysts, journalists), conducted between January and June 2024, following informed consent protocols.
3. Incident analysis of four emblematic failures in Northern Nigeria.
4. Triangulation with media, NGO, and academic sources to enhance credibility.

3.2. Sampling and Case Selection

Cases were purposively selected to capture air operations, ground patrols, civilian rescue, and counter-banditry.

Table 2. Case Selection Summary.

Case	Incident Type	Relevance
Rann (Borno)	2017)	Airstrike on IDP Camp Air-ground intel failure
Dapchi (Yobe)	2018)	Schoolgirls abduction Predictive intel failure
Zamfara (2021)	Bandit raids	Jurisdictional rivalry
Shiroro (2022)	Ambush on soldiers	Tactical intel breakdown

Source: Author compilation, 2025

3.3. Data Analysis

- NVivo 12 was used for thematic coding (meta-themes: rivalry, fragmented pipelines, operational consequences).
- Cross-case patterns were mapped to the ITE Framework.
- A process-tracing approach was employed to reconstruct the intelligence flow and identify specific points of failure for each case.

3.4. interviewee Table (Anonymized)

Code	Background	Role in Study
INT-Army01	Retired Colonel	Interview on Rann & Shiroro
INT-DSS01	Former DSS Analyst	Interview on Dapchi & Zamfara
INT-NAVY01	Retired Navy Officer	Strategic coordination
INT-Journalist01	Security Correspondent	Cross-validation of events
INT-MNJTF01	MNJTF Consultant	Regional intel perspective
INT-Army02	Retired Lt. Colonel	Counter-banditry operations
INT-DSS02	Retired DSS Field Officer	Operational insights
INT-Journalist02	Security Analyst	Media triangulation

Source: Author compilation, 2025

3.5 Validity and Reliability

- Triangulation across interview, documentary, and media sources enhanced internal validity.
- Standardized coding protocols ensured reliability.
- Limitations include potential recall bias in interviews and restricted access to classified data.

4. Findings and Case Analyses

4.1. Rann Airstrike (2017)

17 Jan 2017: NAF mistakenly bombed IDP camp, 120+ deaths (MSF, 2017).

- **Cause:** Unverified coordinates; the DSS had previously flagged the location as a civilian safe zone, but this information was not integrated into the Air Force's operational picture.
- **Mechanism:** A communication silo between the DSS and the NAF, rooted in a lack of standardized sharing protocols, led directly to the mistaken strike and mass civilian deaths. As INT-DSS02 noted, «We had marked Rann as a humanitarian site, but that database was not linked to the Air Force's targeting cell. They operated on separate, unverified information.»

4.2. Dapchi Abduction (2018)

19 Feb 2018: 110 schoolgirls abducted.

- **Cause:** A jurisdictional dispute between the DSS and the Army led to delayed escalation. Intelligence on suspicious movements near Dapchi was not acted upon decisively.
- **Mechanism:** Information hoarding due to inter-agency competition prevented a consolidated threat assessment. This is corroborated by the Nigerian Senate (2019) report and INT-Journalist01, who stated, «There was a standoff about who «owned» the Dapchi threat, DSS for internal security or the Army for counter-insurgency. While they debated, the window for prevention closed.»

4.3. Zamfara Bandit Raids (2021)

- **Cause:** Multiple agencies (Police, Army, DSS) acted independently on overlapping intelligence; UAV surveillance data collected by one agency was not shared with others on the ground.
- **Mechanism:** Deliberate non-sharing of tactical intelligence, driven by competition for operational credit, led to an avoidable ambush. INT-Army02 explained, «We knew the bandits were massing from our UAV feeds, but that was considered <our> asset. The police unit that walked into the ambush didn't have that real-time picture.»

4.4. Shiroro Ambush (2022)

- **Cause:** Critical human intelligence on insurgent movements was delayed by 48 hours due to a hierarchical verification process between field agents and headquarters.
- **Mechanism:** Bureaucratic delay, compounded by a culture of distrust in intelligence sourced from other services, prevented timely deployment. INT-Army01 confirmed, «The intel was good, but it came through a joint channel and was stuck in <verification.> By the time it was deemed credible, our men were already in a kill zone.»

Table 3. Recurrent Intelligence Failure Mechanisms

Mechanism	Manifestation Across Cases
Bureaucratic delay	Rann Shiroro
Information hoarding	Dapchi, Zamfara
Jurisdictional competition	Zamfara, Dapchi

Source: Author compilation, 2025

5. Discussion

5.1. Institutional Rivalry

Agencies function as fiefdoms, influenced by political patronage. The lack of horizontal integration reinforces rivalry (Ewi, 2020), a finding consistently reported by interviewees across agencies (INT-DSS01, INT-Army01).

5.2. Counter-Insurgency Implications

Fragmented intelligence increases vulnerability to ambushes. Militants actively exploit these communication gaps, resulting in repeated operational failures. The empirical data reveal a self-reinforcing cycle.

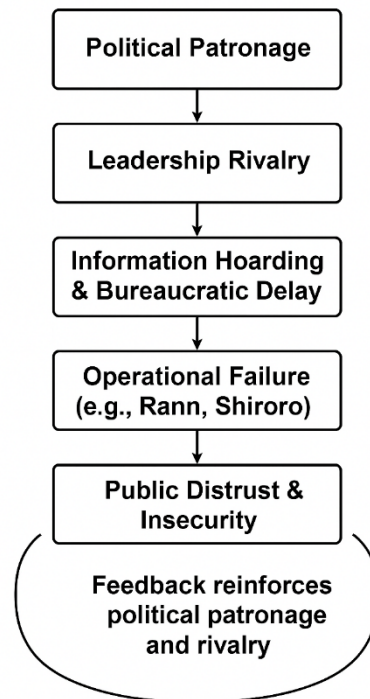


Figure 2. The Cycle of Dysfunction: An Empirical Instantiation of the ITE Framework

This cycle operationalizes the broader ITE Framework, showing how theoretical variables manifest in the Nigerian context, with political patronage acting as a key driver.

5.3. Regional Implications

Domestic intelligence failures have direct spillover effects, compromising the effectiveness of regional bodies. Delayed or fragmented intelligence from Nigeria constrained the MNJTF's coordinated response during critical ISWAP incursions in 2019 (UN, 2020; INT-MNJTF01).

5.4. Policy Recommendations

1. **Establish a National Intelligence Fusion and Coordination Centre (NIFCC):** Mandate a civilian-headed body that reports directly to the National Security Adviser, with the authority to task agencies and integrate all-source intelligence.
2. **Reform the National Security Agencies Act (Cap N74, 2004):** Legally streamline mandates and clarify jurisdictional boundaries to reduce competition.
3. **Implement Joint Training & Rotational Leadership:** Develop a curriculum including table-top exercises based on the emblematic cases studied here to build trust and shared mental models.
4. **Invest in Secure Digital Interoperability:** Fund and deploy shared, secure platforms for real-time intelligence dissemination across all operational commands.
5. **Formalise Civil-Military Liaison:** Institutionalize coordination with humanitarian agencies to prevent tragedies like Rann and improve human security.

Feasibility Note: While resistance from entrenched institutional interests is expected, the recurring and measurable human and strategic costs documented in this study provide a compelling mandate for decisive reform.

6. Conclusion

The endurance of insurgency in the Sahelian theatre is institutionally, not solely militarily, driven. The cases of Rann, Dapchi, Zamfara, and Shiroro, analyzed through triangulated data, illustrate how deep-seated rivalry, mistrust, and bureaucratic inertia systematically convert intelligence potential into operational liability. The cyclical Intelligence-Trust-Effectiveness Framework demonstrates that breaking this cycle requires more than just funding; it demands deliberate structural reform, enhanced transparency, depoliticised leadership, and genuine regional integration to secure the Lake Chad Basin.

7. References

1. Aghedo, I., & Osumah, O. (2014). Insurgency in Nigeria: A nation's existential challenge. *African Security Review*, 23(2), 106-115.
2. Akinyemi, B., & Nwokoma, N. (2022). Security expenditure and governance quality in Nigeria. *Defence and Peace Economics*, 33(4), 421-438.
3. Argyris, C. (1999). *On organizational learning* (2nd ed.). Blackwell.
4. Creswell, J. W., & Plano Clark, V. L. (2018). *Designing and conducting mixed methods research* (3rd ed.). Sage.
5. Dada, K. S. J., Mohammed, H. A., Mallam, D., & Ajayi, E. O. (2025). Security of information resources in Federal College of Education libraries in Northwest Nigeria. *International Journal of Contemporary Security Studies*, 1(1), 85-98.
6. Ewi, M. (2020). Security sector reform and coordination in West Africa. *African Security Review*, 29(3), 255-273.
7. Garba, T. M., & Akaan, R. (2025). The Socioeconomic and Psychological Implications of Polygamy: A Quantitative and Qualitative Analysis Concerning Disaster Risk Reduction and Management (DRRM) in Nigeria. *International Journal of Contemporary Security Studies*, 1(1), 25-34.
8. International Crisis Group. (2022). *Stopping Nigeria's spiralling farmer-herder violence*. ICG.
9. Janković, L., Cvetković, V. M., Gačić, J., Renner, R., & Jakovljević, V. (2025). Integrating psychosocial support into emergency and disaster management and public safety: The role of the Red Cross of Serbia. *International Journal of Contemporary Security Studies*, 1(1), 99-124.
10. Lupia, A. (2006). Delegation and its perils. In K. Strøm & W. Müller (Eds.), *Delegation and accountability in parliamentary democracies* (pp. 33-69). Oxford University Press.
11. Médecins Sans Frontières. (2017). *Nigeria: Dozens killed in Rann airstrike*. MSF.
12. Metić, A. (2025). The Significance and Role of Police Officers in Building the School as a Safe Environment for All Students. *International Journal of Contemporary Security Studies*, 1(1), 17-24.
13. Nigerian Senate. (2019). *Report of the ad-hoc committee on the Dapchi abduction incident*. National Assembly Press.
14. Okoli, A. C. (2022). Counter-insurgency and state fragility in Nigeria. *Small Wars & Insurgencies*, 33(6), 1150-1172.
15. Omale, D. (2021). Inter-agency coordination and the future of Nigerian security. *Journal of African Peace and Security*, 12(1), 75-90.
16. Onuoha, F. C. (2021). Intelligence failures and the persistence of Boko Haram violence. *African Affairs*, 120(479), 560-584.
17. Popović Mančević, M. (2025). Non-Traditional Roles of Military Actors: NATO's Engagement in Natural Disaster Response. *International Journal of Contemporary Security Studies*, 1(1), 75-84.
18. Premium Times. (2021, June 15). *Zamfara attacks: 20 policemen killed as bandits ambush convoy*.

19. United Nations. (2020). *Report of the Secretary-General on the activities of the MNJTF in the Lake Chad Basin*. UN.
20. Williams, P. (2020). Lessons from counter-insurgency in Mali and Afghanistan. *Journal of Strategic Studies*, 43(7), 1053-1078.
21. World Bank. (2023). *Military expenditure (% of GDP) - Nigeria*. <https://data.worldbank.org/indicator/MS.MIL.XPND.GD.ZS?locations=NG>





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Research article

Middle Powers in a Multipolar World: The Case of Turkey's Foreign Policy Repositioning

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ABSTRACT

In today's emerging multipolar world, middle powers are playing increasingly active roles in regional and global affairs. This article examines Turkey's foreign policy transformation over the past two decades, focusing on how it has repositioned itself as an assertive and strategically autonomous middle power. While historically aligned with the West through NATO and its EU aspirations, Turkey has adopted a more diversified and multidirectional approach. Methodologically, the study employs a qualitative single-case analysis drawing on official policy documents, leadership discourse, and secondary academic and policy sources. Its outreach now includes deeper engagement in the Middle East, Africa, and Central Asia, expanding cooperation with Russia and China, and more transactional ties with the United States and the European Union. Key drivers behind this shift include domestic political changes, economic needs, and evolving security concerns. Turkey also employs soft power, including humanitarian diplomacy, media influence, and defense exports, as part of a hybrid toolkit to extend its influence. The article finds that Turkey's repositioning reflects broader patterns of middle-power behavior in a multipolar world. It concludes that its long-term effectiveness will depend on internal stability, economic resilience, and balanced global relations within an increasingly fragmented international order.

KEYWORDS

Middle powers; Multipolar world order; Turkish foreign policy; regional diplomacy.

1. Introduction

The global order is undergoing a fundamental transformation, marked by the steady erosion of unipolarity and the ascent of a multipolar configuration in which multiple centers of power increasingly shape international affairs. In the aftermath of the Cold War, the United States' dominance as the unchallenged global hegemon gave rise to a liberal international order characterized by American military preponderance, economic integration under neoliberal principles, and the institutionalization of global governance mechanisms (Ikenberry, 2001, p. 3). However, this unipolar moment proved to be historically contingent and structurally unsustainable. The twenty-first century has witnessed the resurgence of strategic competition, the diffusion of economic power, and the reassertion of regional and civilizational identities. As emerging powers such as China, Russia, India, and Brazil challenge the normative and institutional foundations of the Western-led order, the international system is becoming increasingly fragmented and contested (Acharya, 2018, p. 56).



In this shifting global landscape, the agency of middle powers has become more pronounced. Traditionally positioned between major and minor powers, middle powers possess sufficient material capabilities and diplomatic acumen to shape outcomes within specific regional or thematic arenas. They often act as norm entrepreneurs, coalition builders, and mediators in international disputes (Cooper, 1997, p. 9). Unlike great powers, they tend to eschew expansionist ambitions in favor of stability-oriented activism. However, the advent of multipolarity has altered the behavioral logic of middle powers, offering them both opportunities for strategic maneuvering and challenges related to systemic volatility. Recent debates in the *International Journal of Contemporary Security Studies* (IJCSS) have highlighted how middle powers navigate multipolar uncertainty through strategic autonomy, flexible alignment, and regionally grounded security practices, providing an essential analytical backdrop for this study (Petrović, 2025, p. 139-148).

Over the past two decades, Turkey has transitioned from a traditionally Western-aligned actor to a more autonomous and assertive regional power (Kirişci, 2011, p. 33). While maintaining its formal commitment to NATO and its institutional connections with the European Union, Ankara has pursued a multidirectional foreign policy that engages a broader array of partners across the Middle East, Africa, Eurasia, and the Global South (Kardaş, 2013, p. 637). This repositioning has involved a diverse set of instruments, including military interventions, energy diplomacy, cultural outreach, humanitarian assistance, and ideological framing. The resulting foreign policy doctrine diverges significantly from Turkey's earlier tradition of cautious, security-oriented diplomacy. It reveals a deliberate effort to redefine its identity and role on the world stage.

For the purposes of this study, "strategic autonomy" refers to a state's capacity to formulate and implement foreign policy independently of binding alliance constraints; "active neutrality," used interchangeably with "strategic flexibility," denotes selective engagement with competing power blocs without permanent alignment; and "multidirectional foreign policy" describes the simultaneous pursuit of diversified diplomatic, economic, and security relations across multiple regions and actors.

This article seeks to analyze the repositioning of Turkey's foreign policy within the framework of middle power behavior in a multipolar world. It examines the historical evolution, strategic motivations, and operational dimensions of Turkey's foreign policy transformation under the leadership of the Justice and Development Party (AKP), particularly under President Recep Tayyip Erdoğan (Hintz, 2018, pp. 75–77). The research aims to address three interrelated questions:

- (1) How does Turkey's recent foreign policy behavior correspond to theoretical expectations of middle powers in multipolar systems?
- (2) What strategic, economic, and domestic drivers account for Turkey's growing assertiveness?
- (3) What instruments does Turkey employ to project influence, and what limits does this repositioning impose on regional stability and global governance?

To address these questions, the article adopts a qualitative analytical methodology rooted in the tradition of foreign policy analysis (FPA) and middle power theory. The study combines theoretical insights from neoclassical realism and constructivist perspectives with empirical data drawn from official policy documents, speeches by Turkish leaders, regional diplomatic engagements, and third-party assessments published by international think tanks and academic institutions (Ünver, 2015, p. 272). The research is designed as a single-case qualitative study, using Turkey as an illustrative case of a middle power navigating the uncertainties of a multipolar world. The justification for this case study design lies in the explanatory richness that Turkey provides, given its strategic geography, military capabilities, political transformations, and complex relations with both Western and non-Western actors (Öniş & Kutlay, 2017, p. 8).

The analytical framework employed in this study rests on four core pillars: historical continuity and change in Turkish foreign policy; the quest for strategic autonomy in a fragmented global order; the deployment of hybrid power instruments (hard, soft, and economic); and the impact of domestic political dynamics on foreign policy behavior. Each of these components is examined across temporal and regional contexts to trace the evolution and coherence of Turkey's strategic outlook. The paper does not aim to offer a definitive judgment on the success or failure of Turkey's repositioning; rather, it seeks to critically assess the structural logic, internal contradictions, and external ramifications of this foreign policy shift (Oğuzlu, 2020, p. 31).

The novelty of this research lies in its integration of middle power theory with empirical evidence from Turkey's regional engagements, particularly after the Arab uprisings and the shifting dynamics of the post-2016 international system. By framing Turkey's foreign policy not as an aberration or anomaly, but as a strategic

recalibration typical of contemporary middle powers, the article contributes to a more nuanced understanding of how non-hegemonic states adapt to systemic uncertainty. It also adds to the growing literature on the diversification of global governance actors, emphasizing the role of regional powers in contesting and reconfiguring the norms and institutions of international politics.

Methodologically, the article follows a thematic structure organized into interconnected sections. The first section lays out the conceptual foundations of middle power behavior and its relevance in multipolar settings. The second section traces the historical trajectory of Turkish foreign policy, highlighting continuities and ruptures. The third section examines the specific dimensions of Turkey's repositioning, including military assertiveness, economic diplomacy, and cultural projection. The fourth section investigates the domestic drivers and constraints shaping foreign policy decisions. The final section evaluates the regional and global implications of Turkey's middle power activism and offers reflections on its strategic sustainability.

By weaving together theory, history, policy analysis, and regional dynamics, this article seeks to offer a comprehensive and critical account of Turkey's foreign policy repositioning as a middle power navigating a turbulent and pluralistic international environment. It invites scholars, practitioners, and regional observers to consider the interplay between global structural change and state-level agency, and to assess how countries like Turkey contribute to, and are shaped by, the emerging contours of a multipolar world.

2. Method and Scope of Research

This study adopts a qualitative case study approach, using Turkey as a model for analyzing middle power behavior in a multipolar world. The research is based on document and discourse analysis, drawing from academic literature, policy reports, and official statements. Academic peer-reviewed literature is prioritized for theoretical framing, while official policy documents and leadership speeches are used to capture state intent and strategic discourse. Policy reports and think-tank assessments are employed as supplementary sources to contextualize regional developments and external perceptions.

The scope covers the period from the early 2000s to the present, focusing on Turkey's foreign policy shifts, regional diplomacy, strategic partnerships, and balancing between Western and non-Western actors. The study aims to understand how Turkey seeks strategic autonomy and what this reveals about middle power dynamics in global politics.

Core Issue

The core issue of this research is Turkey's evolving role as a middle power within a multipolar international system. The study focuses on how Turkey's foreign policy repositioning reflects broader shifts in global power structures and middle power diplomacy. This topic is highly relevant to contemporary international studies, as it highlights the strategic behavior of states that operate between great powers and emerging poles. By examining Turkey's pursuit of strategic autonomy and regional influence, the research sheds light on how middle powers adapt to uncertainty, seek agency, and reshape traditional alliance patterns in a changing global order.

3. Middle Powers and the Multipolar System

This section outlines the defining characteristics of middle power behavior in a multipolar international system and explains how structural fragmentation expands both opportunities and constraints for middle power agency.

The emergence of multipolarity has significantly altered the strategic calculus of states that do not belong to the club of great powers but nevertheless possess enough material and diplomatic resources to exert influence. These states, often labeled as "middle powers," occupy a distinctive niche in the international hierarchy, with their behavioral patterns shaped by both systemic pressures and domestic determinants (Cooper, 1997, p. 9). Middle powers are states that are neither great nor small in terms of international capability and influence but have the capacity and willingness to act as stabilizers in the global system. They often leverage multilateralism, mediation, and institution-building to pursue their interests and contribute to global governance (Holbraad, 1984, p. 74).

In a multipolar world where power is more diffusely distributed across regional and functional domains, the scope for middle power activism expands. Rather than aligning unconditionally with dominant powers, these states pursue diversified strategies, including hedging, soft balancing, and issue-based coalitions (Paul, 2018, pp. 122–124). Multipolarity provides middle powers with new avenues for strategic autonomy, particularly when global institutions are in flux and hegemonic leadership is either absent or contested (Gilley & O’Neil, 2014, p. 3). The ability to navigate between rival poles, engage in selective partnerships, and articulate alternative normative visions becomes a hallmark of middle power diplomacy in this context.

Turkey’s emergence as a middle power in the multipolar order is not merely the product of its geography but of its evolving strategic ambitions (Oğuzlu, 2023, pp. 267–284). As a NATO member, a candidate for EU accession, and a rising regional actor, Turkey has long occupied a liminal position between the West and the Global South. The AKP’s foreign policy, particularly in the 2010s, sought to capitalize on this position by advancing a multidimensional diplomacy that was at once Western-facing and regionally assertive (Davutoğlu, 2001, p. 73). The country’s increasing involvement in regional crises, its diversification of alliances, and its engagement in international institutions such as the G20 and MİKTA reflect a middle power strategy aimed at maximizing leverage through flexible alignment.

Moreover, Turkey’s behavior fits the profile of an emerging middle power; a state from the Global South that challenges the dominance of established powers not through confrontation, but through norm-setting, soft power, and regional leadership. This is evident in Turkey’s proactive humanitarian diplomacy, its emphasis on Muslim solidarity, and its hosting of platforms such as the Istanbul Mediation Conferences. As a middle power, Turkey aspires not only to influence regional outcomes but also to shape the normative contours of global politics. Its call for reforming the United Nations Security Council under the slogan “The world is bigger than five” illustrates its desire to question the legitimacy of the existing order.

Yet, Turkey’s middle power activism also reveals inherent tensions. While the fluidity of multipolarity offers opportunities for maneuver, it also entails volatility and strategic ambiguity (Schweller, 2011, p. 285). Middle powers like Turkey must constantly adapt to shifting alignments, manage complex regional rivalries, and prevent overextension. The ability of middle powers to influence global or regional agendas depends not only on material resources but also on the coherence of their strategies and the credibility of their commitments (Hellmann & Herborn, 2010, pp. 795–816). In Turkey’s case, balancing between NATO obligations, economic ties with the EU, energy dependency on Russia, and growing interactions with China has proven both a strength and a vulnerability.

Therefore, the Turkish experience serves as an instructive case for understanding how middle powers are repositioning themselves in a world no longer governed by a single hegemon. Turkey’s foreign policy is not simply reactive to structural shifts; it reflects an active pursuit of a new role in the evolving international architecture. By combining strategic ambition with regional embeddedness, and by engaging both institutional and unilateral pathways, Turkey exemplifies the dynamism and dilemmas of middle power diplomacy in a multipolar age (Kardaş, 2013, p. 645).

4. The Evolution of Turkish Foreign Policy

This section traces the historical evolution of Turkish foreign policy, highlighting the shift from cautious Western alignment toward a more proactive and regionally assertive posture.

The historical evolution of Turkey’s foreign policy provides crucial insight into its contemporary repositioning as a middle power in a multipolar world. For much of the twentieth century, Turkey maintained a cautious and Western-oriented foreign policy, rooted in the principles of Kemalist ideology. This approach emphasized national sovereignty, secularism, and alignment with the Euro-Atlantic order. Following its accession to NATO in 1952, Turkey firmly positioned itself within the Western security architecture, viewing alignment with the United States and Western Europe as essential to its national security and modernization trajectory (Hale, 2013, p. 204).

Throughout the Cold War, Turkish foreign policy was predominantly reactive and focused on strategic containment. The Soviet threat loomed large, leading Ankara to prioritize military cooperation with NATO allies and limit its engagement with volatile regions such as the Middle East. Turkish diplomacy was characterized

by restraint, caution, and an aversion to regional entanglements that could threaten its Western alliances. This approach continued into the post-Cold War era, although the regional context began to shift rapidly with the disintegration of the Soviet Union, the Gulf War, and the emergence of new threats and opportunities in the Middle East, Balkans, and Central Asia (Robins, 2003, p. 49).

The 1990s marked a transitional phase, with Turkey cautiously exploring new foreign policy directions while grappling with domestic instability and the rise of political Islam. It was not until the early 2000s, with the electoral victory of the Justice and Development Party (AKP), that a comprehensive shift began to unfold. The AKP's ascent to power signaled the beginning of a more proactive, multidimensional, and ideologically nuanced foreign policy. While the party initially framed its approach in pragmatic and reformist terms; seeking to deepen EU integration, normalize relations with neighbors, and enhance Turkey's soft power; the trajectory of Turkish foreign policy would change dramatically in response to both domestic transformations and regional upheavals (Öniş & Yılmaz, 2009, p. 9).

A key architect of this new vision was Ahmet Davutoğlu, whose concept of "strategic depth" emphasized Turkey's historical and cultural ties across the former Ottoman space. Under his influence, the AKP government launched the "zero problems with neighbors" doctrine, aimed at resolving longstanding tensions and positioning Turkey as a benevolent regional leader. This period saw a remarkable expansion in Turkey's diplomatic outreach, economic partnerships, and cultural initiatives. Relations with Syria, Iran, Iraq, and the Gulf states improved, and Turkey became an active mediator in regional disputes. Simultaneously, its soft power tools; such as development aid, humanitarian diplomacy, and cultural promotion; were deployed to enhance its image and influence across the Muslim world and beyond (Davutoğlu, 2001, p. 74).

However, the optimism of this period proved short-lived. The eruption of the Arab uprisings in 2010 presented both opportunities and challenges for Turkish foreign policy. Initially supportive of popular demands for change, Turkey sought to position itself as a model for democratic governance in the Muslim world. Yet, as the uprisings devolved into civil wars and authoritarian reversals, Turkey's approach shifted toward a more interventionist and ideologically driven posture. In Syria, Ankara moved from cautious diplomacy to direct military involvement, driven by security concerns and strategic competition. In Egypt, it backed the Muslim Brotherhood and refused to recognize the post-coup regime, leading to a rupture with Cairo and tensions with other Gulf monarchies (Oğüzlu, 2023, pp. 267–284).

These developments marked a decisive departure from the earlier "zero problems" strategy and ushered in a new era of assertive regional engagement. Turkish foreign policy became increasingly securitized, personalized, and shaped by domestic political dynamics. The failed coup attempts in 2016 further accelerated this transformation, as the Turkish leadership adopted a more nationalist and anti-Western narrative. Relations with the United States and the European Union deteriorated, while partnerships with Russia, China, and Qatar deepened. This pivot reflected a broader desire to pursue strategic autonomy and resist external pressure, even at the cost of traditional alliances.

Today, Turkey's foreign policy reflects a complex amalgam of historical legacies, strategic calculations, and domestic imperatives. While its Western ties remain formally intact, Ankara's actions increasingly signal a desire to operate independently within the international system. This evolution illustrates not only Turkey's adaptation to a changing global environment but also its ambition to shape that environment as a confident, regionally grounded, and ideologically assertive middle power.

5. Strategic Autonomy and Regional Assertiveness

This section examines Turkey's pursuit of strategic autonomy and demonstrates how this objective has translated into increasingly assertive regional policies and independent security decisions.

One of the most defining and debated dimensions of Turkey's foreign policy repositioning is its growing pursuit of strategic autonomy. In contrast to its historical reliance on Western alliances, particularly NATO and the United States, contemporary Turkish foreign policy has been increasingly marked by independent decision-making, assertive regional engagement, and a willingness to challenge the preferences of its traditional allies. This shift does not imply an outright break from the West but reflects a recalibration of priorities and a broader desire to diversify strategic partnerships in an increasingly multipolar world.

The trajectory of strategic autonomy gained momentum following the breakdown of trust between Ankara and Washington, especially after the 2016 failed coup attempt in Turkey. The Turkish leadership accused Western powers of being either indifferent or complicit in the events, and the presence of Fethullah Gülen in the United States fueled suspicions of a hidden agenda. These grievances added to existing tensions over Syria, where the United States' cooperation with the Kurdish YPG, considered by Turkey as an extension of the PKK, was viewed as a direct threat to Turkish national security (Hintz, 2018, pp. 141–145).

This environment of deepening mistrust catalyzed Ankara's move toward a more diversified foreign policy strategy. The clearest manifestation of this shift was Turkey's acquisition of the Russian S-400 missile defense system in 2017, despite strong objections from NATO and the subsequent imposition of U.S. sanctions. For Turkish policymakers, this procurement symbolized a commitment to sovereign defense decision-making (Aydın, 2010; Stein, 2020). Critics, however, viewed it as a symptom of Turkey's drift away from the transatlantic alliance. Ankara's subsequent exclusion from the F-35 fighter jet program in 2019, following the imposition of U.S. CAATSA-related measures, underscored the growing rift with Washington and the redefinition of defense relationships (Aydın, 2010; Stein, 2020).

Turkey's pursuit of strategic autonomy has also been reflected in its increased military presence and operations in its neighborhood. In Syria, Turkey has conducted a series of cross-border operations between 2016 and 2019 aimed at curbing the expansion of Kurdish forces and establishing buffer zones. These military campaigns, including Operation Euphrates Shield, Olive Branch, and Peace Spring, signaled a new doctrine of proactive defense, wherein threats beyond Turkey's borders were addressed through direct intervention (Hintz, 2018; Oğuzlu, 2020). While these operations were justified in terms of counterterrorism and refugee management, they also served broader geopolitical aims of establishing influence in northern Syria.

Beyond Syria, Turkey has projected its military and diplomatic influence into multiple regional theaters. In Libya, Ankara intervened decisively in support of the UN-recognized Government of National Accord, deploying drones, advisors, and naval assets. The intervention not only altered the course of the Libyan conflict but also secured maritime agreements that bolstered Turkey's claims in the Eastern Mediterranean. In the Caucasus, Turkey's backing of Azerbaijan during the 2020 Nagorno-Karabakh war reinforced its image as a capable military ally and a strategic actor in Eurasia. These actions demonstrated Ankara's readiness to take calculated risks and to use hard power as a complement to diplomatic engagement.

The Eastern Mediterranean has become another arena where Turkey's assertiveness is clearly visible. Tensions with Greece and Cyprus over maritime boundaries, natural gas exploration, and the status of disputed islands have escalated into diplomatic standoffs and naval brinkmanship. Turkey has dispatched research vessels and naval escorts to contested waters, asserting its interpretation of maritime rights and challenging the legitimacy of exclusive economic zones declared by other actors. While Ankara defends its position as grounded in international law and national sovereignty, these moves have alarmed the European Union and raised concerns about regional stability.

Yet, Turkey's pursuit of strategic autonomy is not limited to the military domain. It also entails a deliberate effort to diversify its strategic alignments and reduce dependency on Western actors. Relations with Russia, China, and Iran have gained new prominence, even as they remain complicated by historical rivalries and conflicting interests. Ankara's participation in forums such as the Astana process on Syria and its growing trade with Asian economies reflect an eastward shift in orientation. At the same time, Turkey continues to engage with Western institutions, albeit on its own terms, seeking transactional cooperation rather than full alignment.

The doctrine underpinning this behavior is rooted in the concept of "active neutrality" or "strategic flexibility," whereby Turkey avoids binding commitments to any one bloc and maximizes its leverage by engaging multiple actors simultaneously. This approach allows for agility in a fluid geopolitical environment but also carries risks of isolation and credibility loss. Critics argue that strategic ambiguity may confuse allies and embolden adversaries, while supporters claim it reflects a realistic adaptation to a world no longer governed by fixed alliances or unipolar discipline (Öniş & Kutlay, 2020, p. 200).

In essence, Turkey's quest for strategic autonomy marks a significant transformation in its foreign policy identity. It signals a departure from the predictability of alliance-bound behavior toward a more fluid, interest-driven, and assertive international role. Whether this strategic autonomy can be sustained over the long term, however, will depend on Turkey's ability to manage the complex interplay between its regional ambitions, global partnerships, and domestic imperatives.

To synthesize the foregoing analysis, Table 1 maps the key drivers of Turkey's pursuit of strategic autonomy to the instruments employed, the primary regional arenas involved, and the main constraints shaping its assertive foreign policy behavior.

Table 1. Turkey's Strategic Autonomy and Regional Assertiveness

Drivers	Instruments	Primary Regions	Key Constraints
Breakdown of trust with Western allies after 2016	Strategic defense procurement (e.g., S-400)	NATO space / Transatlantic relations	Sanctions and alliance tensions
Regional security threats and conflict spillovers	Cross-border military operations	Syria and Iraq	Risk of military overextension
Competition over maritime rights and energy resources	Naval deployments and energy exploration	Eastern Mediterranean	EU opposition and legal disputes
Shifting balance of power in regional conflicts	Military support to allies and partners	Libya and the Caucasus	Escalation risks and regional backlash
Multipolarity and declining alliance predictability	Active neutrality and strategic flexibility	Eurasia and Global South	Credibility costs and strategic ambiguity

As summarized in Table 1, Turkey's pursuit of strategic autonomy relies on a hybrid toolkit that varies across regions and is conditioned by both structural and domestic constraints.

6. Economic Diplomacy and Energy Strategy

This section analyzes how economic diplomacy and energy strategy function as core instruments of Turkey's foreign policy, reinforcing its regional influence and strategic autonomy.

In tandem with its strategic and military activism, Turkey has increasingly relied on economic diplomacy and energy strategy as key pillars of its foreign policy repositioning. These instruments not only serve as tools for advancing national interests but also reinforce Ankara's aspirations to act as a regional hub and global connector between East and West (Kirişçi, 2009, pp. 29–57). Economic statecraft allows Turkey to pursue influence through trade, investment, development aid, and energy transit, often complementing its geopolitical goals with commercial incentives and infrastructure initiatives (Kirişçi, 2017).

One of Turkey's most pronounced ambitions has been to become an energy corridor linking suppliers in the Caucasus, Central Asia, and the Middle East to consumers in Europe. Its geostrategic location has made it a natural transit state, and successive governments have sought to leverage this geography by participating in major pipeline projects. The Baku-Tbilisi-Ceyhan (BTC) oil pipeline (2006), the South Caucasus Pipeline, and the Trans-Anatolian Natural Gas Pipeline (TANAP) (2018) are emblematic of Turkey's role in promoting energy diversification and reducing European dependence on Russian supplies. More recently, the TurkStream pipeline (2020), built in cooperation with Russia, has enhanced Turkey's position as a critical node in regional energy networks.

In addition to transit ambitions, Turkey has invested in expanding its own energy resources. The discovery of significant natural gas reserves in the Black Sea in 2020 was heralded as a game-changer, potentially reducing Turkey's energy import bill and strengthening its energy independence. Exploration and drilling efforts have also extended to the Eastern Mediterranean, though these moves have been mired in geopolitical controversy, particularly with Greece and Cyprus. Ankara insists that Turkish Cypriots must share in the island's hydrocarbon wealth and that Turkey's maritime claims are legitimate. While these explorations have triggered diplomatic crises, they also illustrate the centrality of energy to Turkey's broader strategy of asserting sovereignty and securing long-term economic resilience.

Economic diplomacy extends well beyond energy. Under the AKP, Turkey has pursued a policy of trade diversification and commercial expansion into emerging markets. Africa, in particular, has become a focal

point of Turkish outreach. Over the past two decades, Ankara has opened dozens of embassies across the continent, increased trade volume exponentially, and supported Turkish businesses in construction, logistics, and consumer goods. Turkish Airlines now flies to more African destinations than any other non-African carrier, symbolizing Turkey's bid for soft economic influence (Özkan, 2011, pp. 93–105).

Similarly, the Balkans and Central Asia have featured prominently in Turkey's commercial diplomacy. Historical and linguistic ties have facilitated economic partnerships, and Turkish companies have become active players in infrastructure development, banking, and education. In Central Asia, Ankara has sought to institutionalize its presence through frameworks such as the Organization of Turkic States, which aims to foster cooperation among Turkic-speaking countries in trade, transport, and culture.

Development assistance and humanitarian aid have also emerged as crucial tools in Turkey's economic foreign policy. The Turkish Cooperation and Coordination Agency (TİKA) plays a central role in this regard, implementing projects in over 100 countries. From building schools and hospitals to providing technical training and disaster relief, TİKA's operations reinforce Turkey's image as a benevolent and capable partner. These initiatives often align with Turkish business interests and diplomatic priorities, creating a synergy between altruism and strategic influence (Öniş & Yılmaz, 2013, pp. 327–341).

Despite these ambitions, Turkey's economic diplomacy is not without its challenges. The country has faced significant economic turbulence in recent years, including high inflation, currency devaluation, rising unemployment, and a widening current account deficit. These internal pressures have limited Ankara's ability to sustain expansive foreign economic initiatives and made it more vulnerable to shifts in global capital flows. Moreover, political disputes with key trading partners; such as the United States and some EU members; have occasionally resulted in sanctions or reduced market access, undermining economic diplomacy efforts.

Nonetheless, Turkey's integration of economic tools into its foreign policy reflects a maturing strategic vision. Rather than relying solely on military or diplomatic channels, Ankara is employing a multidimensional approach that links domestic development goals with international outreach. By investing in infrastructure, logistics, energy, and humanitarian programs abroad, Turkey seeks to entrench itself as an indispensable economic actor across multiple regions. The long-term effectiveness of this strategy will depend not only on macro-economic stability but also on Ankara's ability to balance commercial pragmatism with geopolitical ambitions.

7. Cultural Outreach and Soft Power

This section explores Turkey's use of cultural outreach, humanitarian engagement, and public diplomacy as soft power tools to complement its hard and economic power strategies.

In addition to hard and economic power, Turkey has increasingly prioritized the projection of soft power as a complementary dimension of its foreign policy. Soft power, defined as the ability to influence others through attraction rather than coercion, has been a hallmark of Turkey's diplomatic posture since the early 2000s. This effort to cultivate cultural affinity, religious solidarity, and humanitarian appeal serves not only to enhance Turkey's image abroad but also to deepen its regional and global reach without direct confrontation (Nye, 2008, pp. 94–109).

The cornerstone of Turkey's soft power architecture lies in its cultural diplomacy. Institutions such as the Yunus Emre Institute, established to promote Turkish language and culture, operate in dozens of countries, organizing language courses, cultural events, and academic exchanges. The aim is to foster a global awareness of Turkey's historical legacy, contemporary society, and shared values with neighboring regions. This form of outreach is particularly effective in countries with Ottoman historical ties, such as those in the Balkans, the Middle East, and North Africa, where cultural familiarity can translate into strategic rapport.

Religious diplomacy also plays a central role in Turkey's soft power strategy. The Directorate of Religious Affairs (Diyanet) has expanded its international activities, funding mosque construction, religious education, and interfaith initiatives across multiple continents. This effort seeks to promote a moderate interpretation of Islam consistent with Turkish traditions while countering competing religious narratives. Through this channel, Turkey has projected itself as a custodian of Islamic civilization, especially in contrast to Gulf-funded religious movements or more radical interpretations. While this approach has earned Ankara credibility among certain

Muslim communities, it has also generated criticism from secular quarters and rival states wary of perceived ideological agendas.

Media and public diplomacy constitute another arena of Turkish soft power. State-run outlets like TRT World and Anadolu Agency produce multilingual content targeting international audiences, often with narratives that challenge Western media framings. These platforms are designed not only to inform but also to shape global discourse around issues such as humanitarian crises, regional conflicts, and Turkey's own policies. Social media campaigns and online diplomacy have further amplified Turkish messaging, particularly among younger, digitally connected populations (Kaya, 2019, pp. 6310–6331).

Humanitarian diplomacy represents perhaps the most visible and acclaimed aspect of Turkey's soft power. Turkey has consistently ranked among the world's top donors of humanitarian aid relative to GDP. Its response to crises in Syria, Somalia, Palestine, and Afghanistan has garnered praise, and its hosting of more than 3.5 million Syrian refugees remains one of the largest refugee programs globally. Organizations such as the Disaster and Emergency Management Authority (AFAD), the Turkish Red Crescent (Kızılay), and numerous Turkish NGOs operate in complex environments, delivering food, shelter, medical services, and educational support (Akpınar, 2013, pp. 735–757). These efforts enhance Turkey's reputation as a compassionate power, particularly in regions where Western engagement is limited or perceived as conditional.

Higher education has also become a strategic tool of influence. Through scholarship programs like Türkiye Bursları, the Turkish government attracts thousands of international students annually, particularly from Africa, Asia, and the Balkans. Many graduates of Turkish universities go on to occupy influential positions in their home countries, contributing to long-term diplomatic and economic ties. This educational diplomacy creates personal and institutional networks that foster goodwill and mutual understanding.

Despite these accomplishments, Turkey's soft power strategy is not without limitations. Critics argue that its cultural and religious outreach can sometimes blur the line between influence and interference, especially when perceived as politically motivated. In some regions, Turkish soft power competes with entrenched narratives propagated by rival actors, leading to contested spaces of influence. Moreover, domestic political developments; such as constraints on media freedom, polarization, and democratic backsliding; can undercut the credibility of Turkey's soft power message.

Nevertheless, the integration of cultural, religious, and humanitarian instruments into Turkish foreign policy reflects a deliberate and evolving vision. By combining moral leadership with national interest, Turkey positions itself not just as a power to be reckoned with, but also as a model to be emulated. Its soft power projection reinforces its identity as a multidimensional middle power, capable of engaging a diverse set of actors and audiences across geographic, cultural, and ideological lines.

8. Domestic Political Dynamics

This section assesses the domestic political factors shaping Turkey's foreign policy behavior, focusing on leadership centralization, ideology, and public opinion.

Turkey's foreign policy repositioning cannot be fully understood without examining the domestic political environment in which it unfolds. Internal dynamics; particularly the concentration of power in the executive branch, the transformation of institutional frameworks, and the role of ideological narratives; have played a critical role in shaping the country's external behavior. Far from being solely a reaction to international developments, Turkey's foreign policy in recent years has increasingly reflected domestic priorities, regime interests, and political calculations.

The shift toward a presidential system, formally adopted through the 2017 constitutional referendum, has significantly altered the structure of decision-making in Turkey. Executive authority has become highly centralized under President Recep Tayyip Erdoğan, reducing the influence of traditional bureaucratic institutions, such as the Ministry of Foreign Affairs, and elevating the role of presidential advisors and political loyalists. This centralization has allowed for a more agile and responsive foreign policy apparatus, capable of making swift decisions. However, it has also raised concerns about coherence, institutional memory, and the sustainability of long-term strategy (Sezer, 2020).

Personalization of foreign policy under Erdoğan has also introduced a more ideological and confrontational tone into Turkish diplomacy. The president's speeches and symbolic gestures are often carefully crafted to resonate with domestic audiences, particularly conservative and nationalist constituencies. Foreign policy initiatives are frequently framed as extensions of national sovereignty, Islamic solidarity, or anti-imperial resistance, creating a powerful narrative that links Turkey's international activism to a broader struggle for independence and dignity. This rhetorical posture enhances domestic legitimacy but can complicate diplomatic engagement with foreign partners who may view such narratives as provocative (Taş, 2022, pp. 1–17).

Nationalism, in particular, has become a dominant theme in Turkey's domestic and foreign policy discourse. Political alliances; such as the partnership between the ruling AKP and the ultranationalist Nationalist Movement Party (MHP); have reinforced a hardline approach to issues related to territorial integrity, regional security, and ethnic identity. This dynamic has manifested in Turkey's uncompromising stance on the Kurdish question, maritime disputes in the Aegean and Eastern Mediterranean, and assertive military interventions abroad. The securitization of foreign policy thus serves both international and domestic objectives, reinforcing the image of a strong and sovereign state confronting external threats (Yabancı, 2019, pp. 92–114).

Public opinion also plays a non-negligible role in shaping foreign policy decisions. Surveys indicate that a substantial segment of the Turkish population supports an independent foreign policy and harbors skepticism toward traditional Western allies, particularly in light of perceived double standards and past grievances. This public mood provides political cover for assertive policies and makes it difficult for the government to pursue conciliatory approaches without appearing weak. At the same time, the economic costs of diplomatic isolation, sanctions, and reduced foreign investment can generate public discontent, placing pressure on the leadership to balance nationalist rhetoric with pragmatic outcomes.

Media and education contribute to shaping public perceptions of international affairs. Pro-government outlets often frame Turkey's foreign engagements as battles for justice, leadership, and historical restoration. School curricula and public campaigns emphasize Ottoman heritage, civilizational mission, and resistance to colonial powers. While these narratives foster a strong sense of national pride, they may also narrow the space for critical reflection and alternative perspectives on global realities (Arda, 2015, pp. 203–226).

Finally, economic performance is intimately linked to foreign policy legitimacy. The government's ability to deliver growth, attract investment, and manage crises influences public support for its international agenda. Periods of economic success have emboldened Turkish leaders to pursue more ambitious foreign policy goals, while downturns have sometimes forced recalibrations. For example, the 2021–2023 economic crisis contributed to a wave of normalization efforts with former regional rivals, as Ankara sought to stabilize the currency, attract Gulf investment, and repair ties with the West.

In sum, Turkey's foreign policy cannot be detached from the domestic political context that both enables and constrains it. The interplay between institutional change, leadership style, ideological narratives, and popular sentiment creates a complex environment in which foreign policy is crafted not just as an instrument of state interest but also as a reflection of internal legitimacy and regime consolidation. Understanding this domestic foundation is essential to assessing the consistency, motivations, and future trajectory of Turkey's international behavior.

9. Regional and Global Implications

This section evaluates the regional and global implications of Turkey's foreign policy repositioning, considering its impact on regional stability, alliance dynamics, and global governance.

Turkey's foreign policy repositioning, while rooted in national ambitions and shaped by domestic dynamics, has far-reaching implications for both regional order and the broader architecture of global governance. As Ankara redefines its strategic identity and projects influence across multiple arenas, it both contributes to and disrupts existing balances of power, institutional norms, and patterns of cooperation. Understanding these implications is essential not only for assessing Turkey's own trajectory, but also for evaluating the evolving role of middle powers in a multipolar world (Özkeçeci-Taner, 2022, pp. 445–460).

In the Middle East, Turkey's assertiveness has introduced a new layer of complexity to an already volatile regional environment. Its involvement in Syria, Iraq, Libya, and the Gulf has challenged the dominance of tra-

ditional regional powers such as Iran, Saudi Arabia, and Egypt. Turkey's military presence in northern Syria and Iraq has altered the strategic calculations of Kurdish actors and created tensions with both Baghdad and Damascus. In Libya, Turkish support for the Tripoli-based government reshaped the dynamics of civil conflict and provoked counter-alignments by Egypt and the UAE (Stein, 2020). In the Gulf, Ankara's close alliance with Qatar during the 2017 blockade reinforced ideological and geopolitical divisions within the Gulf Cooperation Council.

These interventions have redefined Turkey's regional identity. Once seen as a model of moderate Islamic democracy and economic modernization, Turkey is now increasingly viewed through the prism of hard power projection, ideological ambition, and neo-Ottoman revivalism. While this posture has enabled Turkey to assert itself as a regional force, it has also raised anxieties among neighbors who fear encroachment on their sovereignty or influence (Altunışık, 2008, pp. 41–54). Diplomatic ruptures with several Arab capitals, particularly in the early 2010s, illustrate the costs of unilateralism and ideological overreach.

In recent years, however, there has been a discernible shift toward normalization and pragmatic engagement. Ankara has sought to repair ties with Egypt, Saudi Arabia, the UAE, and Israel, motivated by economic necessity, regional recalibration, and shifting global alignments. These efforts have included high-level visits, trade initiatives, and security dialogues, aimed at turning the page on a decade of mutual suspicion. While structural differences remain, the thaw in relations indicates Turkey's recognition of the need to balance strategic autonomy with cooperation, and activism with restraint.

In Europe, Turkey's relationship with the European Union continues to be characterized by ambivalence and transactionalism. Despite being a long-standing candidate for EU membership, accession talks have stalled, and mutual frustrations have deepened. Human rights concerns, democratic backsliding, and maritime disputes in the Eastern Mediterranean have strained relations. Yet, economic interdependence, migration management, and shared security interests prevent a full rupture. The EU relies on Turkey to stem irregular migration, combat terrorism, and stabilize neighboring regions, while Turkey depends on European markets, investment, and diplomatic recognition. This mutual dependency sustains a fragile equilibrium, where cooperation persists amid political divergence (Tocci, 2014, pp. 1–20).

Within NATO, Turkey's position has become increasingly complex. Its acquisition of Russian defense systems, divergences over Syria policy, and diplomatic confrontations with fellow members have triggered debates about alliance cohesion. Some analysts argue that Turkey is drifting away from NATO's strategic core, while others emphasize its indispensable role in counterterrorism, Black Sea security, and regional deterrence. The war in Ukraine has further highlighted Turkey's relevance, as it has maintained dialogue with both Kyiv and Moscow, facilitated prisoner exchanges, and played a central role in brokering grain export agreements. These actions illustrate Ankara's capacity to act as a balancing force and pragmatic mediator, even amid contentious alignments.

Globally, Turkey aspires to reshape the norms and institutions of international politics. It has advocated for reforming the United Nations Security Council, expanded its presence in Africa and Latin America, and increased its participation in alternative multilateral forums. Through its engagement in the Organization of Turkic States, the D-8 Organization for Economic Cooperation, and the G20, Turkey positions itself as a bridge between the developed and developing world. These efforts aim not only to enhance Turkish influence but also to challenge Western-centric governance models and promote a more equitable and pluralistic international order.

However, Turkey's global ambitions are constrained by material limitations, reputational challenges, and strategic contradictions. Economic fragility, diplomatic isolation, and inconsistent messaging can undermine Ankara's credibility. Balancing ties with Russia and the West, Iran and the Gulf, China and NATO, requires deft diplomacy and internal cohesion. Moreover, Turkey's assertiveness may alienate potential partners if perceived as self-serving or coercive. Thus, the success of its global engagement strategy depends on its ability to manage contradictions, build coalitions, and project consistency over time.

Overall, Turkey's repositioning generates both opportunities and tensions for regional and global politics. It introduces a more diversified and contested set of actors, norms, and alignments, reflecting the broader reality of a multipolar world. Whether Ankara will emerge as a constructive middle power that contributes to stability and cooperation, or as a revisionist actor driven by unilateralism and ambition, will depend on the evolution of its domestic politics, economic resilience, and diplomatic choices in the years to come.

10. Executive Summary and Recommendations

Turkey's evolving foreign policy reflects a broader transformation in the behavior of middle powers within a shifting global order. Moving beyond its historical alignment with Western-centric frameworks, Turkey has adopted a more assertive, strategically autonomous, and multidirectional approach to international engagement. This repositioning has been shaped by both structural global changes, including the erosion of unipolarity and the rise of multipolarity, as well as domestic political transformations that have empowered leadership to pursue ambitious foreign policy agendas.

The research highlights Turkey's ability to blend hard and soft power tools, including military interventions, economic partnerships, cultural influence, and strategic diplomacy, across several regions including the Black Sea, North Africa, the Eastern Mediterranean, and Central Asia. This hybrid strategy has allowed Ankara to increase its regional influence, forge new alliances, and contribute to reshaping global governance debates. However, this same assertiveness has led to tensions with traditional allies, economic vulnerabilities, and questions regarding long-term strategic coherence.

Domestically, centralized political control and ideological narratives have facilitated swift decision-making but also introduced challenges in policy consistency and institutional capacity. Externally, Turkey's pursuit of active neutrality (strategic flexibility) between competing blocs, such as NATO and Russia or the West and emerging Eastern powers, has demanded careful calibration. While this approach has yielded some short-term gains, it also carries risks of overextension and strategic ambiguity.

Recommendations derived from the study include the following:

1. **Strengthen Institutional Capacity:** For Turkey to sustain its middle power role, it must invest in foreign policy institutions that enhance strategic planning, inter-agency coordination, and diplomatic professionalism.
2. **Rebuild Strategic Trust:** Repairing strained relationships with key allies and partners; particularly in the EU and NATO; through confidence-building measures and transparent dialogue is essential to ensure external support and reduce diplomatic friction.
3. **Balance Ambition with Resources:** Aligning foreign policy objectives with economic capabilities and societal consensus will enhance policy sustainability and reduce the risks of overreach.
4. **Promote Norm-Based Engagement:** Emphasizing international law, multilateral cooperation, and regional stability will improve Turkey's global image and reinforce its legitimacy as a constructive actor.
5. **Leverage Soft Power Strategically:** Expanding cultural diplomacy, educational exchange, and development cooperation can complement hard power strategies and deepen Turkey's influence in emerging regions.

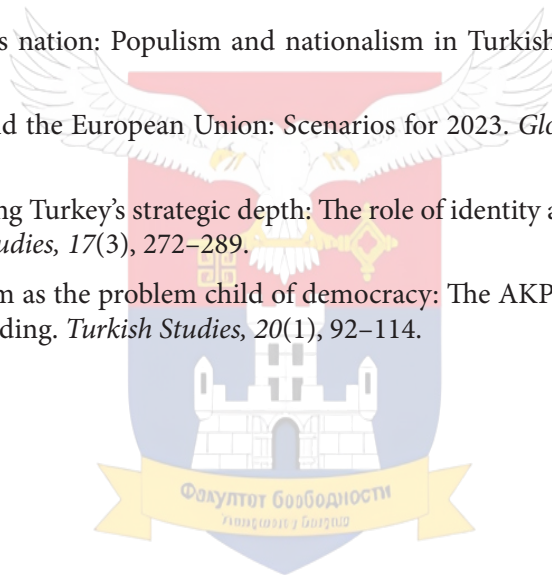
In summary, Turkey's foreign policy trajectory offers important insights into the opportunities and constraints faced by middle powers in the 21st century. Its experience underscores the significance of strategic autonomy, the value of adaptability, and the importance of balancing ambition with long-term vision. As a case study, Turkey provides a compelling example of how states situated between great powers can actively shape the evolving global order; if they navigate it with prudence, resilience, and foresight.

11. References

1. Acharya, A. (2018). *The end of American world order* (2nd ed.). Polity Press.
2. Akpınar, P. (2013). Turkey's peacebuilding in Somalia: The limits of humanitarian diplomacy. *Turkish Studies*, 14(4), 735–757.

3. Altunışık, M. B. (2008). The possibilities and limits of Turkey's soft power in the Middle East. *Insight Turkey*, 10(2), 41–54.
4. Arda, M. (2015). Turkey – the evolving interface of international relations and domestic politics. *South African Journal of International Affairs*, 22(2), 203–226.
5. Aydın, M. (2010). Turkish foreign policy: Framework and key issues. *UNISCI Discussion Papers*, 23, 13–34.
6. Cooper, A. F. (1997). *Niche diplomacy: Middle powers after the Cold War*. Palgrave Macmillan.
7. Davutoğlu, A. (2001). *Strategic depth: Turkey's international position*. Küre Yayınları.
8. Farag, M. I. H., & Tayie, M. S. (2024). Asymmetric security threats: A study of the impact of illegal migration on regional security in the Mediterranean region. *Political Science Journal*, (68), 383–416. <https://doi.org/10.30907/jcopolicy.vi68.752>
9. Garba, T. M., & Akaan, R. (2025). The Socioeconomic and Psychological Implications of Polygamy: A Quantitative and Qualitative Analysis Concerning Disaster Risk Reduction and Management (DRRM) in Nigeria. *International Journal of Contemporary Security Studies*, 1(1), 25–34.
10. Gilley, B., & O'Neil, A. (2014). *Middle powers and the rise of China*. Georgetown University Press.
11. Hale, W. (2013). *Turkish foreign policy since 1774* (3rd ed.). Routledge.
12. Hellmann, G., & Herborth, B. (2010). Fishing in the mild West: Democratic peace and militarized interstate disputes in the transatlantic community. *Review of International Studies*, 36(3), 795–816.
13. Hintz, L. (2018). *Identity politics inside out: National identity contestation and foreign policy in Turkey*. Oxford University Press.
14. Holbraad, C. (1984). *Middle powers in international politics*. Macmillan.
15. Ikenberry, G. J. (2001). *After victory: Institutions, strategic restraint, and the rebuilding of order after major wars*. Princeton University Press.
16. Kardaş, Ş. (2013). Turkey: A regional power facing a changing international system. *Turkish Studies*, 14(4), 637–645.
17. Kaya, R. (2019). The rise of TRT World and the politics of state-led global media. *International Journal of Communication*, 13, 6310–6331.
18. Kirişçi, K. (2009). The transformation of Turkish foreign policy: The rise of the trading state. *New Perspectives on Turkey*, 40, 29–57.
19. Kirişçi, K. (2011). Turkey's 'demonstrative effect' and the transformation of the Middle East. *Insight Turkey*, 13(2), 33–52.
20. Kirişçi, K. (2017). *Turkey's foreign policy in turbulent times*. Brookings Institution. <https://bit.ly/3WjYZJp>
21. Nye, J. S. (2008). Public diplomacy and soft power. *The Annals of the American Academy of Political and Social Science*, 616(1), 94–109.
22. Oğuzlu, H. T. (2023). Turkey as a restrained middle power. In *Reflections on the centenary of the Republic of Turkey* (pp. 267–284). Routledge.
23. Oğuzlu, T. (2020). Turkish foreign policy at the nexus of changing international and regional dynamics. *Perceptions: Journal of International Affairs*, 25(1), 31–52.
24. Öniş, Z., & Kutlay, M. (2017). The dynamics of emerging middle-power influence in regional and global governance: The paradoxical case of Turkey. *Political Studies*, 65(1), 8–28.
25. Öniş, Z., & Kutlay, M. (2020). The new age of hybridity in Turkey's foreign policy: Balancing between East and West. *Turkish Studies*, 21(2), 200–223.
26. Öniş, Z., & Yılmaz, Ş. (2009). Between Europeanization and Euro-Asianism: Foreign policy activism in Turkey during the AKP era. *Turkish Studies*, 10(1), 9–32.

27. Öniş, Z., & Yılmaz, Ş. (2013). Turkey and the West: Fault lines in a troubled alliance. *International Affairs*, 89(2), 327–341.
28. Özkan, M. (2011). Turkey's rising role in Africa. *Turkish Policy Quarterly*, 9(4), 93–105.
29. Özkeçeci-Taner, B. (2022). Turkey's foreign policy: Principles, constraints, and challenges. In *The Oxford handbook of Turkish politics* (pp. 445–460). Oxford University Press.
30. Paul, T. V. (2018). *Restraining great powers: Soft balancing from empires to the global era*. Yale University Press.
31. Petrović, T. (2025). (Re)Constructing Europe: Has a Common Identity Integrated Europe? *International Journal of Contemporary Security Studies*, 1(1), 139–148. https://doi.org/10.18485/fb_ijcss.2025.1.1.10
32. Robins, P. (2003). *Suits and uniforms: Turkish foreign policy since the Cold War*. Hurst.
33. Schweller, R. (2011). Emerging powers in an age of disorder. *Global Governance*, 17(3), 285–299.
34. Sezer, Ö. (2020). *Idealization of the land: Forming the new rural settlements in the early Republican period of Turkey, 1923–1950* (Doctoral dissertation). Technische Universität Berlin.
35. Stein, A. (2020). Turkey's military interventions: A shift toward hard power. *War on the Rocks*. <https://bit.ly/3RkUxs8>
36. Taş, H. (2022). The people's nation: Populism and nationalism in Turkish politics. *Middle East Studies*, 58(1), 1–17.
37. Tocci, N. (2014). Turkey and the European Union: Scenarios for 2023. *Global Turkey in Europe Working Paper*, 9, 1–20.
38. Ünver, H. A. (2015). Defining Turkey's strategic depth: The role of identity and political culture. *Journal of Balkan and Near Eastern Studies*, 17(3), 272–289.
39. Yabancı, B. (2019). Populism as the problem child of democracy: The AKP's populist transformation and Turkey's democratic backsliding. *Turkish Studies*, 20(1), 92–114.





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Research article

Putin, Finland, and NATO in Far North in 2024–2025

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ABSTRACT

In May 2022, Finland applied for NATO, and in late 2022, launched talks on bilateral defence cooperation with the US. The country joined the alliance in April 2023; eight months later, Helsinki and Washington D.C. signed DCA. From the first days of Finland's NATO process, Moscow anticipated the outcome: according to President Putin, the alliance is not a threat but its role as a camouflage of the US interests. In this article, I employ a mitigation- and legitimization-oriented discourse analysis to probe Putin's Finland-related utterances from January 2024 to August 2025. Through the stratagems Putin utilizes in his public appearances, I differentiate Moscow's standpoints on NATO's enlargement in Far North and Finland's position as of today. Putin does not consider Finland as a risk, despite its substantial military power. Rather, the country was ensnared in NATO. First, these explanations are targeted to domestic spectators, to moderate the paradox of now having NATO next to the Russian Arctic. Second, Putin deems Finland's membership as "absolutely senseless"; combining storytelling and history, he insists "ideal relations" reigned between Moscow and Helsinki. Above all, militarization of the Arctic – Russia's core nuclear base and its key source of critical minerals and raw materials – legitimizes Moscow's equal measures in Far North. The number of Russian soldiers rise to 70 to 100 thousand, and their readiness is enhanced. On Putin's words, these steps are aimed at no one, as history testifies. Quite the opposite, it is Russia to uphold the fragile balance in the Arctic region.

KEYWORDS

Vladimir Putin; Finland; Russia; NATO; DCA; Discourse analysis.

1. Introduction

In mid-May 2022, shocked by the Russian incursion into Ukraine, Finland's top leaders voiced their support for NATO membership. Particularly, they exhorted the legislators "to undertake the national steps as rapidly as possible". (FG 2022.) In less than a year, in April 2023, the Finnish flag was solemnly raised at NATO HQ. This development ended Finland's military neutrality that had been valued as the country's prime foreign doctrine for 80 years. Such a policy, initiated by President Paasikivi in 1946–1956, and elaborated by his successor, President Kekkonen in 1956–1981, was essential for a small state, squeezed between the great powers of the Cold War era. It preferred personal ties with the Soviet leaders, and at the same time, amicable interaction with the West. Finland and the USSR signed the Friendship, Cooperation and Mutual Assistance agreement (YYA) in 1948 which for forty years regulated their bilateral collaboration. The heyday of the YYA eon proved the 1970s,



with a substantial financial advance in Finland, and intense cultural exchange across the Finno-Soviet border (Finland's non-alignment policy in 1945–1989, see Rainio-Niemi, 2014; Dinçer, 2022, pp. 401, 407; neutrality as an identification, see Aunesluoma & Rainio-Niemi, 2016; Vezhlytseva, 2019).

Along and after the demise of the Soviet Union in 1991, Finland reassessed its foreign orientation. Ponomaryeva seems to consider the year 1994 as the expiry date of Finnish general and military neutrality. Then, Finland joined NATO's Partnership for Peace (PfP) program. (Ponomaryeva, 2022, p. 18). In a way, she has right: this marked the beginning of building common capabilities and a Western-style defence. On the other hand, Aunesluoma & Rainio-Niemi date the turn in 1995, and especially, in Finland's EU membership. Or, as they put it, a total neutrality now "decreased" into a military one (Aunesluoma and Rainio-Niemi, 2016, p. 68). However, even this interpretation can be questioned; in 2005, Finland launched its cooperation with NATO's Rapid Deployment Forces. Simultaneously, the country – side by side with Sweden – took part in the alliance's operations in Libya, Afghanistan, Kosovo and Bosnia. (Ponomaryeva, 2022, p. 18.) Whether Helsinki and Stockholm did perceive these actions rather as peacekeeping than breaches of their non-alignment doctrine, it requires a separate probe. What is certain that after the NATO accession ceremony in April 2023, and the signing of the Defence Co-operation Agreement (DCA) between Helsinki and Washington D.C. eight months later (FM-DCA), Finland has permanently renounced its neutrality. Just days later, Russian President Vladimir Putin slammed the American units freshly dislocated at the vicinity of Russia, assured Moscow to monitor the development, and to react with "mirror-like" measures (Putin 2023).

To the surprise of many, in 2024–2025 Putin does not overtly refer to Finland's (or Sweden's) DCA, even after the pact entered into force in September 2024 (FM-DCA). Instead, he constantly takes up broken economic ties and almost laments their fate. Also, he often comments on NATO's military endeavours in Finland and Far North. In this article, I examine Putin's Finland-related speeches between January 2024 and August 2025 to unravel the strategic accounts and plausible incongruities in Moscow's standpoint on the Arctic and Finland's security. I employ a legitimization- and mitigation-oriented discourse analysis, widely defined by Fairclough. For readability and to evade reiteration, the analysis chapters are thematically organized. The scrutiny discloses that although his tender approach to Finland's NATO bid in 2022–2023 was not enough to impede Finland's accession nor the subsequent DCA, Putin yet narrates the events as if the ordinary Finns were misled. Thus, he, mitigates the unsolicited outcome, i.e., the alliance now standing next to the Russian Arctic. Through allusions to past cordial contacts, Putin aims to hamper Finland's advancing collaboration with Western allies. However, it is not decisive whether he triumphs or not; in any case, militarization of the High North legitimizes Russia's similar steps.

1.1. Methods and Material

While this inquiry is fundamentally qualitative, and due to its striking contemporaneity, in part exploratory, it is hard to place within strict scientific frames. Cross-disciplinary describes this investigation quite well, perhaps we could say it merges IR, security, Russian and general area studies as well as sociolinguistics (to say the least). The latter one is visible in my methodology, Norman Fairclough's theory on the (use of) language in a systematic nexus with its social environment. Fairclough divides his technique – called discourse analysis – in three levels. On the textual one, the attention is paid to solitary words and phrases. Secondly, the so-called production level comprises the resources and the production processes. Thirdly, on the sociocultural level the academic pays attention to the text's past and present ties. At the same time, the presentation farther construes its social framework. (Fairclough, 1992, pp. 1, 38, 62–63, 87.) Logically, language is therefore the foundation for global politics, as insisted by Balzacq (2011, p. xiv). Although Fairclough some years afterward developed his ideas to Critical Discourse Analysis (CDA), I prevalently employ his prior theorisation. As CDA focuses on power and social wrong, to avoid any ideological bias (Pälli & Lillqvist, 2020, pp. 387–388), I just lend a few conceptions therefrom.

Since the player here is the Russian presidential administration, resources are smoothly available. Therefore, throughout my scrutiny, I concentrate on the textual and the sociocultural levels. I seek *hedges*, that is, those discursive means by which Putin interprets any given action or information as unsure, or by which he mitigates the substance. CDA, in turn, assists me with its concept of *legitimation*. (Pälli & Lillqvist, 2020, pp. 392–393.) Van Leeuwen divides this in four categories, all of which include sub-types: Authorisation, Moral evaluation,

Rationalisation, and Mythopoesis (see Van Leeuwen, 2007.). The last we may translate as storytelling, to keep it simple. It is particularly intriguing whether Putin legitimises his stances through references to history and/or to the future; these, of course, do not exclude mythopoesis, rather, they can go hand in hand. Thence, not only to trace the semantic context but the political stimuli and intentions of the Russian president, it proves imperative to differentiate the axioms, indications and gaps he voices. The adjuvant questions are:

- how does Putin explain the development in Finland?
- what kind of implications does he utter?
- how does the sociopolitical environment impact Putin's communication?

To base my findings on authenticity, I employ Putin's live discourses, held in Russian. In the Kremlin search engine, I used the entire voice 'Финляндия' (Finland in Russian) because partial nouns return zero hits. In total, there are thirteen results during the research cycle from January 1, 2024, to August 30, 2025; markedly, it is only one less than during Finland's NATO steps in 2022–2023. Within each of these utterances, I searched with a shortened voice 'Финлянд*', to enable all the grammatical spellings, e.g. genitive or instrumental. Out of the thirteen hits, many include one or two mentions of the country (e.g., Putin, 2024d; *ibid.*, 2024h; *ibid.*, 2025d), at times the word is not even expressed by the Russian president (for instance, Putin, 2024b; *ibid.*, 2024c; *ibid.*, 2024g; *ibid.*, 2025e). As a substitute, the allusion to the northwestern neighbour comprises a few sections (e.g., Putin, 2024e), or the Russian leader utilizes Finland as an example within the European/global/Arctic framework (Putin, 2024a; *ibid.*, 2025b; *ibid.*, 2025c). As such, the topics contain rather detailed cases, say, two comparisons of Russian, Finnish etc. birth rates, rouble as currency in Helsinki, and references to Finns during the Second World War (ahead of the Victory's 80th commemoration). Principally, the translations from Russian, Finnish, Ukrainian and Swedish are courtesy of the author of this text, except for a few official news and addresses that were also available in English.

Only three themes traverse the entire period. Foremost, the Russian president deplores NATO's enlargement in Far North, with its military consequences. Side by side, Putin comments on today's Finland and Sweden. Thirdly, Putin constantly regrets the lost economic interaction between Helsinki and Moscow; since this topic encompasses various branches – for instance, the financial decay in Finland's eastern regions (Putin, 2025c), collapsed nuclear projects (*ibid.*, 2025a) and the envisioned Finno-American atomic icebreaker deal (*ibid.*, 2025b) – I leave it for a distinct inquiry. Also, as discourse analytical principles prefer ample material, it is well-grounded to focus on the Russian leader's prolonged rationalizations on the military evolution in Far North. To illuminate the sociopolitical context, and Putin's implications, secondary material consists of international news and facts from Nordic authorities. Thus, this article forms a compilation of statements, interpretations and inferences pronounced by Putin, carefully probed, set in their proper connections, and posed in a structured account.

1.2. Literature overview

Obviously, Putin's 25 years in power has stimulated plenty of investigation on his motivations and speeches; it is the Russians themselves or Russian-speaking academics that have conducted most of these (e.g. Prozorov, 2004; Dement'yeva, 2009; Koteyko & Ryazanova-Clarke, 2009; Sedykh, 2012; Bekoyeva, 2015; Andronova, 2015; Sedykh, 2016; Galyamina, 2016). By and large, Sedykh suggest that the Russian president highlights his message with associations that blend actual and abstract significances, and thus, he renders the clarification more vivid (Sedykh 2012, pp. 40, 42). Bekoyeva insists that Putin often takes advantage of "I", with corresponding grammar. Also, this manoeuvre does not impede him to tackle issues in "we". (Bekoyeva, 2015, p. 30.) As for "morphology", Blackburn offers interesting details from Putin's early terms. Orderliness and independence constituted the nucleus, freedom and modernisation situated next to these, while multipolarity, fairness, common will and preserving society located far from the core. (2024, p. 4–6.) Dement'yeva discloses how Putin in the beginning of his career juxtaposed his language with that of his patron, Boris Yeltsin: while the latter "conservatively" stood against the Soviet speak, Putin utilised "a fresh young" idiom. The Russian leader employs graduation (which from 2000 to 2008 frequently read 'very good') and personal pronouns. His reliable tone re-

inforces the message. Unlike his then-successor Medvedev, Putin is inclined to an exclusive 'we'. Unfortunately, Dement'yeva proceeds with a closer look at Medvedev's tongue, leaving that of Putin aside. (2009, pp. 82–85.)

The dichotomy 'we' vs. 'they' in Putin's discourse is farther examined by Galyamina. According to her, Putin initially delivered his speeches from the perspective of the entire government; since 2014, he speaks for the whole nation. The same year saw the appearance of 'the other': the threat now consisted of liberals in opposition, defined as "the fifth column" of foreign powers, instead of left-wing groups and Islamists. (Galyamina, 2016, pp. 160, 165). Regarding Russian legitimisation of the strife in Ukraine circa the same years, Shevko suggests that all above-mentioned four categories were applied. Moscow referred to authority of traditions, customs and laws; it appealed to altruistic and humanitarian values; rationalisation and theorisation, such as allusions to polls and research, were employed; Russia fuelled emotions and cast projections on future to legitimise its actions now. (Shevko, 2020, pp. 51–54.) The outbreak of the full-fledged warfare in Ukraine prompted global research on Putin's utterances, e.g. in 2022 only, a plentiful of topical studies were published. Myasnikov differentiates the Russian president and Ministry of Foreign Affairs' discourses to corroborate Russian military operations in Georgia, in Crimea and the peninsula's subsequent merger with Russia, and Syria. Here, the most fascinating are the allegations Russia voiced. For example, during the Georgian operation in 2008, Moscow did not blame a particular Western state but NATO. Instead, in the case of Syria seven years later, the guilty one was the US. (Myasnikov, 2022, pp. 110, 113, 115.) Burret analyses Putin's internal legitimacy, his imago, and the president's "populism" in relation to domestic finances, mainly from 2000 to 2020. We are interested in the part concerning Putin's patriotism and traditionalism since his return to the Kremlin in 2012. Even though Burret casts an overview on such irrelevant topics here as Russian minority laws and Orthodoxy, the section also illuminates the recent confrontations with the West. (2024.)

Mölder & Berg explore the Kremlin's discourse regarding the current conflicts and judge that after 2008 Moscow's views on international order indeed hardened. At the same time, the Kremlin step by step introduced cooperation with non-Western states in its speeches. (Mölder & Berg, 2022, pp. 12, 17.) It is though worth noticing that Mölder & Berg's findings are based on the English-language documents of the Kremlin (translated by Kremlin officials), and not on the authentic Russian versions. Mal'chenkov sheds more light in Russia's third world connections. He describes the three phases of Putin's "civilisational" addresses in 1999–2006, in 2007–2014 and from 2015 on. By 2006, the wording 'Russian world' – in contrast to the occidental liberalism – occurs in Putin's idiom. Therefrom, the Russian president emphasizes the uniqueness of Russia, and especially, the "great mission of the Russians" – i.e., to civilise. From 2015 to our days, the conflict between the two civilisations dominates Putin's tongue. (Mal'chenkov, 2022, pp. 57–60; 63–64, 66.) Equally, Blackburn sets the rise of tensions in this era. Moscow's ideology established between 2014 and 2018, with the then-fresh National Security Strategy and Foreign Policy Concept as its codifications. (2024, pp. 14–16.) Tepe & Chekistrova compare Putin's discourse with those of the Indian premier Modi and with those of the Turkish president Erdogan. Discursively, Putin seems the slyest of these leaders. E.g. his reference to 'the people' turns out to be far more abstract than Modi's or Erdogan's. For Russia's sovereignty, in Putin's mind, Orthodoxy and nationalism are indispensable; implicitly, the Russian president knits these together. Consequently, it is critical to keep the country's foes at bay, indifferent of their origin. (Tepe & Chekistrova, 2022, pp. 3, 10–11.)

Surprisingly, although Finland's position in the eyes of the Kremlin is neatly connected to Moscow's Arctic discourse – per se a topic widely studied (e.g. Conley & Rohloff, 2015; Sergunin & Konyshev, 2016; Baev, 2018; Godzimirski & Sergunin, 2020; Marsili, 2022; Sinyayeva & Samodurov, 2024; Lamminparras, 2025a) – probes on Russia's assessments on Helsinki's increasing cooperation with NATO and the US are missing. For instance, in new Russian research, there are merely a few quotes from Putin in each inquiry; besides, these tackle Putin's standpoint on Finland's initial NATO steps. Chiefly, the Russian academics rather examine the opinions of Finnish top decision-makers and citizens than those of the Kremlin. (See, e.g., Ponomaryeva, 2022; Lyuttser, 2022; Zhilkin, 2022.) An equal disinterest appears to reign in Finnish domestic examinations. For example, in their case study of Finland as an arena of Russian information influence, Kari and Hellgren quote President Putin only once (2021). As such, Forsberg's article is a detailed report on NATO's popularity in Finland throughout the latest two decades. However, he only in passing indicates "the Russian demands" between Autumn 2021 and early Spring 2022. (2024.) My recent exploration on Putin's discourse on Finland's NATO bid is purposefully limited to the years 2022 and 2023. Still, I demonstrate how Putin distinctly anticipated the future Finno-American defence cooperation, namely DCA and American troops soon to dislocate next to the Russian Arctic. So, the Russian president legitimised Moscow's countermeasures, that is, strengthening its northwestern frontier. (Lamminparras, 2025b.)

2. Reinforcing the (North)west

As stated above, Finland's (and Sweden's, for its part) NATO membership is tightly intertwined with the Russian fundamental perspectives in the Polar region. The Arctic Zone is Russia's core producer of copper, tin, antimony, tungsten, platinum elements, cobalt and nickel, chromium and manganese, to speak nothing about rare earth minerals (Conley & Rohloff, 2015, p. 56; Sergunin & Konyshchev, 2016, p. 27). Most of these prove essential for naval industry. Military aviation and missile production require raw materials, especially tungsten. If one considers the elongated war in Ukraine and Kyiv's highly developed long-haul drone capacity, it is understandable that President Putin already in Summer 2024 highlighted these assets, i.e., "the fundamental mineral resources" (RÄLamminparras 2025a, 46.) And even the war in Ukraine notwithstanding, it is obvious that any rise of tensions in the High North would largely jeopardize Russia's core industrial base.

Putin overtly referred to such a scenario in the yearly international Arctic forum in March 2025.

- нас, конечно, беспокоит только тот факт, что страны НАТО в целом всё чаще обозначают Крайний Север как плацдарм возможных конфликтов, отрабатывают применение войск в этих условиях, в том числе силами своих «новобранцев» – Финляндии и Швеции --

- we are, of course, concerned only about the fact that the NATO countries, as a whole, more often indicate the Far North as a platform for plausible conflicts, work out deployment of military within these circumstances, among them forces of their "newcomers" – Finland and Sweden --. (Putin, 2025c.)

First, the "we" in Putin's description alludes to the nation, that is, the president personifies Russia. In general, Putin mixes formal – e.g., "are concerned", "a platform" and "deployment" – and colloquial expressions, say "of course" and "more often". His tone occurs calm and balanced. Perchance, the reason for this clever combination is the audience of the Arctic forum; it consisted of (local) politicians, international guests, university lecturers and students, entrepreneurs etc. However, the verb he utilizes – "are concerned" – does not express a profound anxiety. Rather, it mitigates the entire course of the events, that is, NATO's enlargement northwards.

Oddly enough, a mere year earlier Putin had strongly emphasized the need for military reinforcements, due to the alliance's recent activity.

Серьёзно необходимо укрепить группировки на западном стратегическом направлении, чтобы нейтрализовать угрозы, связанные с очередным расширением НАТО на восток, втягиванием в альянс Швеции и Финляндии.

It is seriously indispensable to strengthen groupings in the western strategic direction, to neutralise threats that are related with NATO's further expansion to East, by drawing Sweden and Finland in the alliance. (Putin, 2024f.)

Here, Putin's idiom was far more official, with such words as "neutralise" and "expansion". The Russian president's typical graduation manifested in "seriously". Putin posed NATO's enlargement as a question of life and death for Russia – an act of legitimisation par excellence. Moreover, such an approach fits and serves Putin's internal ambitions, as insisted by Burrett. According to her, to pose the war in Ukraine as a strife against the US and NATO assists to uphold Putin's imago as Russia's prime defender. (2024, p. 13.) Logically, as the alliance just proceeds its expansion, the president does not miss his chance to reinforce the picture.

It is worth noticing that the event was Putin's yearly speech to the Federal Assembly, consisting of the State Duma (parliament) and the Council of Federation (Upper Chamber), in February 2024. This not only explains Putin's formality; due to the occasion's nature, the utterance factually serves as a policy declaration (cf. the same address a year prior, e.g. Burrett, 2024, pp. 13–14). Just as in 2008, when Russia conducted a military operation in Georgia, NATO only is presented as responsible for one-sided acts, leading to instability. Also, Putin's notion on "neutralising threats" can be read as a similar hint of an aggression from the alliance's side he had pronounced sixteen years earlier. (Myasnikov, 2022, p. 110.) Likewise, the explanation echoes the tone of the justifications of the SMO. Readily then, Moscow framed Ukraine as one of NATO's main military strongholds, targeted against Russia. (Blackburn, 2024, p. 20.) Obviously, any extension thereafter only augments the risks. Thence, legitimisation stands loud and clear: NATO's "further expansion" triggers Moscow's steps, or more precisely, turns them "indispensable".

In early 2024, the estimates spoke of an enormous restructuring of the Russian forces along the country's northern, western and north-western frontiers. The Western Military District is split in two – in Moscow and Leningrad Military Districts, as they were during Soviet years – whereas the Northern Fleet maintains its district-like status (Joint Strategic Command Northern Fleet, JSC). Marine Corps brigades by Russia's western boundary will be turned into divisions. If these visions succeed, there might dislocate 65 to 70 thousand Russian combatants in the Polar region. (Panschin, 2024, pp. 40–45.)



Fig. 2 DCA premises in Finland (extract)

Numerically, this would triple their staffing. The wildest conjectures put the future number of Russian soldiers East of Finland to a hundred thousand. Nonetheless, these assumptions are greatly theoretical, if not outright click-bates. One issue remains the manning: will there be enough voluntary to enrol in the ranks? Their military education until a unified and efficient unit is fit takes years. Therewithal, Ukraine's June 2025 strikes as far as to Olenya, an air base packed with strategic bombers TU-22M3 and TU-95MS, in the Kola Peninsula (Humpert, 2025), let alone the brand-new allegedly 3000km range projectile Flamingo (see, e.g., Vedmedenko 2025), today question the reasonableness and advantages of immense troops concentrations.

Despite these obstacles and open questions, according to the Kremlin, a large development program is to take place.

- **выстраиваем адекватную линию реагирования, повышая боевые возможности Вооружённых Сил и модернизируя объекты военной инфраструктуры.**

- we are building an adequate line of response, enhancing combat possibilities of the Armed forces and modernizing objects of military infrastructure. (Putin, 2025c.)

Nonetheless, though massive they may turn, these actions are not directed at any state or player. Or, in Putin's ambiguous wording:

Подчеркну: Россия никогда никому не угрожала в Арктике. Но мы внимательно следим за развитием ситуации.

I underscore: Russia has never threatened anyone in the Arctic. But we closely monitor the evolution of the situation. (Ibid.).

Ensuing Putin's language, Moscow has throughout the past decently behaved in the Polar region, albeit he voices this in a negative form "has never". Again, he mitigated the imminent militarization of the High North, seemingly for Russia's part. Clandestinely, the word choice infers a continuum, i.e., authorisation by traditions. It accentuates legitimization of the envisaged steps. However, the expression constitutes the opposite of the president's narration about annexation of Crimea. A decade ago, Putin insisted that if Russia had not overtaken

the peninsula, it would have been NATO's land and naval forces to seize Crimea, and thus, to encumber Russian entrance to the Bosphorus. (Myasnikov, 2022, p. 112.) There is yet a hedge, "we closely monitor the evolution". That is, a similar restriction in the Polar waters is not totally excluded.

3. Finland's "absolute senselessness"

As much as Putin slams NATO for its fresh expansion, it is not the "newcomer" Finland (nor Sweden) to pose a hazard. The term the Russian president utilised in February 2024 exposes this: according to Putin, the enlargement took place "by drawing" (Putin, 2024f). Markedly, the choice is similar with his wording in December 2023, immediately after Finland had signed DCA, i.e., "dragged in" (ibid., 2023; Lamminparras, 2025b, p. 16). In fact, Putin lauds the pre-NATO Russo-Finnish (and Russo-Swedish) encounters:

С Финляндией у нас вообще были идеальные отношения, просто идеальные. У нас не было ни одной претензии друг к другу, тем более территориальной, я уж не говорю о других областях.

With Finland, we maintained entirely ideal relations, just ideal. We did not possess a single pretension on each other, least territorial, other spheres not to mention. (Putin, 2024e.)

- Финляндии и Швеции, с которыми, кстати говоря, у нас до недавнего времени не было вообще никаких проблем. Сами своими руками зачем-то создают. Зачем? Совершенно непонятно.

- of Finland and Sweden, with which, so to speak, we until recent times had no issues. They with their own hands for some reason create [those]. Why? Completely incomprehensible. (Putin, 2025c.)

What first strikes in the eyes is Putin's all-encompassing "we", pronounced three times. Again, he impersonates the whole Russia. In both speeches, the tongue of the Russian president widely involves a colloquial vocabulary; the exceptions are "pretensions" and "spheres". The informality is probably due to the occasions, the former is a face-to-face interview, and the latter Putin's message during the Arctic forum. Substantially, his allusions to the utmost cordial interaction with the Nordic states are on one hand aimed to moderate the domestic interpretations on the factual political development, and on the other, perhaps to remind Nordic dwellers of the gone mutual benefits. Apart from legitimising Moscow's stance (if not disappointment?) with reference to the shared profitable past – authorisation by tradition – Putin perchance tends to foment emotions on 'those good old days' during the YYA too. Thence, he practices moral evaluation. His note on the zero "pretensions" serves as a tool of rationalisation.

Likewise, it is important to see that in Moscow's eyes not even the combined military might of Sweden and Finland did (nor does) constitute a risk. To exemplify, Finland is capable to raise a war-time army of 180 000 soldiers. The armoured corps take advantage of two hundred Leopard 2A4–2A6 main battle tanks, the same number of CV9030 and BMP-2M mechanised infantry combat vehicles, seven hundred armoured person carriers, 1200 tracked vehicles, and 800 field guns. (FDFA.) A part of these consists of armoured 155mm self-propelled howitzers, that is, they assist to an enhanced combat resilience. Moreover, the multiple launch rocket system (MLRS) units are modernised with GMLRS AW, ATACMS, UNITARY and GMLRS ER projectiles, extending their maximum range to 150–300 km. (FDFA, 2024; Reserviläinen, 2024.) Additionally, Sweden's intelligence services are highly appreciated, and the Swedish Navy fields submarines. The Finnish Air forces shall host some sixty F-35 multirole fighters, and together with their Swedish equivalents, number a few hundred. In case of a serious conflict, it would be an option to seal the Finnish Gulf, if one aspired to encumber Russian naval actions from/to St. Petersburg to/from Kaliningrad. (Hallamaa & Heikinmatti, 2022). In other words, a Bosphorus-scenario might take place in the Baltic, instead of Black, Sea.

On the contrary, as Putin twice denotes, Russia had removed its forces from the vicinity of Finland.

У нас и войск-то не было, мы войска оттуда все убрали, с российско-финской границы.

We did not have troops, we withdrew all troops therefrom, from the Russo-Finnish border. (Putin, 2024e.)

У нас там не было войск, теперь будут. Не было там систем поражения, теперь появятся.

We did not have troops there, now [there] will be. There were no strike systems, now they will appear. (Ibid.)

Once again, the “we” occurs throughout the utterances, marking exclusivity. The double notion on “did not have troops there” only accentuates this. As if Russia, despite (or perchance, for?) its grandeur, could pay an outstanding compliment to its precious neighbour and diminish its forces by the common boundary. Legitimation here occurs retrospective: since there were no Russian combatants by the Finno-Russian boundary, there was neither any motivation to seek security from NATO. Observing Putin’s rationalisation, the withdrawal was undertaken even though the High North is the main base for Russia’s strategical submarines, with most of Moscow’s maritime nuclear warheads on their long-range missiles. From/to the US, the straightest route for any hypothetical projectile flies over the North Pole. Therefore, the zone is utmost crucial for early warning and defence installations. (Baev, 2018, pp. 410, 412–414, 420.) Furthermore, the Russian Arctic between Novaya Zemlya and the Kola Peninsula is occasionally referred as vital for Moscow’s military and/or security prospects (Godzimirski & Sergunin, 2020, p. 40). Much of Russian arms testing is conducted here.

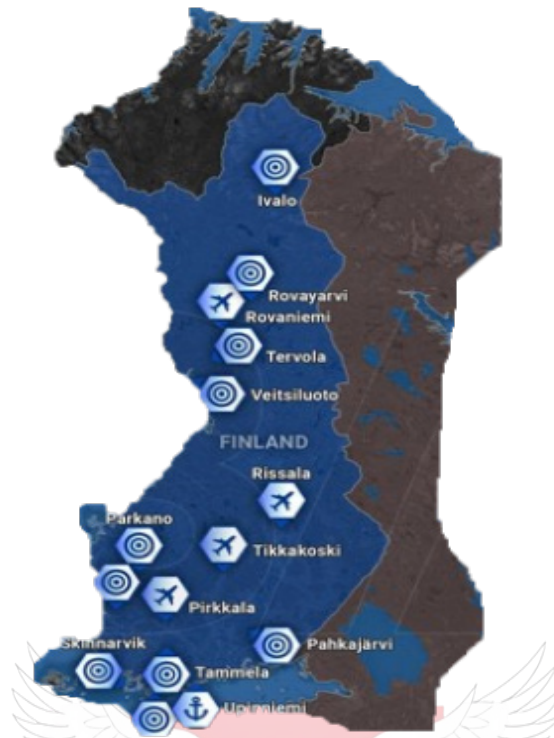
As of today, not only has the Baltic Sea turned into NATO’s internal waters, but the alliance’s northernmost border closes to 1000km. Nevertheless, what is still missing is that Putin would harshly condemn Helsinki for the necessity to strengthen the Russian military presence in the Polar region. Rather, he insinuates foreign misleading, or at least a weak understanding among the Finnish politicians on NATO, its assets, and plausible effects for the nation:

Зачем они это сделали? -- из чисто политических соображений. Очень, наверное, хотелось быть членами западного клуба, под каким-то «зонтиком». Зачем им это нужно, я, откровенно говоря, не понимаю.

Why did they do it? -- for purely political reasons. Apparently, there was a huge will to be part of Western club, protected by an «umbrella». Why is it necessary for them, I, frankly speaking, I do not understand. (Putin, 2024e.)

Thematically, a contemporary parallel is to be found in southeastern Europe, aka the Moldovan EU referendum in October 2024. Moscow, impersonated in the MFA’s spokesperson, Maria Zakharova, condemned the very plebiscite as thoroughly have breached basic civil and human rights. As for foreign politics, the spokesperson accused the western states of a deliberate “fraud” and an immense “meddling”. According to Zakharova, these were performed for one single reason – to transform Moldova into a NATO base, via its EU membership. Nonetheless, the West failed to deceive the valiant Moldovans living within the republic; almost 55 per cent rejected the course. (RNLamminparras, 2025c.) In theory, unlike in Moldova, the foreign powers’ success was better than perfect in Finland; no NATO referendum was deemed necessary.

Except for delivering his stance in “I”, there is a semantic cross-reference to Putin’s initial commentary on Helsinki’s decision to apply for NATO. While the Finnish president Sauli Niinistö in May 2022 informed Moscow on the conclusion, Putin largely bemoaned the turn of the tide; in particular, he notified his counterpart that such a move is “erroneous” since there are no menaces to Finland’s calm. (Putin, 2022.) Contrastively, at the time, Spring 2024, seventy-six per cent of Finns voiced their support for NATO. What is interesting is that Putin sharply describes the roots of this alignment and the mindset of his neighbours. Just as he rationalises, the Finns truly aspire to situate in the West: more than a half opined that “Finland would not constitute a fully western state without NATO membership”. (Simojoki, 2024.)



If one judges by the date of Putin's interview (March 13, 2024) and the concurrent political evolution in the Nordics, it is possible to discern implications to the ongoing DCA processes. In Sweden, less than two weeks earlier, the debate on DCA took new rounds, after Hungary finally ratified the country's NATO accession. For example, left-green parties voiced their clear rejection of the DCA agreement. (DN, 2024). It was factually from these discussions the Russian president's conversation set sail; according to the interviewer Kiselyov, Swedish Minister of Foreign Affairs, Tobias Billström, had informed the Turks [the penultimate to ratify Sweden's NATO membership] that Stockholm objects NATO bases on the Swedish soil. Kiselyov inquired whether the Swedes really had understood where they were going. (Putin, 2024e.) Clearly, Kiselyov spoke of the envisioned US military presence, albeit his term was incorrect. Six days prior, Sweden had already become a member of the alliance.

In Finland, President Sauli Niinistö, one of the key initiators of Finland's NATO bid in 2022, inaugurated the new president, Alexander Stubb, on March 1, 2024 (Niinistö, 2024a; *ibid.*, 2024b). Even though the presidential connections between Helsinki and the Kremlin terminated in May 2022, it would be a gross understatement to claim that the Kremlin did not follow the discourses and actions of its counterpart. Not least because of Niinistö's decisive role in Helsinki's path to the alliance. Moreover, it was exactly Niinistö himself to associate Russia's invasion into Ukraine, NATO and DCA in his farewell speech afore the Parliament:

Tämän vuosikymmenen alussa Venäjän julma hyökkäys Ukrainaan muutti ratkaisevasti turvallisuustilannetta koko Euroopassa. Suomessa vastaus haettiin hakeutumalla Natoon ja neuvottelemalla sen jatkoksi DCA-sopimus Yhdysvaltain kanssa. (Niinistö, 2024a.)

Russia's cruel invasion of Ukraine in the early years of this decade dramatically changed the security situation in the whole of Europe. Finland responded by joining NATO and continued by negotiating the DCA agreement with the United States. (Niinistö, 2024b.)

In both languages, DCA is perceived as "a continuum" ("jatko" in Finnish) of NATO, as if it naturally was linked to, and unquestionably followed, the membership. It is worth pondering that if the alliance itself would satisfy security needs and guarantee peace of its members, why Washington prefers bilateral defence cooperation agreements at once the flag of a fresh NATO country is raised in Brussels. Readily in Summer 2022, the Russian president anticipated Finland to turn into a US military stronghold in Far North. After Finland signed DCA in December 2023, Putin speculated there would situate 21 American military bases on the soil of the northwestern neighbour. (Lamminparras, 2025b, p. 18.) Notably, at its time legitimization was expressed by referring to the future; in March 2024, the procedure was in full speed. Ultimately, fifteen Finnish garrisons, harbours, airdromes and storage areas were in part or fully transferred to American jurisdiction. Many of these

situate next to the Russian Arctic regions, or no farther than 200km (by air) from the border. Furthermore, the US units and installations enjoy large extraterritorial rights, non-subjugation to Finnish Penal Code included. (FM-DCA.)

Hence, taken in consideration the then-heated debates in both Sweden and Finland, it is well-grounded to presume that DCA was Putin's chief point of reference, instead of NATO as such. Save that Kiselyov erred in terminology. Not least, because already by the Syrian intervention in late 2015, the Russian reasonings concentrated in defaming the western countries, and particularly the US for its alleged strive for hegemony (Myasnikov, 2022, pp. 110, 113). That Putin alluded to (warned of?) a sheer loss of sovereignty further speaks for the interpretation:

- Это абсолютно бессмысленный шаг с точки зрения обеспечения собственных национальных интересов.
- It is an absolutely senseless move from the perspective of safeguarding proper national interests. (Putin, 2024e.)

As for the contents, the formulation does resemble a euphemism of the Russian president's harsh note on Occident a mere year prior. Then, Putin overtly slammed "the West seeking unlimited power" (Burrett, 2024, p. 14.). In the Finnish context, Moscow likely implied the soon-to-be-promulgated American extraterritorial privileges. However, the source material regarding DCA, or the US interests in Finland, is minimal. Therefore, I warmly encourage my fellow scholars to deepen this preliminary assessment. Perhaps, the inclusion of the concurrent Swedish debate clarifies the issue. Nevertheless, about Putin's general view (and disappointment?) on the two Nordic states there is no doubt:

- мне думается, что они больше выигрывали от того, что они придерживаются нейтралитета
- I believe that they benefited more if they adhered to neutrality -- (ibid.).

4. Conclusions

It is not Finland – nor Sweden, for its part – to cause major concerns in Moscow, despite their recent NATO accessions. Neither does the sizable joint Finno-Swedish military might, be it under their own flags or that of the alliance. On the contrary, Russia – personified in President Putin's all-encompassing "we" – until recent years nurtured friendly and profitable bilateral relations with both Nordic states. Here, the Russian leader unites storytelling (mythopoesis) and authorisation by tradition; also, he seeks to stir emotions on those golden days of collaboration, especially among Finns. This manner mostly falls in the category of moral evaluation. More of a legitimisation by rationalisation is Putin's notion on no "pretensions" on either side of the boundary. An equal tool is his claim that afore NATO there was not a single need to field major contingents by the Finno-Russian border. In fact, in the eyes of the Kremlin, Finland "was drawn" in the alliance. Somewhat paradoxically, Putin is profoundly aware of the true background: it was the Finns' will to be part of the West. Nonetheless, his word choice yet implies that the Finns were rather lured, or at least they failed to see the whole picture on NATO's essence and its consequences.

Through these justifications, Putin on one hand mitigates the course of the events – NATO's enlargement next to north-western Russia – afore his domestic audience. It is pertinent to note that most of the above-mentioned stances were pronounced during interviews or his addresses to federal decision-makers. On the other hand, the Russian leader tends to exhort the Finns, and the Swedes, to hamper their countries' deepening western defence collaboration and estrangement. The fascinating alteration in his wording likewise points to this assumption. In Spring 2024, Putin perceived strengthening the Far North as a choice between life or death for Russia, due to "NATO's further expansion to East". Markedly, the tones and words were not far from those utilised to justify the SMO in Ukraine. A year later, his attitude is by far softer: Stockholm and Helsinki's decisions to join the coalition are just "completely incomprehensible". To discern an overall picture on this discursive turn, I encourage reassessments on the topic, say, in spring or autumn 2026.

Foremost, the Russian president legitimises Russia's ongoing program to reinforce its Arctic. As the Polar region produces most of Russia's raw materials and minerals, vital for both maritime industry and aeronautics, any foreign foothold at the vicinity of the Arctic resources calls for countermeasures. One step consists of testing brand new arms in the Polar waters. Apart from reorganising its military districts, the number of Russian

combatants by the country's northwestern boundary may also rise to 66 thousand, or up to 100 thousand if one considers the vilest speculations. On Putin's words, as in the past, Moscow does not threaten anyone. Here, the historical continuum serves for further legitimisation. Indeed, in the Russian leader's idiom, the militarisation is only "a mirror-like action". The hedge here reads: there is someone else to put the Polar calm in danger. Whether Putin indicates Finland's Defence Cooperation Agreement with the US, and the fifteen American military bases in Finland, appears probable. However, this presumption requires further inquiries, with a wider corpus. What yet becomes evident is Putin's conviction: the Nordic states would be better off if they still observed their traditional non-alignment doctrine.

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5. References

1. Aunesluoma, J. & Rainio-Niemi, J. (2016). "Neutrality as Identity: Finland's Quest for Security in the Cold War". In *Journal of Cold War Studies*, 18, 4, pp. 51–78. doi: 10.1162/JCWS_a
2. Baev, P. (2018). 'Russia's Ambivalent Status-Quo/ Revisionist Policies in the Arctic' in *Arctic Review on Law and Politics*, Vol. 9, pp. 408–424. doi: 10.23865/arctic.v9.1336
3. Balzacq, Th. (2011). *Securitisation Theory: How Security Problems Emerge and Disappear*. London and New York: Routledge.
4. Bekoyeva, I. D. (2015). 'Osobennosti politicheskogo diskursa VV Putina [Peculiarities of the political discourse of V. V. Putin]', in *Aktualnyye problemy filologii i pedagogicheskoy lingvistiki*, 2(18), pp. 27–31. Available at <https://cyberleninka.ru/article/n/osobennosti-politicheskogo-diskursa-v-v-putina> (Accessed: August 30, 2025).
5. Blackburn, M. (2024). 'The morphology of Putinism: the arrangement of political concepts into a coherent ideology.' *Journal of Political Ideologies*, pp. 1–31. doi: 10.1080/13569317.2024.2431864
6. Burret, T. (2024). 'Making Russia Great Again? Vladimir Putin's Changing Sources of Legitimacy 2000–2024'. *Politics and Governance*, Vol. 13, Art. 9029. doi: 10.17645/pag.9029
7. Conley, H. & Rohloff, C. (2015). *The New Ice Curtain. Russia's Strategic Reach to the Arctic*. Lanham (MD): Rowman & Littlefield.
8. Dement'yeva, M. K. (2009). "Jazykovyye sredstva vyrazheniya ochenki v sovremennom rossiyskom ofitsial'nom politicheskom diskurse [Linguistical means of evaluation expression in current Russian official political discourse]". In *Politicheskaya lingvistika*, 30, pp. 82–92. Available at <https://cyberleninka.ru/article/n/yazykovye-sredstva-vyrazheniya-otsenki-v-sovremennom-rossiyskom-ofitsialnom-politicheskoy-diskurse> (Accessed August 30, 2025).
9. Dinçer, M. (2022) 'The approach of Finland to Russian occupation of Ukraine: securitisation of the Putin regime', *Uluslararası Ekonomi, İşletme ve Politika Dergisi* [International Journal of Economics, Business and Politics], 6(2), pp. 397–424, pdf.
10. DN (Dagens Nyheter, 2024). Natomotståndarna laddar om efter Ungerns ja [NATO opponents reload after Hungary's yes]. 1 March. Available at <https://www.dn.se/sverige/natomotstandarna-laddar-om-efter-ungerns-ja/> (Accessed: August 30, 2025).
11. Eskola, T. (1996). *Uuden Testamentin hermeneutiikka. Tulkintateorian perusteita* [The hermeneutics of the New Testament. Fundamentals of the interpretation theory]. Helsinki: Yliopistopaino.
12. Fairclough, N. (1992). *Discourse and Social Change*. Cambridge: Polity Press.
13. FDFA (Finnish Defence Forces). Army. Undated. Available at <https://maavoimat.fi/en/about-us> (Accessed: 30 August 2025).

14. FDFA (2024). Army combined fires stand for a capable entity. April 10. Available at <https://maavoimat.fi/en/-/army-combined-fires-stand-for-a-capable-entity> (Accessed: August 30, 2025).
15. FG (Finnish Government, 2022). Tasavallan presidentin ja pääministerin yhteislausunto Suomen Nato-jäsenyydestä [Common Statement of the President of the Republic and of the Prime Minister on Finland's NATO membership]. 12 May. Available at <https://valtioneuvosto.fi/-/10616/tasavallan-presidentin-ja-paaministerin-yhteislausunto-suomen-nato-jasenyydesta> (Accessed: August 30, 2025).
16. FM (Ministry of Foreign Affairs of Finland, 2022). Yhdysvallat ja Suomi käynnistävät sopimusneuvottelut puolustusyhteistyöstä [The United States and Finland launch talks on defence cooperation]. 29 September. Available at https://um.fi/ajankohtaista/-/asset_publisher/gc654PySnjTX/content/yhdysvallat-ja-suomi-kaynnistavat-sopimusneuvottelut-puolustusyhteistyosta (Accessed: August 30, 2025).
17. FM-DCA. Defence Cooperation Agreement with the United States (DCA). Undated. Available at <https://um.fi/defence-cooperation-agreement-with-the-united-states-dca-> (Accessed: August 30, 2025).
18. Galyamina, Ju. E. (2016). 'My–oni: Kak v diskurse Vladimira Putin raznykh let konstriruyetsya identichnost'. [We – they: How identity is constructed in Vladimir Putin's discourse in different years], in *Politicheskaya nauka*, 3, pp. 152–167. Available at <https://cyberleninka.ru/article/n/my-oni-kak-v-diskurse-vladimira-putina-raznyh-let-konstruiruetsya-identichnost> (Accessed: August 30, 2025).
19. Godzimirski, J. & Sergunin, A. (2020). 'Russian Expert and Official Geopolitical Narratives on the Arctic: Decoding Topical and Paradigmatic DNA', in *Arctic Review on Law and Politics*, Vol. 11, pp. 22–46. doi: 10.23865/arctic.v11.1350
20. Hallamaa, T. & Heikinmatti, A. (2022) 'Suomen ja Ruotsin Nato-jäsenyys muuttaa voimasuhteet Itämerellä – asiantuntija: "Tämä todennäköisesti muuttaa Venäjän laskelmia"' [The Finnish and Swedish memberships alter the balance in the Baltic Sea – an expert: "This probably affects the Russian estimates"]. *Yle*. May 21. Available at <https://yle.fi/a/3-12454816> (Accessed: 30 August 2025).
21. Humper, M. (2025). 'Ukraine War Reaches Arctic With Massive Drone Attack on Olenya Air Base Near Murmansk', *High North News*, 2 June. Available at <https://www.highnorthnews.com/en/ukraine-war-reaches-arctic-massive-drone-attack-olenya-air-base-near-murmansk> (Accessed: August 30, 2025).
22. Lamminparras, N. (2025a). *A Selection from Alarmism to Technocracy. Russia and the Arctic in 2024–2025*. Intelligence Paper no. 2. March 15, 2025. Available at the author.
23. Lamminparras, N. (2025b). "Finns no threat but the US foothold in North". Putin and Finland's NATO accession in 2022–2023', in *Security & Defence Quarterly*, 4/2025 vol. 52. Accepted final version, slated for December 2025.
24. Lamminparras, N. (2025c). "'Sovereign Chişinău or abyss with NATO". Moscow and the Moldovan EU referendum 2024', in *Bulletin of "Carol I" National Defence University*, No. 2/2025, pp. 33–46.
25. Langenohl, A. (2019). 'Dynamics of Power in Securitisation: Towards a Relational Understanding', in Langenohl, A. and Kreide, R. (eds.) *Conceptualizing Power in Dynamics of Securitisation*. Baden-Baden: Nomos, pp. 25–37.
26. Mal'chenkov, C. (2022). 'Tsivilizatsionnyy diskurs v vyskazyvaniyakh VV Putina [Civilisational discourse in the public statements of VV Putin]' In *Diskurs-Pi*, 19(2), pp. 53–71. Available at <https://cyberleninka.ru/article/n/tsivilizatsionnyy-diskurs-v-vyskazyvaniyah-v-v-putina> (Accessed August 30, 2025).
27. Myasnikov, St. (2022). 'Legitimation of Russia's special foreign policy operations. strategic narratives of Russian officials'. *Vestnik Permskogo Universiteta. Politologiya*. T. 16, No. 4, pp. 105–117, pdf.
28. Mölder, M. & Berg, E. (2022). 'Conflicts and Shifts in the Kremlin's Political Discourses since the Start of the Putin Presidency (2000–2019)', in *Europe-Asia Studies*, 75(4), pp. 564–582. doi: 10.1080/09668136.2022.2069677
29. Niinistö (Tasavallan Presidentti, 2024a). Tasavallan presidentti Sauli Niinistön puhe eduskunnassa 1.3.2024. 1 March. Archived, available at <https://www.presidentti.fi/niinisto/puheet/tasavallan-presidentti-sauli-niiniston-puhe-eduskunnassa-1-3-2024> (Accessed: August 30, 2025).
30. Niinistö (President of the Republic of Finland, 2024b). Speech by President of the Republic of Finland Sauli Niinistö in Parliament on 1 March 2024. 1 March. Archived, available at <https://www.presidentti.fi/>

niinisto/en/speeches/speech-by-president-of-the-republic-of-finland-sauli-niinisto-in-parliament-on-1-march-2024 (Accessed: August 30, 2025).

31. Panschin, Vladimir (2024). 'Venäjän sotilaallinen voima Suomen lähialueilla – mitä lähivuodet tuovat tullessaan?' [The Russian military might at vicinity of Finland – perspectives for the years to come], in Col. Lehto, Martti (Ed.-in-Ch.) *Sotilasaikakauslehti 1/2024* [Military Gazette 1/2024], pp. 38–48. Helsinki: Upseeriliitto.
32. Ponomaryeva, A. (2022) 'Finlyandiya na poroge NATO: obshtshestvennoye izmereniye otказа ot neytraliteta' [Finland at NATO's doorstep: societal dimension of renunciation of neutrality]. *Evropeyskaya bezopasnost': sobytiya, otsenki, prognozy*, Vypusk 64(81), pp. 17–24, pdf.
33. Putin (Prezident Rossii) 2025a. Vstrecha s molodymi sotrudnikami predpriyatiy atomnoy otrasli [Meeting with the young functionaries of enterprises within atomic branch]. 22 August. Available at <http://kremlin.ru/events/president/news/77837> (Accessed: August 30, 2025).
34. Putin (2025b). Vstrecha s predstavitel'yami rossiyskikh delovykh krugov [Meeting with representants of the Russian business circles]. 26 May. Available at <http://kremlin.ru/events/president/news/77034> (Accessed: August 30, 2025).
35. Putin (2025c). Mezhdunarodnyy forum – «Arktika – territoriya dialoga» [International forum – «Arctic – territory of dialogue»]. 27 March. Available at <http://kremlin.ru/events/president/news/76554> (Accessed: August 30, 2025).
36. Putin (2025d). Soveshtshaniye c chlenami Pravitel'stva [Discussion with the members of the Government]. 18 February. Available at <http://kremlin.ru/events/president/news/76282> (Accessed: August 30, 2025).
37. Putin (2025e). Vstrecha s gubernatorom Sankt-Peterburga Aleksandrom Beglovym [Meeting with the governor of St. Petersburg, Aleksandr Beglov]. 27 January. Available at <http://kremlin.ru/events/president/news/76168> (Accessed: August 30, 2025).
38. Putin (2024a). Zasedaniye Gosudarstvennogo Soveta [Session of the State Council]. 20 December. Available at <http://kremlin.ru/events/president/news/75918> (Accessed: August 30, 2025).
39. Putin (2024b). Itogi goda c Vladimirom Putinym [Results of the year with Vladimir Putin], 19 December. Available at <http://kremlin.ru/events/president/news/75909> (Accessed: August 30, 2025).
40. Putin (2024c). Zasedaniye Soveta po razvitiyu grazhdanskogo obshtshestva i pravam cheloveka [Session of the Council for the development of civil society and human rights], 10 December. Available at <http://kremlin.ru/events/president/news/75816> (Accessed: August 30, 2025).
41. Putin (2024d). Cheremoniya vrucheniya veritel'nykh gramot [Handover ceremony of credentials], 5 November. Available at <http://kremlin.ru/events/president/news/75494> (Accessed: August 30, 2025).
42. Putin (2024e). Intervyu Dmitriyu Kiselyovu [Interview with Dmitri Kiselyov], 13 March. Available at <http://kremlin.ru/events/president/news/73648> (Accessed: August 30, 2025).
43. Putin (2024f). Poslaniye Prezidenta Federal'nomu Sobraniyu [Address of the President to the Federal Assembly], 29 February. Available at <http://kremlin.ru/events/president/news/73585> (Accessed: August 30, 2025).
44. Putin (2024g). Vstrecha s glavoy «Inter RAO» Borisom Koval'chukom [Meeting with the Head of «Inter RAO», Boris Koval'chuk], 5 February. Available at <http://kremlin.ru/events/president/news/73383> (Accessed: August 30, 2025).
45. Putin (2024h). Soveshtshaniye po voprozam sotsial'no-ekonomicheskogo razvitiya aglomeratsii Sankt-Peterburga [Discussion on the social-economic development of the agglomeration of St. Petersburg]. 26 January. Available at <http://kremlin.ru/events/president/news/73329> (Accessed: August 30, 2025).
46. Putin (2023). Rashirennoye zasedaniye kollegii Minoborony [Extended session of the Collegium of the Ministry of Defence]. 19 December. Available at <http://kremlin.ru/events/president/news/73035> (Accessed: August 30, 2025).

47. Putin (2022). Telefonniy razgovor s Prezidentom Finljandii Sauli Niinistö [Phone call with the President of Finland, Sauli Niinistö]. 14 May. Available at <http://kremlin.ru/events/president/news/68409> (Accessed: 29 August 2025).
48. Pälli, P. & Lillqvist, E. (2020) 'Diskurssianalyysi' [Discourse analysis]. *Kielentutkimuksen menetelmiä I-IV* [Methodology of Linguistics II], Luodonpää-Manni, M., Hamunen, M., Konstenius, R., Miestamo, M., Nikanne U. and Sinnemäki K. (eds.), pp. 374–411. Helsinki: Finnish Literature Society.
49. Rainio-Niemi, J. (2014). *The Ideological Cold War. The Politics of Neutrality in Austria and Finland*. New York: Routledge.
50. Reserviläinen (The Reservist, 2024). Suomen MLRS-raketinheitimet päivittyvät, myös moderneja ampumatarvikkeita on hankittu runsaasti [Finnish MLRS rocket launchers will be updated, plenty of modern ammunition alike procured]. March 2. Available at <https://reservilainen.fi/suomen-mlrs-raketinheitimet-paivittyvat-mynos-moderneja-ampumatarvikkeita-on-hankittu-runsaasti/> (Accessed: August 30, 2025).
51. Sedykh, A. (2012). 'Emotional'no-ekspressivnyye komponenty fraseologicheskogo diskursa VV Putina i A. Merkel'. [Emotive-emphatic components of phraseological discourse of V. V. Putin and A. Merkel], in *Politicheskaya lingvistika*, (2), pp. 39–45. Available at <https://cyberleninka.ru/article/n/emotsionalno-ekspressivnyye-komponenty-frazeologicheskogo-diskursa-v-v-putina-i-a-merkel> (Accessed: August 30, 2025).
52. Sergunin, A. & Konyshov, V. (2016). *Russia in the Arctic. Hard or soft power?*. Stuttgart: Ibidem-Verlag.
53. Shevko, D. (2020). 'Legitymatsiya agressii proty Ukrayini v rosiys'komu ofitsiynomu diskursi' [Legitimation of aggression against Ukraine in Russian official discourse]. *Strategichna panorama*, No. 1-2, pp. 48–57, pdf.
54. Simojoki, N. (2024). Naton kannatus notkahti – suomalaiset eivät luota Trumpin Yhdysvaltojen tulevan apuun [Support for NATO decreased – Finns do not rely on Trump's USA to come to aid]. 24 April. Available at <https://www.is.fi/politiikka/art-2000011188407.html> (Accessed: August 30, 2025).
55. Sinyayeva, N. & Samodurov, D. (2024) 'Voyennaya bezopasnost' v Arktike svyazi s rashireniyem NATO v Severnoy Evrope' [Military security in the Arctic in relation to the NATO expansion in Northern Europe], *Voyennoye pravo* [Military Jurisprudence]. No. 4(2024), pp. 33–40. Available at <http://www.voennoepravo.ru/files/04-24.pdf> (Accessed: 30 August 2025).
56. Tepe, S. & Chekurova, A. (2022). 'Faith in Nations: The Populist Discourse of Erdogan, Modi, and Putin', in *Religions* 2022, 13(5). doi: 10.3390/rel13050445
57. Van Leeuwen, T. (2007). Legitimation in Discourse and Communication. *Discourse & Communication*, 1, pp. 91–112. doi: 10.1177/1750481307071986
58. Vedmedenko, I. (2025). Ne "Flaminkho" yedinoyu: naypotuzhnishi rakety Ukrayini. Unian, 27 August. Available at <https://www.unian.ua/weapons/ne-flamingo-yedinim-naypotuzhnishi-raketi-ukrajini-13110840.html> (Accessed August 30, 2025).
59. Vezhlyvtseva, N. Yu. (2019) 'Neitralitet Finlyandii kak chast yeyo natsional'noy identichnosti' [Finland's neutrality as part of its national identity]. *Vestnik MGIMO-Univerzitet*, 2(65), pp. 86–100. doi: 10.24833/2071-8160-2019-2-65-86-100
60. Zhilkin, V. (2022) 'Istoriya rossiysko-finlyandskikh otnosheniy i otsenka strategicheskikh i politicheskikh posledstviy vstupleniya Finlyandii v NATO' [History of Russo-Finnish relations and estimates on strategic and political consequences of Finland's accession to NATO]. *Rossiya: tendentsii i perspektivy razvitiya*, 17-2, pp. 70–76, pdf.



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Research article

Risks and Threats to Critical Infrastructure with Reference to Trends in the Protection of Critical Infrastructure in the Republic of Serbia

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ABSTRACT

Critical infrastructure consists of facilities, resources, and systems that are of vital importance for the functioning of a country's society and economy. Its importance is reflected both in regular and emergencies. Risks and threats are becoming increasingly frequent. In addition to their growing number, their destructive potential is also on the rise. A characteristic of the modern concept of critical infrastructure is the altered perception of risks and threats, as well as the increased interdependence between infrastructural elements. This influences the growing scope, content, and complexity of critical infrastructure, while potential threats pose a primary concern for national security. The forms of endangerment to critical infrastructure in this paper are divided into natural, external, and internal. The Republic of Serbia has undertaken the identification, determination, and protection of critical infrastructure. Like developed countries in this field, it is making efforts to address shortcomings in the normative and organizational framework. By adopting laws, bylaws, and appropriate strategies, a normative foundation has been established to support further development of the critical infrastructure protection system. The security and protection of critical infrastructure in the Republic of Serbia are conditioned by the relationship between threats and challenges, as well as by the ability to respond to them. In the final part of the paper, the normative and legal framework for critical infrastructure in the Republic of Serbia is analyzed, along with recommendations to improve the current state of protection.

KEYWORDS

Critical infrastructure; risks; threats; Republic of Serbia; normative-legal framework.

1. Introduction

By the end of the 20th century, critical infrastructure had become an important element of national security. At that time, critical infrastructure protection was introduced and has since become a priority for all states (Jakovljević, 2010). As a key segment of modern society, critical infrastructure faces a range of challenges and risks (Komazec, 2023). The challenges it encounters are numerous and complex. The growing number of hazards and threats creates an increasing need for adequate protection of critical infrastructure. In this context, protection

does not refer only to the infrastructure itself, but also to the consequences that may affect the economy and society. The functioning of the economy and society, both in regular and emergencies, is one of the primary and most important goals. This further initiates the development of a more resilient system in accordance with new requirements and more advanced technology. Successful prevention and emergency management are directly linked to an efficient critical infrastructure protection system (Komazec, 2023; Trbojević, 2018; Mićović, 2016). It is necessary to identify which infrastructure is critical to maintaining continuous services or functions and is vulnerable to specific threats or hazards. Prioritizing the allocation of resources to this group of infrastructure can improve security, increase resilience, and enhance long-term sustainability (Biringer, Vugrin, & Warren, 2013). Identifying hazards involves detecting and precisely describing all sources of danger and the scenarios in which they can occur. The result of identification is the prevention of undesired events and the prevention of the conditions that cause or worsen them (Cvetković, 2020). Resilience can be defined as the capacity of a system, the process through which the system is “strengthened,” but also as a strategy for risk management (Ninković, 2024). The resilience of critical infrastructure is the ability to function under the influence of adverse external and internal factors (Lukas & Hromada, 2011).

The two terms “risk” and “threat,” as key concepts of this paper, require closer definition. A security threat is considered anything that represents a source of danger and poses the potential to inflict serious harm on individuals, property, society, or the state (Mićović, 2020). Risk, on the other hand, refers to the combination of the probability that a disaster will occur within a specific period of time and the negative consequences associated with it.

Critical infrastructure refers to systems, services, and assets, whether physical or virtual, that are so vital to societal well-being that any disruption or destruction of these systems can have significant consequences for citizens’ health, safety, and economic welfare, as well as for the effective functioning of government institutions (Košanin, 2018; Janković et al., 2025). It encompasses a wide range of sectors, including, but not limited to, the water supply sector, transportation and transit, energy production and distribution, information and communication technologies, healthcare, food supply, financial services, government institutions, and public administration (Rakić, 2015; Lewis, 2006; Jakovljević & Gačić, 2012).

Increasing operational complexities and growing interdependencies among systems have contributed to infrastructure vulnerabilities resulting from natural disasters, human errors, and technical failures. New forms of threats have also emerged, including cyber warfare, terrorism, and cybercrime. These events can have severe consequences, and in some cases, may lead to the destruction of infrastructure (Mićović, 2016). It is important to note that the term “risk” here refers to the combination of potential events and the likelihood of their consequences. In contrast, the term “threat” generally refers to harmful actions directed against infrastructure. *Vulnerability* can be defined as the degree to which a system, subsystem, or component is likely to be damaged by exposure to risks (Mićović, 2020).

The terrorist attacks on the USA on September 11, 2001, and the terrorist attacks in Paris, London, Moscow, Brussels, and Barcelona confirmed the need for a new approach to the protection of critical infrastructure. Likewise, natural disasters can have devastating consequences for infrastructure, such as hurricanes Katrina, Maria, and Irma, as well as tsunamis in Southeast Asia and Japan (Trbojević, 2018).

The Republic of Serbia is making considerable efforts to establish an integrated system of protection and rescue capable of effectively responding to threats to critical national resources (Jakovljević, 2010). However, a certain level of confusion can be observed regarding the security and protection of critical infrastructure. The first step in addressing this issue is to develop a comprehensive legal and normative framework to ensure the adequate protection of critical infrastructure. Although Serbia has enacted a Law on Critical Infrastructure, the sector is additionally regulated by numerous other legal acts, resulting in a degree of complexity and ambiguity in the field (Mladenović & Komazec, 2022; Cvetković & Stojković, 2015). From a normative-legal perspective, the Republic of Serbia adopted the Law on Critical Infrastructure in 2018. The domestic legal framework for the protection of critical infrastructure also includes a regulation defining the criteria for identifying critical infrastructure and the procedures for reporting on it. Furthermore, the Law on Public-Private Partnership represents one of the key instruments for the protection of critical infrastructure.

Trends toward the advancement and interconnection of all elements of critical infrastructure are underpinned by specific prerequisites, specifically specialized knowledge, which represents investments in preventive mechanisms that can be incorporated into the strategic framework for the protection of critical infrastructure.

In the future, the system for protecting critical infrastructure will be effective only through mutual understanding and coordination among state authorities, companies, and other stakeholders (Mićović, 2020).

The authors will use content analysis to collect domestic and international literature and to examine other research experiences, drawing on scientific papers, professional books, and journals. This method is also significant for studying normative-legal regulations by analyzing available and official laws, documents, and reports. The historical method will be used to examine past events to identify appropriate solutions for the future and to enhance responses to potential threats.

For this study, the authors will employ content analysis to collect domestic and international literature, as well as to examine other research experiences, drawing on scientific papers, professional books, and journals. This method is also significant for studying the normative-legal framework by analyzing available and official laws, documents, and reports. The historical method will be used to examine past events in order to identify appropriate solutions for the future and to enhance responses to potential threats.

The primary objective of this review paper is to present the risks and threats to critical infrastructure and clearly highlight the activities that should be undertaken to improve the functioning and protection systems of critical infrastructure in the Republic of Serbia.

2. Natural risks and threats to critical infrastructure as a form of vulnerability

Disasters caused by biological, hydrological, lithospheric, and climatic natural phenomena have become frequent occurrences in daily life. The consequences of these disasters often have destructive effects on life, health, material and cultural assets, as well as on the international community as a whole (Cvetković, Milojković, & Stojković, 2014; Cvetković & Filipović, 2017; Ocal, 2019).

Natural hazard-induced disasters are understood as events in which interactions occur between specific hazards (lithospheric, hydrospheric, atmospheric, biospheric, and extraterrestrial) and built social systems, resulting in consequences for community safety and normal functioning. This necessitates additional efforts to restore life and all other social activities to their previous “normal” state. Natural disasters can also be understood as the consequences of spatial interactions between hazardous ecological processes and the population, or specific vulnerable segments thereof (Cvetković, 2023; Cvetković, 2020, p. 84; Degg, 1992, p. 199; Cvetković & Stojković, 2015). According to the International Strategy for Disaster Reduction (ISDR, 2009), natural hazards are natural processes that cause losses in human life, health, and services, as well as disruptions to the economy and social protection, and lead to environmental degradation.

A significant increase in natural disasters causing serious consequences for critical infrastructure has been observed (Korajlić & Marjanović, 2022; Kaur, 2020). Broadly speaking, critical infrastructure can be affected or damaged by various natural phenomena, such as floods, earthquakes, strong winds, landslides, snowfalls, hail, and similar events. These changes lead to a growing number of catastrophic events, significantly increasing the need for forecasting, planning, and strengthening the system (Milenković, 2025).

The risk and threats from disasters caused by a single natural event are often accompanied by another natural phenomenon, or even a chain of events. An example of such a situation is the earthquake followed by a tsunami in Japan, which was subsequently accompanied by a series of accidents triggered by the earthquake, significantly affecting the functioning of critical infrastructure. The tsunami, triggered by the earthquake, affected nuclear power plants, reducing the total energy required for delivery to the consumer grid (Korajlić & Marjanović, 2022; Kumiko & Shaw, 2019; Onuma, Shin, & Managi, 2017). Subsequent seismic shocks can cause greater damage to already weakened structures (Cvetković & Planić, 2022). Secondary effects of earthquakes include fires, dam ruptures, and landslides, which can block land and water routes and cause flooding. Damage to facilities where hazardous materials are used or produced may result in chemical leaks.

Similarly, the earthquake that struck the Republic of Serbia and the city of Kraljevo on November 3, 2010, seriously endangered critical infrastructure. On that day, the city experienced heating issues and partial power outages, and water was deemed unsafe for drinking. The maternity ward was flooded, the operating rooms at

the “Studenica” Clinical Center were non-functional, and store shelves collapsed, severely disrupting the supply of goods to citizens (Mićović, 2016, p. 47).

Floods are by far the most frequent and dangerous threat, and, as a hazard, they can lead to erosion. Erosion, in turn, can undermine bridges, embankments, and buildings, eventually causing their collapse (Aktar et al., 2021; Korajlić & Marjanović, 2022; Perić & Cvetković, 2019). The 2014 floods primarily affected central and western Serbia. During this event, the Kolubara Mining Basin was also impacted. Due to flooding of the Kolubara River on May 15–16, 2014, mining equipment was submerged, and parts of the railway used to transport coal from the Kolubara mine were damaged. This resulted in a suspension of coal transport to Obrenovac. As a consequence, production was significantly reduced during the period from May 15 to May 25 (Miletić, 2023; Vlada Republike Srbije, 2014).

Strong storm winds can damage overhead power lines or telecommunications lines, which are considered critical infrastructure assets. Addressing the consequences of stormy weather in modern society requires an electricity supply; in this sense, critical infrastructure serves to provide quality medical care, food preparation, and other essential services. Communication and telephone systems are the lifeline of the protection and rescue system and, as such, depend on wired connections. Without them, the system must rely solely on radio communications, which can quickly become a “bottleneck” in any significant protection and rescue operation (Jakovljević, 2010, p. 65).

Awareness of the importance of the functioning of infrastructure systems—from the consequences of a destroyed bridge that disrupts the movement of resources and citizens within a community, to a major failure at a power plant during the winter months when electricity is a matter of life and death—represents a significant step toward effective risk and threat management of natural disasters (Cvetković, 2014).

To better understand the impact of natural disasters on critical infrastructure, it is essential to understand the fundamental qualitative and quantitative indicators of natural disasters at the global level and over longer periods. By analyzing statistical results on the geospatial and temporal distribution of various natural disasters (Cvetković & Mijalković, 2013; Cvetković, 2013), it is evident that natural disasters increasingly threaten people and their assets, including critical infrastructure.

3. External risks and threats to critical infrastructure as a form of vulnerability

One of the most severe forms of external risks to critical infrastructure is armed aggression. Depending on political, geopolitical, and military interests, armed aggression aims to bring about radical changes. Its ultimate objective is the occupation of territory and the destruction of the constitutional, economic, and social system of a state (Miletić, 2023; Stajić, 2015).

The increasing dependence of societies on information technologies leads to new forms of threats that these societies must be able to confront, whether they are intentional threats, anthropogenic in nature, or natural disasters. Such often recurring and sophisticated threats impact cyber, national, and international security. Cyber threats originate from various sources and manifest through disruptive activities targeting individuals, economic entities, and national infrastructure. They are characterized by specific features such as their transnational nature, the anonymity of attackers, dispersion, and the ability to strike from a distance without direct contact with the target. Threat actors can include individuals, states, or non-state entities. The main threats that modern nation-states face today include hacking, cybercrime, cyberterrorism, political and ideological extremism, cyber espionage, and state-sponsored cyber-attacks and aggression, i.e., warfare (Miletić, 2023; Ptáček & Skoruša, 2015). These events indicate a fundamental shift in the structure of modern conflicts (Vračević, 2025). Cybersecurity is essential for the sustainable growth of nations (Vidović & Beriša, 2025).

Today, terrorism poses a threat in many countries worldwide, ranking among the most pressing security risks of the present day (Pribičević, Janković, & Živković, 2022; Krstić, 2016). Infrastructure can easily become a target for terrorist organizations (Mančić, 2025). Terrorism constitutes one of the most significant challenges in ensuring security from a global, regional, and national perspective. As an international threat, it goes beyond the scope of traditionally defined conflicts and crises. The activities of terrorist organizations may specifically aim at reaching the media for propaganda purposes (gaining publicity for those who carried out the terrorist attack, creating a sense of societal insecurity, spreading ideology, and recruiting followers), achieving political

objectives (forcing state authorities to take or refrain from specific actions), as well as economic goals (causing economic problems or disruptions in securing the country's energy resources) (Miletić, 2023; Zubrzycki, 2017).

Terrorist activities may be carried out to destroy or turn off water, craft, hydraulic structures, and port facilities in order to take control over them. The objective of a terrorist act may also be to provoke an environmental disaster (ecoterrorism); an example of this is oil spills. In such cases, the targets of terrorist acts may include tankers, oil transshipment facilities, coastal installations, oil storage units, and offshore oil platforms. Terrorist attacks can target elements of port infrastructure, particularly those involving seaports and handling terminals, as well as military port facilities. Another group of potential targets includes hydraulic structures such as drilling platforms, pipelines, or underwater cables (Miletić, 2023; Zubrzycki, 2017).

Intelligence and reconnaissance activities can also be classified as external forms of endangerment, as they involve operations aimed at collecting necessary information. In traditional warfare, an adversary would attempt to gather as much information as possible before launching an attack. The goal is to learn about available resources, their weaknesses, and their vulnerabilities. Various methods may be used to obtain such information, including surveillance, eavesdropping, interception of communications, and initiating espionage investigations (Miletić, 2023; Shaikh et al., 2008).

The prevention of terrorist attacks, aggression, intelligence and reconnaissance activities, and cyber threats to critical infrastructure should be part of a broader national strategy. This strategy would focus on anticipating such attacks, detecting plans, conspiracies, and other activities, and disrupting and preventing them. In this context, the protection of critical infrastructure primarily depends on the coordinated activities of intelligence agencies, police, and other law enforcement authorities (Pribičević, Janković, & Živković, 2022).

4. Internal risks and threats to critical infrastructure as a form of vulnerability

Sabotage refers to individual or group activities aimed at causing harm to business enterprises (Mićović, 2016). Typically, when one thinks of sabotage, the image of someone breaking or physically destroying something comes to mind. However, sabotage is only contingently associated with a specific tactic that may be carried out in any given situation. Sabotage is a form of action that operates through circulation, transportation, and mobility infrastructure (Miletić, 2023; Barney, 2019).

It takes many forms, such as disruptions to the expansion of the oil economy, including physical blockades and the occupation of testing sites and pipeline routes, obstructive interventions in public debates and regulatory procedures, assertions of territorial sovereignty and stewardship, litigation, disputes, and licensing approvals. In this sense, sabotage is materialistic: it relies on a network of human and non-human agents, a confederation of workers, locations, architectures, machines, processes, and materials (Miletić, 2023; Barney, 2019).

Perpetrators of sabotage plan and execute all tasks very deliberately to avoid detection. Saboteurs can be individuals who infiltrate a system or those already employed within it, performing ordinary or managerial tasks and thus having access to targeted locations. The fundamental characteristic of sabotage lies precisely in the perpetrators' intimate knowledge of the system (Miletić, 2023; Mićović, 2016).

Crime is defined in multiple ways among experts in this field. It can refer to any deviant behavior, or it can be limited to unlawful conduct that is punishable as a criminal offense. Crime is, in fact, one of the most pressing issues in all modern countries, including our own, as evidenced by its continuous increase. Due to its social danger and harmfulness, all societies strive to suppress it—either preventively or repressively—by continually seeking more effective methods and means. In these efforts, there is a noticeable shift from primarily repressive measures toward preventive measures aimed at preventing crime (Stajić, 2015, p. 300).

In today's world, cyber threats can harm critical infrastructure, leading to service disruptions essential to sustaining life, catastrophic economic damage, or severe degradation of national security. Vulnerability to cyber threats has increased (Dada et al., 2025). The complexity and diversity of cyber threats exploiting vulnerabilities in critical infrastructure are growing daily. To minimize the potential damage from cyber threats, countermeasures must be implemented and their effectiveness continuously monitored (Miletić, 2023; Karabacak & Tatar, 2014).

First, it is necessary to determine the characteristics of the threat, as this will be useful for risk assessment. Risk prevention activities should be initiated by international and national organizations responsible for proposing and adopting laws and strategies, launching initiatives and programs, and defining legal frameworks to reduce the risk of such forms of endangerment within the relevant systems (Pribičević, Janković, & Živković, 2022).

5. Analysis of critical infrastructure from a normative-legal perspective and trends for improving the protection of critical infrastructure in the Republic of Serbia

In terms of legislation, the Republic of Serbia has made significant efforts in recent years. In 2018, the Law on Critical Infrastructure was adopted. The scope of this law (Službeni glasnik broj, 87/18) regulates national and European critical infrastructure, establishes its definition and identification, defines the competencies and responsibilities of authorities and organizations in the field of critical infrastructure, governs data protection, information provision, and reporting, as well as oversight implementation and management procedures.

The Regulation on the Criteria for the Identification of Critical Infrastructure and the Method of Reporting on Critical Infrastructure in the Republic of Serbia was adopted in 2022. This regulation (Službeni glasnik broj 69/22) establishes the criteria for identifying critical infrastructure, which are determined based on an assessment of the consequences that may arise from the disruption or destruction of critical infrastructure, as well as the potential consequences in the event of threats to it.

The sectors of critical infrastructure in the Republic of Serbia are: energy, transportation, water and food supply, healthcare, finance, telecommunications and information technologies, environmental protection, and the functioning of state authorities.

The National Security Strategy of the Republic of Serbia from 2019 states that the dynamics of global information technology development will lead to further intensification of activities in cyberspace, whose security will primarily be threatened by cyber espionage, attacks on critical infrastructure, unauthorized intrusions into classified databases, as well as the spread of fake news and disinformation through social networks (Službeni glasnik broj, 94/2019).

The same document notes that critical infrastructure facilities will be identified and protected, and early warning and preventive response measures will be implemented to address natural disasters, technological accidents, and catastrophes. It further states that climate change, along with the increasing scarcity of natural resources, is expected to lead to a rise in conflicts worldwide caused by competition for energy resources and other natural raw materials, as well as for drinking water and food. In addition, the increased risk of attacks on energy transport infrastructure will compel states to significantly strengthen the protection of critical energy infrastructure, including the use of military forces (Službeni glasnik broj, 94/2019).

The Defense Strategy of the Republic of Serbia from 2019 states that ensuring the security of critical infrastructure is of primary importance for protecting the security of the Republic of Serbia and its citizens. In this regard, the identification and protection of critical infrastructure facilities will be regulated by law and aligned with European Union regulations. Special attention will also be given to the full implementation of legal and normative measures. To ensure the security of critical infrastructure facilities, all preventive measures will be continuously undertaken, particularly regarding protection against fires, explosions, and terrorist attacks. An integrated information system for the security monitoring of critical infrastructure facilities will be established. For prevention, timely, and effective response to emergencies, functional integration of services relevant to protection, rescue, and emergency management will be ensured, along with the establishment of a public warning system across the territory of the Republic of Serbia. Measures will be taken to ensure continuous training for emergency headquarters and the population in performing protection and rescue tasks (Službeni glasnik broj 94/2019).

Based on the Law on Disaster Risk Reduction and Emergency Management (Službeni glasnik broj, 87/18), a Methodology for the Preparation and Content of Disaster Risk Assessment and Protection and Rescue Plans has been adopted (Mladenović & Komazec, 2022; Službeni glasnik broj, 80/19), which re-identifies critical fa-

cilities, critical locations, and areas from the perspective of vulnerability. According to the Methodology (Official Gazette No. 80/19), critical infrastructure consists of systems, networks, facilities, or their components, the disruption of which, or the interruption of the delivery of goods or services, may have serious consequences for national security, human health and life, property, the environment, citizen safety, economic stability, or may threaten the functioning of the Republic of Serbia. The following infrastructure has been identified:

1) **Energy infrastructure** includes: thermal and hydroelectric power plants, combined heat and power plants, and other electricity generation facilities, as well as power lines, transmission lines, and transformer stations; facilities for electricity production from renewable sources; high dams and water reservoirs; facilities for oil and gas production and processing, biofuel production, and biomass facilities.

2) **Transport infrastructure** includes: road, rail, and air transport (highways, state roads of categories I and II; classified and unclassified roads, bridges, tunnels, overpasses, and bus stations; railway networks and stations; airports), inland waterways, ports, and border crossings.

3) **Water management infrastructure** includes: constructed systems for active and passive protection on primary and secondary watercourses; water supply facilities – interregional and regional water supply objects, drinking water treatment plants; flood protection works for urban and rural areas; hydraulic engineering structures on navigable waterways; navigable canals and ship locks not included in the hydroelectric system.

4) **Food supply infrastructure** includes: food production facilities and capacities, food storage facilities (silos, cold storage, etc.), and facilities and means for distribution.

5) **Healthcare critical infrastructure** includes: primary level facilities (health centers, hospitals, pharmacies, institutes); secondary level facilities (general and specialized hospitals); tertiary level facilities (clinics, institutes, clinical-hospital centers, clinical centers), and higher-level healthcare activities (institutes).

6) **Finance** includes: banking, stock exchanges, investment systems, and insurance systems.

7) **Telecommunication and information critical infrastructure** includes: electronic communication system facilities and equipment of international and mainline significance; data transmission systems; information systems; provision of audio and audiovisual media services.

8) **Environmental protection infrastructure** includes: production and storage of hazardous materials (chemical, biological, radiological, nuclear materials, and landfills).

9) **Functioning of government bodies and emergency services** includes: police, emergency medical services, fire and rescue units, and similar services.

10) **Science and education** include: scientific and educational institutions, their facilities, human and material resources.

The **Law on Public-Private Partnerships and Concessions** (Službeni glasnik broj 88/11, 15/16, and 104/16) can be a key factor in protecting critical infrastructure. In today's risk-prone society, where we are exposed to an increasing number of security threats and challenges – ranging from climate change to organized crime and terrorism – cooperation between the private and public sectors is crucial. Regarding collaboration in the field of critical infrastructure protection in Serbia, the private security sector is a very active partner, providing security services. This involves maintaining an adequate level of service quality, including proper equipment, competence, and training, as well as meeting the criteria set by the public procurement system, taking into account the current state of ownership over critical infrastructure (Keković & Ninković, 2020, p. 98).

It is a fact that significant problems arise in the public procurement of private security services, since the sole criterion is the lowest available price (despite the EU directive providing clear guidelines that mandatory criteria should include the economically most advantageous offer and competitive dialogue). The quality of services becomes questionable if the cheapest offer is selected, which can have serious consequences for the protection of critical infrastructure (Keković & Ninković, 2020, p. 98).

Regarding planning documents, critical infrastructure must be treated differently, particularly in preventive activities and emergency response measures, where it must be prioritized. Trends toward improving the protection of critical infrastructure involve a series of procedures, including (Miletić, 2023; Mićović, 2016):

- defining the vision and mission for the development of the critical infrastructure system;

- adopting a strategy;
- focusing on risk assessment;
- developing models for measuring critical infrastructure parameters;
- identifying sources of funding for critical infrastructure;
- educating personnel for critical infrastructure protection;
- establishing an effective public-private partnership model for critical infrastructure protection.

To implement the aforementioned activities, resources are essential. The basic resources include human, material, spatial, temporal, and knowledge and information resources. These resources have a decisive impact on the effectiveness of responses to challenges, risks, and threats to the safety of people, material assets, and the environment, and thus on protection against all types of risks in any form of emergency. It is necessary to ensure the continuity of resource management in all phases of emergency management (Jakovljević, 2010).

An effective critical infrastructure management system requires establishing an organizational structure, dividing responsibilities, developing procedures, and ensuring proper resource allocation. Organizations should define guidelines for developing an emergency management model based on their current state and environmental requirements to enable an adequate response to potential risks and threats (Jakovljević, 2010).

Regarding the protection of critical infrastructure, the European Union plays a significant role. It has launched numerous initiatives and a range of research programs to study various aspects of threats to critical infrastructure. The Republic of Serbia, which is a candidate for EU accession, must implement and apply specific requirements. European Commission Directive 2008/114/EC serves as the basis for subsequent steps in defining criteria for critical infrastructure. Annex III of the same document outlines procedures that each member state must implement through several steps (Mićović, 2016):

Step 1 – Each Member State applies sectoral criteria to make an initial selection of critical infrastructure within the sector.

Step 2 – Each Member State applies the definition of critical infrastructure under Article 2(a) to the potential European Critical Infrastructure (ECI) identified in Step 1.

Step 3 – Each Member State applies the cross-border element of the ECI definition under Article 2(b) to the potential ECI that has passed the first two steps of this procedure. A potential ECI that meets the definition will proceed to the next step of the procedure. For infrastructure providing an essential service, the availability of alternatives and the duration of disruption/recovery will be taken into account.

Step 4 – Each Member State applies cross-cutting criteria to the remaining potential ECIs. Cross-cutting criteria consider: the severity of the impact; the availability of alternatives for infrastructure providing an essential service; and the duration of disruption/recovery. Potential ECIs that do not meet the cross-cutting criteria will not be considered ECIs.

This directive represented the first step in identifying European critical infrastructure and emphasized the need for enhanced protection. It also highlighted the focus on the transport and energy sectors, but it should also be considered in terms of assessing inter-sectoral impacts, especially in the information and communication technology sector (Mićović, 2016; Škero & Ateljević, 2015).

6. Conclusion

To achieve sustainable development, the primary task is to reduce vulnerability and increase the resilience of critical infrastructure. Understanding the importance of critical infrastructure for human and national security is a prerequisite for adopting and implementing adequate protection strategies, which ensure an acceptable level of losses and damage in the face of natural hazards, as well as external and internal threats (Cvetković, 2020; Cvetković & Martinović, 2020; Cvetković, 2022).

In the face of various crisis events that negatively affect the economy, ecosystems, economic development, and society as a whole, the development and strengthening of the concept of critical infrastructure protection

is of fundamental importance. This concept involves understanding the nature of risks and developing preparedness to prevent or mitigate negative consequences. Continuous adaptation to emerging risks and threats enables the acquisition of broader competencies to respond effectively to crisis events (Košanin, 2018; Sarriegi & Hernantes, 2013).

The population depends on certain services provided within the local community, and its vulnerability often varies with the nature of those services. For example, instead of relying on a single extensive water supply system, it is desirable to have a network of smaller, independent water supply facilities. In the event of floods, it is unlikely that all water supply facilities would be destroyed or damaged. In such cases, the unaffected facilities would continue to provide essential water supply to residents in the flood-affected areas (Cvetković, 2020, p. 519; Parker et al., 1997).

The primary step in defining and protecting critical infrastructure is recognizing its significance in the Republic of Serbia's highest strategic documents (Mladenović & Komazec, 2022). The existing challenges and problems in Serbia regarding critical infrastructure protection cannot be resolved solely by adopting the Law on Critical Infrastructure, but also require the adoption of other documents and subordinate acts with all necessary amendments and harmonizations of the legal framework. Another key factor is the political will to implement strategic goals, as well as adequate education for the owners and operators of critical infrastructure.

Measures and procedures are the responsibility of owners, operators, or users and must be continuously prepared and implemented. Concrete, practical recommendations for policymakers and critical infrastructure operators include:

- First, identifying the risks, threats, and vulnerabilities to which specific systems are exposed;
- Creating critical infrastructure maps;
- Enabling adequate information exchange;
- Training employees engaged in critical infrastructure protection systems;
- Developing recovery plans in the event of an emergency;
- Investing in outdated infrastructure facilities.

The complexity of risks and threats, and the fact that their occurrence endangers the capacities of critical infrastructure and its regular functioning, indicate the need to undertake and develop actions aimed at (Škero & Ateljević, 2015):

1. Understanding the elements of criticality and vulnerability of different state infrastructures;
2. Defining measures to reduce vulnerabilities;
3. Developing contingency plans for emergencies;
4. Promoting awareness among public and private operators regarding critical infrastructure protection measures;
5. Developing international cooperation.

7. References

1. Aktar, M. A., Shohani, K., Hasan, M. N., & Hasan, M. K. (2021). Flood vulnerability assessment by flood vulnerability index (FVI) method: a study on Sirajganj Sadar Upazila. *International Journal of Disaster Risk Management*, 3(1), 1-14.
2. Barney, D. (2019). Beyond carbon democracy: Energy, infrastructure, and sabotage. *Energy culture: Art and theory on oil and beyond*, 214-228.
3. Biringer E. B., Vugrin D. E., Warren E. D.: *Critical Infrastructure System Security and Resiliency*, Taylor & Francis Group, 2013.
4. Cvetković, V. & Mijalković, S. (2013). Spatial and Temporal Distribution of Geophysical Disasters. Serbian Academy of Sciences and Arts and Geographical Institute Jovan Cvijic, *Journal of the Geographical In-*

- stitute "Jovan Cvijić" 63/3, 345-360, SASA: Special issue: *International Conference Natural Hazards Links Between Science and Practice*.
5. Cvetković, V. (2013). *Interventno-spasilačke službe u vanrednim situacijama*. Beograd. Zadužbina Andrejević
 6. Cvetković, V. (2014). Zaštita kritične infrastrukture od posledica prirodnih katastrofa. In *Sedma međunarodna znanstveno-stručna konferencija, Dani kriznog upravljanja*. Hrvatska: Velika Gorica (Vol. 22, pp. 1281-1295).
 7. Cvetković, V. (2020). *Upravljanje rizicima u vanrednim situacijama*. Beograd. Naučno-stručno društvo za upravljanje rizicima u vanrednim situacijama.
 8. Cvetković, V. (2022). *Taktika zaštite i spasavanja u katastrofama*. Beograd. Naučno-stručno društvo za upravljanje rizicima u vanrednim situacijama.
 9. Cvetković, V. (2023). *Otpornost na katastrofe: vodič za prevenciju, reagovanje i oporavak*. Beograd. Naučno-stručno društvo za upravljanje rizicima u vanrednim situacijama.
 10. Cvetković, V., & Stojković, D. (2015). Knowledge and perceptions of secondary school students in Kraljevo on natural disasters. *Ecologica*, 22(77), 42-48.
 11. Cvetković, V., & Martinović, J. (2020). Innovative solutions for flood risk management. *International Journal of Disaster Risk Management*, 2(2), 71-100.
 12. Cvetković, V., & Planić, J. (2022). Earthquake risk perception in Belgrade: implications for disaster risk management. *International Journal of Disaster Risk Management*, 4(1), 69-88.
 13. Cvetković, V., Flipović, M. (2017). *Pripremljenost za reagovanje na rizike od prirodnih katastrofa*. Zadužbina Andrejević.
 14. Cvetković, V., Milojković, B., Stojković, D. (2014). Analiza geoprostorne i vremenske distribucije zemljotresa kao prirodnih katastrofa. *Vojno delo*, 66(2), 166-185.
 15. Degg, M. (1992). Natural disasters: recent trends and prospects. *Geography*, 77(3), 198-209.
 16. ISDR, UN. (2009). *UNISDR terminology on disaster risk reduction*. Geneva.
 17. Jakovljević, V. (2010). Resursi kritične infrastrukture i njihov značaj za upravljanje vanrednim situacijama. *Godišnjak Fakulteta bezbednosti*, 63-81.
 18. Jakovljević, V., & Gačić, J. (2012). Zaštita kritične infrastrukture u kriznim situacijama. In *Zbornik radova= Proceedings/Međunarodna naučna konferencija Menadžment 2012, Mladenovac, 20-11. april 2012= International Scientific Conference Management 2012. Mladenovac: Fakultet za industrijski menadžment, ICIM plus-Izdavački centar za industrijski menadžment plus*.
 19. Janković, L., Cvetković, V. M., Gačić, J., Renner, R., & Jakovljević, V. (2025). Integrating Psychosocial Support into Emergency and Disaster Management, and Public Safety: The Role of the Red Cross of Serbia.
 20. John, D. K. S., Mohammed, H. A., Diana, M., & Ajayi, E. O. (2025). Security of Information Resources in Federal College of Education Libraries in Northwest Nigeria. *International Journal of Contemporary Security Studies*, 1(1), 85-98.
 21. Karabacak, B., & Tatar, Ü. (2014). Strategies to Counter Cyberattacks: Cyberthreats and Critical Infrastructure Protection. *Critical Infrastructure Protection*, 116, 63.
 22. Kaur, B. (2020). Disasters and exemplified vulnerabilities in a cramped Public Health Infrastructure in India. *International Journal of Disaster Risk Management*, 2(1), 15-22.
 23. Komazec, N. (2023). Kritična infrastruktura u kontekstu održivog razvoja: izazovi i perspektive. *Zbornik radova naučno-stručne konferencije*, 21.
 24. Korajlić, N., & Marjanović, M. (2022). Uticaj prirodnih katastrofa na funkcionisanje kritične infrastrukture. *Zbornik radova naučno-stručne konferencije*, 181.
 25. Košanin, V. (2018). Kritična transportna infrastruktura i krizni menadžment. *Zbornik radova Fakulteta tehničkih nauka u Novom Sadu*.

26. Krstić, M. (2016). Izazov definisanja savremenog terorizma. U: *Vojno delo* 3/2016. Beograd.
27. Kumiko, F. & Shaw, R. (2019). Preparing an international joint project: Use of Japanese flood hazard map in Bangladesh. *International Journal of Disaster Risk Management*, 1(1), 62-80
28. Lewis, T. (2006). *Infrastructure Protection in Homeland Security, Defending a Networked Nation*, Wiley Interscience.
29. Lukas, L., & Hromada, M. (2011). Resilience as main part of protection of critical infrastructure. *International journal of mathematical models and methods in applied sciences*, 5(6), 1135–1142.
30. Mančić, T. (2025). Climate Change as a Security Challenge, Risk and Threat of the 21st Century and Its Consequences on Critical Infrastructure. *International Journal of Contemporary Security Studies*, 1(1), 191-204.
31. Metodologija izrade i sadržaj procene rizika od katastrofa i plana zaštite i spasavanja, *Službeni glasnik broj* 80/2019.
32. Mićović, M. D. (2016). *Bezbednosni aspekti funkcionisanja kritične infrastrukture u vanrednim situacijama* (Doktorska disertacija, Univerzitet u Beogradu-Fakultet bezbednosti).
33. Mićović, M. D. (2020). *Specifičnosti kritične infrastrukture u Republici Srbiji*. Beograd. Kriminalističko-policijski univerzitet.
34. Milenkovic, D. (2025). Theoretical, Institutional and Organizational Aspects of the Integrated Disaster Risk Reduction System: Towards a Deeper Understanding of Disaster Resilience in Serbia. *International Journal of Contemporary Security Studies*, 1(1), 175-190.
35. Miletić, S. (2023). *Značaj funkcionisanja i zaštite kritične infrastrukture u vanrednim situacijama*. Master rad. Univerzitet u Beogradu Fakultet bezbednosti.
36. Mladenović, M., & Komazec, N. (2022). Normativni okvir kritične infrastrukture u Republici Srbiji. *Zbornik radova: Naučno-stručne konferencije „Diskurs o kritičnoj infrastrukturi“*.
37. Ninković, V. M. (2024). *Otpornost kritične infrastrukture na nerutinske rizike* (Doctoral dissertation, University of Belgrade (Serbia)).
38. Ocal, A. (2019). Natural Disasters in Turkey: Social and Economic Perspective. *International Journal of Disaster Risk Management*, 1(1), 51-61.
39. Onuma, H., Shin, K. J., & Managi, S. (2017). Household prepa-redness for natural disasters: Impact of disaster experience and implications for future disaster risks in Japan. *International journal of disaster risk reduction*, 21, 148-158.
40. Parker, D., Islam, N., & Weng Chan, N. (1997). Reducing vulnerability following flood disasters: issues and practices. In *Reconstruction after disaster: Issues and practices* (pp. 23-24). Ashgate Publishing.
41. Perić, J., & Cvetković, V. (2019). Demographic, socio-economic and phycological perspective of risk perception from disasters caused by floods: case study Belgrade. *International Journal of Disaster Risk Management*, 1(2), 31-43.
42. Pribičević, N., Janković, K., Živković, M. (2022). Prevencija rizika od terorizma kao savremenog obilika ugrožavanja kritične infrastrukture. In *naučno-stručna konferencija* 8p.157.
43. Ptáček, B., & Skoruša, L.(2015). Cyber criminality.
44. Rakić, M. M. (2015). *Krizni menadžment u funkciji zaštite kritičnih infrastrukture u zemljama u tranziciji*. Univerzitet u Beogradu.
45. Sarriegi, M., & Hernantes, J. (2013). *Resilience Framework for Critical Infrastructures*, Universidad de Navarra, Donostia, San Sebastian.
46. Shaikh, S. A., Chivers, H., Nobles, P., Clark, J. A., & Chen, H. (2008). Network reconnaissance. *Network Security*, 2008(11), 12-16.
47. Stajić, Lj. (2015). *Osnovi sistema bezbednosti – sa osnovama istraživanja bezbednosnih pojava*. Novi Sad: Pravni fakultet.

48. Strategija nacionalne bezbednosti Republike Srbije, *Službeni glasnik broj 94/2019*.
49. Strategija odbrane Republike Srbije, *Službeni glasnik broj 94/2019*.
50. Trbojević, M. (2018). *Zaštita kritičnih infrastrukture - iskustva tranzicionih zemalja*. Beograd: Institut za političke studije.
51. Uredba o kriterijumima za identifikaciju kritične infrastrukture i načinu izveštavanja o kritičnoj infrastrukturi Republike Srbije, *Službeni glasnik broj 69/2022*.
52. Vidović, N., & Beriša, H. (2025). Economic Aspects of Cyber Security: Socio-Financial Consequences of Cyber Attacks. *International Journal of Contemporary Security Studies*, 1(1), 149-162.
53. Vlada Republike Srbije. (2014). *Izveštaj o elementarnoj nepogodi – poplavi koja je zadesila Republiku Srbije i merama koje su preduzete radi spavanja stanovništva i odbrane ugroženih mesta od poplava*. Retrieved from http://www.parlament.gov.rs/upload/archive/files/cir/pdf/akta_procedura/2014/2220-14.pdf
54. Vračević, N. (2025). Strategic Roles of Private Military Companies: The Evolution and Privatization of Warfare in the Context of Contemporary Global Conflicts. *International Journal of Contemporary Security Studies*, 1(1), 163-174.
55. Zakon o javno-privatnom partnerstvu i koncesijama, *Službeni glasnik broj 88/11, 15/16 i 104/16*.
56. Zakon o kritičnoj infrastrukturi, *Službeni glasnik broj 87/2018*.
57. Zakon o smanjenju rizika od katastrofa i upravljanju u vanrednim situacijama, *Službeni glasnik broj 87/2018*.
58. Zubrzycki, W. (2017). The Security of the Republic of Poland's Maritime Areas and the Polish Coast in the Context of Terrorist Attacks. *Internal Security*, 9, 169-187.
59. Škero, M., & Ateljević, V. (2015). "Zaštita kritične infrastrukture i osnovni elementi usklađivanja sa Direktivom Saveta Evrope 2008/114/ES." *Vojno delo* 67.3, 192-207.





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Shaping Security Beyond Arms: The Quad and Human Futures in the Indo-Pacific

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ABSTRACT

In contemporary world politics, non-traditional security has emerged as a significant concern, with threats posed by terrorist networks, drug cartels, civil wars, maritime piracy, and environmental degradation. Human security functions as a core analytical lens for understanding these non-traditional security (NTS) challenges. The Quad was established in 2004 to coordinate humanitarian efforts related to tsunamis. It has since expanded its agenda beyond strategic-security cooperation to embrace human-centric priorities. By addressing health, climate resilience, disaster relief, and digital empowerment, the Quad increasingly reflects human-security principles within its Indo-Pacific strategy. This study clarifies key concepts such as “human futures,” defined as the long-term safeguarding of social, environmental, and technological well-being, and “climate governance,” referring to collaborative mechanisms for managing climate risks. Using human-security and climate-governance lenses, the study evaluates the Quad’s initiatives through the criteria of effectiveness, inclusiveness, and long-term resilience. Conducted through qualitative, descriptive, and analytical methods based on secondary data, the study addresses three questions: (1) how non-traditional security challenges have reshaped the Quad’s evolving agenda; (2) how human-security principles are incorporated into its regional initiatives; and (3) how these initiatives perform in terms of effectiveness, inclusiveness, and long-term resilience. The paper argues that the Quad’s expanding engagement with non-traditional security contributes to the emergence of a more human-centric Indo-Pacific order.

KEYWORDS

Human Security, Quad, Indo-Pacific, Non-Traditional Security, Climate Governance, India, USA.

1. Introduction

Security is a dynamic concept that adapts to changing global realities. At its most basic level, security refers to a condition in which individuals, communities, states, or systems are free from danger, threat, or harm. It encompasses the measures, conditions, and policies designed to safeguard safety, stability, and effective functioning. Traditionally, security has been understood in state-centric terms, focusing primarily on military threats, territorial integrity, and external aggression. In contemporary world politics, however, the scope of security has expanded significantly, leading to a distinction between traditional and non-traditional security.



While traditional security primarily concerns military conflict between states, non-traditional security (NTS) addresses a range of challenges that transcend national boundaries and often involve non-state actors. The emergence of terrorist networks, drug cartels, intra-state conflicts such as civil wars, maritime piracy, and environmental degradation has transformed the global security landscape and introduced complex, transnational threats (SRIKANTH, 2014). Among these challenges, environmental degradation represents one of the gravest threats to the long-term sustainability of both modern sovereign entities and human societies.

The growing prominence of non-traditional security has reinforced the relevance of human security as an analytical framework that shifts the focus of security studies from states to people. The ultimate aim of security, therefore, is the protection and enhancement of human life, dignity, and well-being. This perspective was formally articulated in the 1994 United Nations Development Programme (UNDP) Human Development Report, which argued that security should extend beyond concerns of nuclear confrontation and territorial defense to address threats affecting everyday human existence. Reflecting on the transformative impact of nuclear weapons after the Second World War, Albert Einstein observed that “everything changed. He cautioned that humanity would require “a substantially new manner of thinking if mankind is to survive” (UNDP, 1994). Despite the absence of a global war on the same scale, individuals across developed and developing states continued to experience persistent insecurity in their daily lives.

During the Cold War, superpowers competed to establish ideological dominance, while newly independent and developing states struggled to consolidate fragile national identities and ensure national security. Yet, irrespective of levels of development, many states failed to provide comprehensive security for their populations. In this context, human security emerged as a critical framework encompassing both “freedom from want” and “freedom from fear,” capturing positive and negative freedoms related to fundamental human needs and rights (Newman, 2010).

The Quadrilateral Security Dialogue (Quad) was established in 2004 in the aftermath of the Indian Ocean tsunami to coordinate humanitarian assistance and disaster relief. Although often associated with strategic and geopolitical cooperation in the Indo-Pacific, human security has remained an important, if sometimes implicit, component of the foreign policy priorities of its member states. While explicit references to human security in Quad leaders’ declarations have become less frequent since 2017, people-centered cooperation continues to shape its engagement, particularly in areas such as health security, climate change, disaster resilience, emerging technologies, and cooperation with Pacific Island countries (Takahashi, 2024).

Against this backdrop, this study examines how the Quad addresses non-traditional security challenges and whether its evolving agenda reflects a shift toward a more human-centric approach. By analyzing Quad initiatives related to health security, climate governance, disaster resilience, and digital empowerment, the study seeks to assess the effectiveness, inclusiveness, and long-term resilience of these efforts in shaping a secure and sustainable Indo-Pacific order.

2. Theoretical framework

To examine the evolving role of the Quad in addressing non-traditional security challenges in the Indo-Pacific, this study is guided by Human Security Theory and Regional Security Complex Theory (RSCT). Together, these frameworks provide complementary analytical lenses that link people-centered security concerns with broader regional security dynamics.

Human Security Theory shifts the focus of security studies from a predominantly state-centric and military-oriented paradigm to the protection of individuals and communities. It emphasizes key dimensions of security central to contemporary global challenges, including livelihoods, health, dignity, environmental sustainability, and resilience to humanitarian crises. From this perspective, threats such as pandemics, climate change, maritime piracy, and large-scale natural disasters are not merely policy challenges but existential risks to human survival and well-being. Human security, therefore, underscores the need for cooperative, inclusive, and people-centered responses that transcend national borders and traditional security mechanisms.

Complementing this approach, Regional Security Complex Theory, as developed by Buzan and Wæver (2003), situates human-security concerns within the structural dynamics of regional security. RSCT argues that security interactions are regionally clustered, shaped by patterns of interdependence, proximity, and shared

vulnerabilities. In the Indo-Pacific context, transnational challenges such as climate change, disaster risks, and health emergencies generate interconnected security concerns that cannot be addressed by individual states alone. Cooperative frameworks such as the Quad thus emerge as significant platforms for managing these shared risks.

By integrating Human Security Theory with RSCT, this study conceptualizes the Quad as both a people-centered and regionally embedded security actor. This combined framework helps explain the Quad's transition from a narrowly defined strategic-security arrangement to a more comprehensive platform that incorporates disaster relief, health cooperation, climate resilience, and digital empowerment. In operational terms, the analysis evaluates Quad initiatives using three key indicators derived from the theoretical framework: effectiveness (the capacity to deliver tangible outcomes), inclusiveness (the extent of regional engagement and stakeholder participation), and long-term resilience (the sustainability and adaptive capacity of initiatives). This approach enables a systematic assessment of how human-security principles are embedded in the Quad's evolving regional security role in the Indo-Pacific.

3. Methodology

This study employs a qualitative, descriptive, and analytical approach, relying primarily on secondary data, including official Quad statements, government reports, and scholarly literature. The analysis is guided by Human Security Theory and Regional Security Complex Theory (RSCT), which together provide complementary lenses linking people-centered concerns to broader regional security dynamics. Human Security Theory shifts the focus from state-centric, military-oriented paradigms to the protection of individuals and communities, emphasizing livelihood, health, dignity, environmental sustainability, and resilience to humanitarian crises. RSCT situates these concerns within regional security structures, highlighting interdependence, proximity, and shared vulnerabilities that necessitate multilateral cooperation. The study operationalizes these frameworks through three core indicators: effectiveness, assessing tangible outcomes of Quad initiatives; inclusiveness, evaluating the extent of regional engagement and attention to vulnerable populations; and long-term resilience, examining the sustainability and adaptability of interventions. By combining these analytical lenses with systematic analysis of secondary sources, the study evaluates how the Quad addresses non-traditional security challenges while promoting a human-centric Indo-Pacific strategy.

4. The evolution of the Quad

The Quad is a group of four Indo-Pacific democracies—India, the United States, Australia, and Japan—established in the aftermath of the 2004 Indian Ocean tsunami to coordinate humanitarian assistance and disaster relief (Wei, 2024). As Harsh V. Pant, Vice President of the Observer Research Foundation, noted, “by the end of the humanitarian relief mission in mid-January 2005, a new seeding of the Quad framework emerged in the leaders’ minds” (Wei, 2024). In 2007, Japanese Prime Minister Shinzo Abe formalized the Quad to enhance maritime security and strengthen cooperation among the four democracies in response to China’s growing influence. In May, the countries held their first Quad meeting, accompanied by a joint naval exercise in the Bay of Bengal. However, differing national interests and China’s suspicion regarding the group’s aims led to a temporary lapse in cooperation.

The Quad was later revived during the presidency of Donald J. Trump. In 2012, Abe, in his second term as Prime Minister, published the opinion piece “Asia’s Democratic Security Diamond” on Project Syndicate (Wei, 2024). In 2016, before Trump’s presidency, Abe introduced Japan’s “Free and Open Indo-Pacific” strategy, emphasizing security, political, and economic cooperation. In his Nairobi speech, he called for a regional order rooted in freedom, rule of law, and prosperity, free from coercion, highlighting maritime security as a central pillar. Subsequently, Quad foreign ministers met in New York to discuss cooperation on counterterrorism, humanitarian assistance and disaster relief, maritime security, development, and cybersecurity.

In recent years, the Quad has expanded its initiatives to address non-traditional security challenges and promote human-centric regional cooperation. At the 2022 Quad Leaders’ Summit in Tokyo, the group launched the Indo-Pacific Partnership for Maritime Domain Awareness (IPMDA), enhancing the ability of Indo-Pacific

partners to detect and respond to illicit maritime activities, climate events, and humanitarian crises through advanced maritime domain awareness systems (Cabinet, 2023). This shift reflects the Quad's broader transition from a purely strategic security grouping to a more human-centric partnership.

In the realm of health security, the Quad Vaccine Partnership, launched in 2021, delivered nearly 800 million COVID-19 vaccine doses globally and later evolved into the Quad Health Security Partnership, focusing on pandemic preparedness, health workforce training, and disease surveillance (DFAT, 2023). Climate change cooperation is promoted through the Quad Climate Working Group and Q-CHAMP, which support clean energy, climate resilience, and environmental disaster response (Mizo, 2025). On emerging technologies, the Quad's Critical and Emerging Technology Working Group advances collaboration on AI, 5G, semiconductors, and technology governance aligned with democratic values (Quad, 2021). Cybersecurity efforts include joint principles on secure software and a Quad action plan for undersea cable protection to enhance digital resilience (Press Information Bureau, 2024). Additionally, the Quad Infrastructure Coordination Group supports sustainable infrastructure development in digital connectivity, health systems, and energy, complemented by training programs such as the Infrastructure Fellowships initiative (U.S. Embassy & Consulates in India, 2024).

Collectively, these initiatives demonstrate the Quad's evolution into a comprehensive Indo-Pacific strategy centered on human security, inclusivity, and resilience, reflecting a deliberate integration of non-traditional security priorities into regional cooperation.

5. Non-traditional security challenges in the Indo-Pacific

In recent years, the Indo-Pacific region has emerged as a critical arena not only for traditional geopolitical rivalries but also for a complex array of non-traditional security challenges that transcend conventional military concerns. These challenges—ranging from climate change and pandemics to cyber threats and transnational crime—pose significant risks to the stability, development, and security of the diverse nations within this strategically vital region. Include key areas of human security relevance:

Health Security In 2023, the Quad leaders decided to develop a comprehensive Health Security Partnership aimed at strengthening coordination and collaboration among member countries, enhancing regional and global health security, and supporting economic recovery in the Indo-Pacific, building on prior joint efforts such as COVID-19 vaccine delivery (Cabinet, 2023). The Quad is spearheading initiatives to assist partner countries in tackling pandemics, combating diseases, and responding to natural disasters (Pib, 2024).

A significant example is the Quad Cancer Moonshot, launched in 2024 to reduce the burden of cervical cancer in the Indo-Pacific (Ministry of External Affairs, 2024). This landmark collaborative initiative—led by India, Japan, Australia, and the United States—aims to strengthen health infrastructure, expand research partnerships, and promote early detection, prevention, and treatment of cervical cancer, particularly in underserved areas. Despite being preventable and treatable, cervical cancer remains a leading cause of death among women in the region, with low HPV vaccination and screening rates. The initiative addresses these gaps through vaccine deployment, improved access to screening, medical training, and research collaboration.

Each member contributes uniquely: the United States provides funding, training, and global research support; India offers screening tools and digital health expertise; Australia scales vaccination programs through the EPICC consortium; and Japan provides medical equipment and technical assistance. The initiative also involves partnerships with international organizations and NGOs, including the WHO, World Bank, and philanthropic networks such as WHEN and the Minderoo Foundation. Together, these stakeholders aim to reduce disparities in cancer care and advance equitable access to lifesaving services.

The Cancer Moonshot exemplifies a broader human security vision, framing health as a regional security priority and reinforcing the Quad's shift toward a human-centric Indo-Pacific strategy. The Quad continues to enhance health security and regional resilience through initiatives such as the Pandemic Fund, pandemic simulation exercises, specialist training, and the development of standardized emergency protocols. India will host workshops and release a white paper on emergency public health strategies, Australia is expanding its deployable public health workforce with training programs in Darwin, and the United States has pledged over \$84.5 million to strengthen disease prevention, detection, and response capacities in 14 Indo-Pacific countries.

Additionally, the Quad coordinates equitable vaccine access during mpox outbreaks, including supporting local vaccine production in low- and middle-income countries where appropriate.

Climate Change & Environmental Threats: The Quadrilateral Security Dialogue (Quad) has positioned climate change as a top non-traditional security priority, recognizing the Indo-Pacific as home to a quarter of the world's population and 35 percent of global GDP (Roy, 2021). The region faces significant climate impacts, making the Quad a potential leader in advancing the global climate agenda. To address these challenges, the Quad established a Working Group on Climate Change. It launched the Quad Climate Change Adaptation and Mitigation Package (Q-CHAMP), which focuses on both climate mitigation and resilience, while fostering diplomatic engagement with regional organizations such as ASEAN to address vulnerabilities effectively (Verma & S, 2024).

The Quad also supports the Coalition for Disaster Resilient Infrastructure (CDRI) to strengthen climate resilience and infrastructure across the Indo-Pacific (Ramnath, 2022). To provide technical assistance to small island developing states, the Quad will organize a Climate & Information Services Task Force and establish a new technical center under the CDRI framework (India, 2024). Initiatives also aim to enhance Early Warning Systems and Climate Information Services (CIS) in the Pacific, boosting regional climate resilience. For example, the United States is providing 3D-printed weather stations and expert training in Fiji; Australia contributes through the Weather Ready Pacific initiative, which supports the UN's EWS4ALL program; and Japan implements its Pacific Climate Resilience Initiative, focusing on disaster preparedness and renewable energy. Local experts are being trained to improve flash flood forecasting and emergency response.

Despite these collaborative efforts, differences remain among member countries. Japan and the United States have committed to achieving net-zero emissions by the mid-21st century, whereas India and Australia have not yet adopted concrete net-zero targets (Roy, 2021). Nevertheless, by advocating for climate change and other non-traditional security issues, the Quad demonstrates its capacity for productive collaboration and tangible benefits for the region (Centre for Social and Economic Progress, 2023). These initiatives underscore the Quad's commitment to advancing climate resilience, sustainable development, and a human-centric security framework in the Indo-Pacific.

Disaster Relief and Humanitarian Aid, the Quad countries first came together over twenty years ago in response to the devastating 2004 Indian Ocean earthquake and tsunami, providing rapid humanitarian assistance to affected nations (Press Information Bureau, 2024). Since then, the Quad has institutionalized its approach to Humanitarian Assistance and Disaster Relief (HADR), responding to crises across the Indo-Pacific. For example, in 2024, the Quad coordinated HADR efforts following a deadly landslide in Papua New Guinea, jointly providing over \$5 million in humanitarian aid and supporting long-term resilience initiatives. These efforts follow the UN principles of humanity, neutrality, and impartiality, as outlined in Resolution 46/182.

The Quad strengthens disaster-relief coordination by pre-positioning essential supplies for rapid response in regions such as the Indian Ocean, Southeast Asia, and the Pacific. In the coming months, Quad disaster relief experts will conduct tabletop exercises to enhance preparedness for future emergencies. In addition, the Quad is providing over \$4 million in humanitarian assistance to support Vietnam's recovery from Typhoon Yagi (Press Information Bureau, 2024).

Under the Partnership framework, Quad assistance requires a formal request from the affected country. Support may be provided collectively or individually during all phases of disaster response—preparedness, emergency response, and recovery—while fully respecting national sovereignty and territorial integrity. The Partnership emphasizes inclusive humanitarian action, promoting gender equality, empowering women and girls, involving persons with disabilities, and ensuring that indigenous peoples, minorities, and other vulnerable groups are not left behind. There is a strict zero-tolerance policy regarding Sexual Exploitation, Abuse, and Harassment (SEAH).

Quad partners meet twice annually to exchange operational updates and lessons learned, and conduct at least one scenario-based tabletop exercise each year to strengthen coordination and preparedness. The Partnership collaborates closely with the UN, international donors, regional and local governments, NGOs, and other relevant actors to ensure practical and principled humanitarian assistance (Ministry of External Affairs, Government of India, 2022).

On April 3, 2025, the Quad countries announced that they had collectively committed over \$20 million in humanitarian aid. This included providing relief supplies, deploying emergency medical teams, and supporting humanitarian organizations assisting victims of the recent earthquake in Myanmar. The Quad also expressed support for recent temporary and partial ceasefire agreements, urging all parties to uphold and expand these measures to ensure safe and timely delivery of aid. Furthermore, the Quad welcomed statements from ASEAN Foreign Ministers in March 2025, acknowledging the critical support provided by ASEAN and regional partners to affected communities (The Hindu, 2025).

Energy Security: The Quad countries have committed to deepening cooperation on clean energy by aligning policies, investments, and standards to build high-quality, diversified supply chains that enhance energy security and create economic opportunities across the Indo-Pacific. A key milestone was the Wilmington Declaration in September 2024, in which the four countries agreed to strengthen clean energy supply chains as part of broader efforts to boost energy security and regional economic resilience (Schwartz & Subramanlan, 2025). Joint initiatives focus on critical areas such as mineral production, recycling, and battery manufacturing, leveraging each partner's complementary strengths.

Specific national contributions include Australia's AUD 50 million Quad Clean Energy Supply Chains Diversification Program to support solar, hydrogen, and battery projects; India's \$2 million commitment for new solar initiatives in Fiji, Comoros, Madagascar, and Seychelles; Japan's \$122 million in grants and loans for regional renewable energy projects; and the United States' \$750 million in loans to Tata Power Solar and First Solar to support solar manufacturing in India, alongside ongoing efforts to mobilize private capital in solar, wind, cooling, batteries, and critical minerals. Additionally, the Quad is promoting affordable, high-efficiency cooling systems to help climate-vulnerable communities cope with rising temperatures, with the U.S. providing \$1.25 million in technical assistance for initial implementation (Pib, 2024).

Cybersecurity & Technology Cybersecurity the Quad is working to create a stronger, secure, and resilient cyber ecosystem for its members and partners. The four democracies face increasing cyber threats, including DDoS attacks, ransomware, supply chain breaches, zero-day exploits, and cyber espionage, which threaten both regional security and stability (Patil et al., 2025). In response, the Quad Senior Cyber Group (QSCG) was established on 24 September 2021 during a summit hosted by President Biden with Prime Ministers Scott Morrison, Narendra Modi, and Yoshihide Suga (Australian Department of Home Affairs, n.d.).

Key initiatives include the Quad Action Plan to Protect Commercial Undersea Telecommunications Cables, which strengthens digital infrastructure and connectivity, and the 2023 Joint Principles for Secure Software, designed to reduce vulnerabilities across the software lifecycle—from development to procurement and use (Fabiani, 2024; MoEA, GoI, 2023). The Quad also partners with software firms and industry leaders to implement secure software standards, enhancing government networks and digital supply chain resilience.

Capacity-building initiatives include the annual Quad Cyber Challenge, focusing on responsible cyber practices and career development in cybersecurity, particularly for women and underrepresented groups. The previous campaign engaged over 85,000 participants across the Indo-Pacific. Complementary programs, such as the Quad Cyber Bootcamp and a regional conference in the Philippines, aim to strengthen regional cyber capacity, share threat intelligence, and coordinate responses to major cybersecurity incidents (Pib, 2024). Collectively, these efforts contribute to a more resilient, digitally secure Indo-Pacific, aligning with the Quad's broader human-centric security agenda.

India's Role in Promoting Human Security within the Quad India plays a pivotal role in advancing human security within the Quad, focusing on disaster assistance, climate change, and pandemic preparedness. These contributions align with both regional security objectives and India's national priorities, supporting resilience and inclusive development in the Indo-Pacific.

In health security, India participates in the Quad Vaccine Partnership, develops standard response procedures, hosts workshops, and publishes guidance on emergency public health strategies (Pib, 2024). In climate and disaster resilience, India leverages space-based monitoring to track extreme weather events, contributing to regional preparedness (Wilson Center, Environmental Change and Security Program, 2021). India also leads counter-terrorism initiatives, hosting the first working group in 2023 focused on threats from drones, chemical, biological, radiological, and nuclear weapons, and online terrorism (Pib, 2024).

India contributes to space situational awareness programs to promote sustainable space use, which supports climate monitoring, and its maritime security initiatives, such as SAGAR and the Indo-Pacific Oceans Initiative, complement Quad priorities (Pant, 2022). The Quad framework also emphasizes human rights and dignity, consistent with the Sustainable Development Goals and inclusive principles (MoE, GoI, 2024). Strategically, India maintains caution regarding a formal military alliance within the Quad, balancing its engagement with Russia, the Shanghai Cooperation Organisation, and other actors, while managing border tensions with China to ensure the Quad is not perceived as an anti-China bloc (Upadhyay, 2022; Oros & Gordan, 2021).

Overall, India's engagement reflects a multifaceted approach, advancing human security and inclusive development in the Indo-Pacific while advocating for the interests of the Global South.

6. Challenges & Critique

While the Quad has broadened its agenda beyond traditional military concerns through initiatives such as the Vaccine Partnership, climate change working groups, and disaster relief programs, it remains heavily anchored in strategic and security discourse. For example, the Quad Vaccine Partnership aims to strengthen health infrastructure in the Indo-Pacific; however, critics argue that coordination mechanisms to ensure equitable access and long-term resilience remain underdeveloped (Stromesh, 2021). Similarly, its disaster relief efforts (HADR) are often ad hoc and not fully institutionalized, which limits their sustained impact on human security (Halder, 2024).

Although the Quad officially frames itself as promoting “a free and open Indo-Pacific,” analysts note that it remains implicitly oriented toward balancing China's influence. Some commentators describe it as an “Asian NATO” or a soft security bloc: while it provides public goods, much of its cohesion derives from military coordination and strategic signaling (Kwek, 2021). The absence of formal alliance structures compounds ambiguity: the Quad executes joint exercises and engages in crisis diplomacy but does not commit to collective defense, unlike AUKUS or similar frameworks, leaving a predominantly military-driven orientation without full alignment (Koga, 2023).

Limited institutionalization also constrains the Quad's effectiveness compared to other regional platforms such as the EU or ASEAN. Unlike these organizations, the Quad lacks a secretariat, permanent bureaucracy, or binding protocols, operating primarily through occasional leaders' summits and ministerial dialogues. This ad hoc structure limits continuity and long-term planning. Scholars have described its institutional framework as “thin,” with only incremental movement toward deeper institutionalization. Comparisons with ASEAN suggest that the Quad's informal nature can reduce implementation effectiveness and legitimacy, particularly among smaller regional states (ISEAS, 2023).

Geopolitical competition with China further complicates the Quad's human security agenda. While Quad statements generally avoid explicit references to China, their emphasis on coercive behavior and rules-based norms clearly signals a strategic counterbalance (Lee, 2023). Chinese sources often frame the Quad as a U.S.-led instrument of containment, implying that hard security priorities may overshadow or deprioritize human security initiatives as strategic rivalry intensifies.

Power asymmetries among Quad members also pose challenges for cohesion and agenda-setting. The United States is the dominant power, while India, Japan, and Australia differ in economic resources, military capacity, and strategic priorities. India, in particular, is cautious about formal military alliances due to its strategic autonomy tradition, whereas Australia, Japan, and the U.S. rely on established alliance frameworks and shared threat perceptions. These disparities complicate the Quad's ability to move beyond coordination toward collective human security action.

In sum, while the Quad has expanded into human security domains such as health, climate, and disaster relief, these efforts remain constrained by strategic and military imperatives, limited institutional infrastructure, power asymmetries, and geopolitical competition with China. Consequently, the Quad's capacity to deliver sustained, inclusive human security outcomes remains limited (Kumar & Khan, 2021).

7. Summary of Quad Initiatives

The Quad has implemented a range of initiatives across multiple non-traditional security domains, reflecting its human-centric Indo-Pacific strategy. In **health security**, the Quad Vaccine Partnership (2021) and the Quad Cancer Moonshot (2024) enhanced vaccine delivery, strengthened health systems, expanded research collaborations, and improved disease prevention and treatment infrastructure across the region. In **climate and environmental security**, the Quad Climate Change Adaptation and Mitigation Package (Q-CHAMP) and the Coalition for Disaster Resilient Infrastructure (CDRI) initiatives bolster climate resilience, develop Early Warning Systems, provide technical support to small island states, and coordinate adaptation efforts with regional partners. In **disaster relief and humanitarian aid**, the Quad coordinates Humanitarian Assistance and Disaster Relief (HADR), prepositions supplies, deploys emergency response teams, and implements inclusive interventions aligned with UN principles. In **energy security**, Quad members collaborate on clean energy supply chains, renewable energy projects, and technological investments, leveraging the complementary strengths of each country to enhance regional energy resilience. In **cybersecurity and emerging technologies**, the Quad Senior Cyber Group (QSCG) and related initiatives promote secure software development, protect critical infrastructure, enhance cyber capacity, and facilitate workforce training and private sector collaboration. By assessing these efforts through the lens of **effectiveness, inclusiveness, and long-term resilience**, the Quad demonstrates its transition from a strategic-security forum to a comprehensive platform focused on human security, regional cooperation, and sustainable development.

8. Conclusion

The Indo-Pacific region is at a critical crossroads, where traditional security approaches are insufficient to address the complex threats facing its populations. Non-traditional security (NTS) challenges—such as pandemics, environmental disasters, cyber-attacks, and humanitarian crises—underscore the urgent need to prioritize human security in regional policies. In this context, the Quadrilateral Security Dialogue (Quad), comprising India, the United States, Japan, and Australia, has evolved over the years from a primarily military-strategic framework into a more human-centric multilateral initiative. This shift reflects a broader recognition that enduring peace and stability in the Indo-Pacific require addressing vulnerabilities at the individual and community levels affected by transnational threats.

The Quad's origins in 2004, following the Indian Ocean tsunami, were rooted in humanitarian assistance and disaster relief (HA/DR). Since then, the Quad has expanded its focus to include health security, climate change, cybersecurity, and energy resilience. Programs such as the Quad Vaccine Partnership, climate working groups, and digital capacity-building initiatives illustrate deliberate efforts to operationalize a human security agenda. These initiatives reflect a new, inclusive, and people-centered approach to regional security.

Nevertheless, significant challenges persist that limit the Quad's effectiveness as a fully human-centric multilateral platform. Critics note that the Quad remains strategically oriented, with much of its cohesion implicitly tied to balancing China in the region. While leaders emphasize a "free and open Indo-Pacific," human security initiatives are sometimes overshadowed by geopolitical competition. Additionally, the lack of formal institutional structures—such as a permanent secretariat, binding agreements, or mechanisms for long-term policy implementation—makes the Quad's operations dependent on the political will of member states, leading to episodic and ad hoc action rather than sustained impact.

Internal asymmetries among Quad members further constrain its potential. The United States, as the dominant economic and military power, naturally plays a leading role, while India, Japan, and Australia vary in capacity and strategic priorities. This imbalance affects agenda-setting and coordination, complicating the Quad's ability to deliver inclusive, long-term human security outcomes.

In sum, while the Quad has achieved notable successes in responding to pandemics, disaster relief, and other non-traditional security challenges, these remain largely episodic and constrained by strategic, institutional, and power-related limitations. Addressing these structural and operational challenges will be critical if the Quad is to evolve into a genuinely human-centered multilateral platform capable of fostering enduring security and resilience across the Indo-Pacific.

Limitations and Future Research

This study relies primarily on secondary data sources, including official documents, press releases, and scholarly literature. While these sources provide comprehensive insights into the Quad's initiatives and regional strategies, they limit access to internal decision-making processes and real-time operational evaluations. As a result, some nuances regarding intra-Quad coordination and informal diplomatic negotiations may not be fully captured.

Future research could address these limitations through primary data collection methods such as expert interviews, fieldwork in member and partner countries, and surveys of regional stakeholders. Comparative studies of similar multilateral frameworks, such as AUKUS or ASEAN Plus mechanisms, could provide additional insights into institutionalization and effectiveness. Longitudinal studies tracking the Quad's initiatives over time would also enhance understanding of the sustainability and long-term impact of its human-centric approach in the Indo-Pacific.

Data Availability Statement

All data analyzed or generated during this study are included in the manuscript and drawn from publicly available sources, including official government statements, press releases, and academic publications. No primary data were collected.

Competing Interests Statement

The authors declare that there are no competing interests associated with this manuscript.

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9. References

1. Centre for Social and Economic Progress. (2023). *Leveraging the Quad for India's climate ambitions*. Retrieved from Centre for Social and Economic Progress: <https://csep.org/wp-content/uploads/2023/10/5-1.pdf>
2. E3G. (2021). *The Quad on climate*. Retrieved from E3G: <https://www.e3g.org/news/the-quad-on-climate/>
3. Ministry of External Affairs, Government of India. (2022, May 24). *Guidelines for Quad Partnership on Humanitarian Assistance and Disaster Relief (HADR) in the Indo-Pacific*. Retrieved from Ministry of External Affairs: https://www.mea.gov.in/bilateral-documents.htm?dtl/35745/Guidelines_for_Quad_Partnership_on_Humanitarian_Assistance_and_Disaster_Relief_HADR_in_the_IndoPacific
4. Australian Department of Home Affairs. (n.d.). *Quad Senior Cyber Group*. Retrieved from Department of Home Affairs, Government of Australia: <https://www.homeaffairs.gov.au/about-us/our-portfolios/cyber-security/quad-senior-cyber-group>
5. Cabinet, A. G. (2023). *Health Security | Quad Leaders' Summit 2023 | PM&C*. Retrieved from Australian Government Department of the Prime Minister and Cabinet: <https://www.pmc.gov.au/resources/quad-leaders-summit-2023/health-security>
6. Cabinet, A. G. (2023). *Indo-Pacific Partnership for Maritime Domain Awareness*. Retrieved from Australian Government Department of the Prime Minister and Cabinet: <https://www.pmc.gov.au/resources/quad-leaders-summit-2023/indo-pacific-partnership-maritime-domain-awareness>
7. Craig, S. L. (2007). NONTRADITIONAL SECURITY THREATS. *Strategic Studies Institute, US Army War College*.
8. Department of the Prime Minister and Cabinet. (2023). *Quad Leaders' Summit 2023: Climate*. Retrieved from Australian Government: <https://www.pmc.gov.au/resources/quad-leaders-summit-2023/climate>
9. DFAT. (2023, May 20). *Quad Vaccine Partnership*. Retrieved from Indo-Pacific Centre for Health Security: <https://indopacifichealthsecurity.dfat.gov.au/covid-19-vaccine-access/quad-vaccine-partnership?>

10. Fabiani, D. (2024, December 11). *Cyber Security through the QUAD*. Retrieved from Sasakawa Peace Foundation: https://www.spf.org/iina/en/articles/diletta_01.html
11. Haldar, S. (2024, October 04). *Does the Quad have a security agenda?* Retrieved from Observer Research Foundation: <https://www.orfonline.org/expert-speak/does-the-quad-have-a-security-agenda/>
12. India, U. E. (2024, May 20). *Fact sheet: Quad Leaders' Summit*. Retrieved from U.S. Department of State: <https://in.usembassy.gov/fact-sheet-quad-leaders-summit/>
13. International Energy Agency. (2022). *Quad Statement of Principles on Clean Energy Supply Chains in the Indo-Pacific*. Retrieved from International Energy Agency: <https://www.iea.org/policies/18073-quad-statement-of-principles-on-clean-energy-supply-chains-in-the-indo-pacific>
14. ISEAS. (2023). 2023/63 "The Quad: Less than the Sum of its Parts?" by Nick Bisley. Retrieved from ISEAS YUSOF ISHAK INSTITUTE: <https://www.iseas.edu.sg/articles-commentaries/iseas-perspective/2023-63-the-quad-less-than-the-sum-of-its-parts-by-nick-bisley/>
15. Koga, K. (2023). *Institutional Dilemma: Quad and ASEAN in the Indo-Pacific*. Retrieved from Asian Perspective: <https://muse.jhu.edu/article/881958>
16. Kumar, R., & Khan, A. (2021, May 08). *The Quadrilateral Security Dialogue's Path to Institutionalization: A He and Feng Perspective*. Retrieved from Air University: <https://www.airuniversity.af.edu/JIPA/Display/Article/3768292/the-quadrilateral-security-dialogues-path-to-institutionalization-a-he-and-feng/>
17. Kwek, I. (2021, April 14). *The Quad's uneasy place in Southeast Asia*. Retrieved from The Interpreter: <https://www.lowyinstitute.org/the-interpreter/debate/quad/>
18. Lee, M. (2023, March). *Quad FMs, wary of China's might, push Indo-Pacific options*. Retrieved from AP news: <https://apnews.com/article/indo-pacific-diplomacy-india-us-australia-japan-china-17ebf36a78b413a1946f6bfec5546074>
19. Ministry of External Affairs, G. o. (2024). *Fact Sheet: Quad Countries Launch Cancer Moonshot Initiative to Reduce the Burden of Cancer in the Indo-Pacific*. Retrieved from Ministry of External Affairs, Government of India: <https://www.mea.gov.in/bilateral-documents.htm?dtl/38326/>
20. Ministry of Foreign Affairs of Japa. (2023). *Quad Joint Leaders' Statement 2023*. Retrieved from <https://www.mofa.go.jp/mofaj/files/100509241.pdf>
21. Ministry of Foreign Affairs of Japan. (2022, May 24). *Quad Joint Leaders' Statement*. Retrieved from Ministry of Foreign Affairs of Japan: <https://www.mofa.go.jp/files/100347798.pdf>
22. Ministry of Foreign Affairs of Japan. (n.d.). *Quad Cybersecurity Partnership: Joint Principles*. Retrieved from Ministry of Foreign Affairs of Japan: <https://www.mofa.go.jp/files/100347801.pdf>
23. Mizo, R. (2024). *The Quad, maritime security, and climate change*. Retrieved from Toda Peace Institute: <https://toda.org/global-outlook/2024/the-quad-maritime-security-and-climate-change.html>
24. Mizo, R. (2025, July 12). *The Emerging Quad 3.0: Prioritizing a Hard Security Agenda*. Retrieved from Toda Peace Institute – Global Outlook: <https://toda.org/global-outlook/2025/the-emerging-quad-3.0-prioritizing-a-hard-security-agenda.html>
25. MoE, GoI. (2024, July 29). *Quad Foreign Ministers' Meeting Joint Statement*. Retrieved from Ministry of External Affairs: <https://www.mea.gov.in/bilateral-documents.htm?dtl/38044/Quad+Foreign+Ministers+Meeting+Joint+Statement#:~:text=They%20are%20integrated%20and%20indivisible,Foreign%20Ministers'%20meeting%20in%202025.>
26. MoEA, GoI. (2023, May 20). *Quad Cybersecurity Partnership: Joint Principles for Secure Software*. Retrieved from Ministry of External Affairs, Government of India: https://www.mea.gov.in/bilateral-documents.htm?dtl/36574/Quad_Cybersecurity_Partnership_Joint_Principles_for_Secure_Software
27. Newman, E. (2010). Critical human security studies. *Cambridge University Press*, 36, 77-94.
28. Oros, A. L., & Gordan, A. (2021, December 07). *The Quad Should Help India Address Its Most Pressing Security Challenge: Climate Change*. Retrieved from New Security Beat: <https://www.newsecuritybeat.org/author/aoros/>

29. Pant, H. V. (2022, March 20). *India and the Quad: Chinese belligerence and Indian resilience*. Retrieved from Observer Research Foundation: <https://www.orfonline.org/research/india-and-the-quad#:~:text=There%20has%20been%20a%20significant,defence%20policy%20and%20maritime%20security>.
30. Patil, S., Sarma, A., & Chandola, B. (2025, March 17). *Strengthening the Quad's Regulatory Diplomacy on Cybersecurity*. Retrieved from ORF (Observer Research Foundation): <https://www.orfonline.org/research/strengthening-the-quad-s-regulatory-diplomacy-on-cybersecurity>
31. Pib. (2024, September 22). *Fact Sheet: 2024 Quad Leaders' Summit*. Retrieved from Press Information Bureau: <https://www.pib.gov.in/PressReleasePage.aspx?PRID=2057460>
32. Press Information Bureau. (2024, May 20). *Quad Leaders' Summit 2024: Joint efforts toward a resilient Indo-Pacific*. Retrieved from Government of India: <https://pib.gov.in/PressReleasePage.aspx?PRID=2057460>
33. Ramnath, A. (2022). Climate Resilience and the Quad. *Institute of Peace and Conflict Studies*. Retrieved from https://www.ipcs.org/comm_select.php?articleNo=5821
34. Roy, A. (2021, September 24). Climate Action and the Quad. Observer Research Foundation. Retrieved from <https://www.orfonline.org/expert-speak/climate-action-and-the-quad>
35. Schwartz, L. W., & Subramanlan, N. (2025, July 28). *Quad and energy security in the Indo-Pacific*. Retrieved from Foreign Policy: https://foreignpolicy.com/2025/07/28/quad-energy-security-indo-pacific/#cookie_message_anchor
36. Srikanth, d. (2014). Non-traditional security threats in the 21st century: a review. *International Journal of Development and Conflict*, 4, 60-68.
37. Stromesh, J. (2021, September 23). *ASEAN and the Quad: Strategic impasse or avenue for cooperation?* Retrieved from Brookings: <https://www.brookings.edu/articles/asean-and-the-quad-strategic-impasse-or-avenue-for-cooperation/>
38. Takahashi, M. (2024). The Role of the Quad in the context of human security: Can the Quad become a good neighbor of the Blue Pacific? *Journal of Human Security Studies*, 13, 1-20.
39. The Hindu. (2025, April 04). *Quad grouping coordinating efforts for relief to Myanmar after earthquake*. Retrieved from The Hindu: https://www.thehindu.com/news/international/quad-grouping-coordinating-efforts-for-relief-to-myanmar-after-earthquake/article69411665.ece#goog_rewarded
40. The White House. (2021, September 24). *Fact Sheet: Quad Leaders' Summit*. Retrieved from Biden White House Archives: <https://bidenwhitehouse.archives.gov/briefing-room/statements-releases/2021/09/24/fact-sheet-quad-leaders-summit/>
41. U.S. Embassy & Consulates in India. (2024, May 20). *Fact sheet: Quad Leaders' Summit*. Retrieved from U.S. Department of State: <https://in.usembassy.gov/fact-sheet-quad-leaders-summit/>
42. UNDP. (1994). *HUMAN DEVELOPMENT REPORT 1994*. Oxford University Press. Retrieved from <https://hdr.undp.org/system/files/documents/hdr1994encompletenostats.pdf>
43. Upadhyay, S. (2022, July 12). *BRICS, Quad, and India's Multi-Alignment Strategy*. Retrieved from STIMSON: <https://www.stimson.org/2022/brics-quad-and-indias-multi-alignment-strategy/#:~:text=India%20did%20not%20support%20the,mutual%20cooperation%20on%20global%20issues>.
44. Verma, S. S., & S, A. V. (2024). Understanding the Quad's Climate Diplomacy in the Indo-Pacific Region. *Millennial Asia*. <https://doi.org/https://doi.org/10.1177/09763996241258344>
45. Wei, Z. (2024). The Evolution of the 'QUAD'. *Horizons: Journal of International Relations and Sustainable Development*(25).
46. Wilson Center, Environmental Change and Security Program. (2021). *The Quad Should Help India Address Its Most Pressing Security Challenge: Climate Change*. Retrieved from New Security Beat: <https://www.newsecuritybeat.org/2021/12/quad-india-address-pressing-security-challenge-climate-change/#:~:text=A%202021%20survey%20of%20Indian,the%20effects%20of%20climate%20change>.



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The Role Of Nanotechnology in Fire Protection

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ABSTRACT

Nanotechnology provides new solutions for numerous applications that significantly impact almost every aspect of our society, including medicine, smart cities, the military, agriculture, and industry. Additionally, nanostructures are increasingly applied in fire protection. Application of nanotechnology and nanomaterials, compared to traditional materials, can extend the preservation of material integrity under direct exposure to fire and its effects. This undoubtedly eliminates or reduces the possible consequences of fire, which, in addition to safety benefits, also has significant economic benefits. The present short survey sought to summarize the use of nanotechnology in fire protection, including fireproof materials, the construction industry, nanotextiles, and nanosensors. Finally, there is a brief discussion of the possibilities of using the Internet of Nano Things (IoNT), as well as the potential risks this revolutionary technology, as well as nanotechnology, may pose to humanity.

KEYWORDS

Nanotechnology; nanomaterials; fire protection; fire retardant; IoNT; benefits; risks.

1. Introduction

Nanotechnology is considered one of the main driving forces of the 21st century and is believed to offer solutions to many of the challenges facing humanity. Nanotechnology is a revolutionary, multidisciplinary scientific discipline that enables the understanding of phenomena and materials at the nanoscale. Structures, devices, and systems composed of nanomaterials exhibit new properties and functions due to their nanoscale dimensions. They can be utilized across all scientific disciplines, such as biology, chemistry, physics, and engineering. This heterogeneous technology is defined by its scale – the prefix “nano” denotes one billionth of a meter (0.000000001) and, accordingly, enables manipulation of substances at the atomic level, in dimensions from 1 to 100 nm (Drexler et al., 1993). The European Commission in its 2022 recommendation, revised the 2011 definition, and states: “Nanomaterial means a natural, incidental, or manufactured materials consisting of solid particles that are present either on their own or as constituent particles in aggregates or agglomerates, and where 50% or more of these particles in the number-based size distribution, fulfil at least one of the following conditions: one or more external dimensions of the particle are in the size range of 1 nm to 100 nm...” (European Commission, 2022: 4-5).

The word “nanometer” was first proposed by Austrian chemist Richard Zsigmondy, Nobel Laureate in Chemistry in 1925, for his work on colloids and the invention of the ultramicroscope. However, the credit for



the conceptual foundation of today's nano-world belongs to Nobel Laureate in Physics Richard Feynman. At the annual meeting of the American Physical Society held on December 29, 1959, at the California Institute of Technology, Feynman gave a talk titled "There is Plenty of Room at the Bottom," in which he posed, among other things, the question of why the entire 24 volumes of the Encyclopedia Britannica could not be placed on the head of a pin (Feynman, 1960). In this famous lecture, he explained how scientists could control and manipulate atoms and molecules.

The term nanotechnology was first introduced by Professor Norio Taniguchi of the Tokyo University of Science at an international conference of the Japan Society of Precision Engineering in Tokyo in 1974 (Hulla, 2015; Sadhu, 2006). In his paper titled "On the Basic Concept of Nanotechnology," Taniguchi used the term nanotechnology to describe processes occurring at the nanometer scale, relating to the processing, separation, consolidation, and deformation of materials atom by atom or molecule by molecule (Taniguchi, 1974).

The golden era of nanotechnology began in the 1980s when Harold Kroto, Richard Smalley, and Robert Curl, Nobel Laureates in Chemistry in 1996, together with students James Heath and Sean O'Brien, discovered fullerenes (Kroto et al., 1985). Among the pioneers of the nano-world, Eric Drexler of the Massachusetts Institute of Technology (MIT) holds a prominent place. In 1986, he published the book "Engines of Creation: The Coming Era of Nanotechnology" (Drexler, 1986). Drexler's vision of nanotechnology is often referred to as "molecular nanotechnology." It is based on the "bottom up" concept – producing objects atom by atom, or "top down" – building from the top down.

The definition of nanotechnology was agreed upon in 1998–1999 after consultations with experts from over 20 countries and has achieved a certain degree of international acceptance. After about 60 countries developed nanotechnology activities between 2001 and 2004, it became clear that without this definition and a corresponding long-term vision, nanotechnology would not have developed at the same accelerated, conceptually unifying, and transformative path (Roco, 2011, p. 428). In the same period, many countries around the world established national-level programs, partly inspired or motivated by the National Nanotechnology Initiative, which officially began in January 2001 (Hulla et al., 2015).

Mihail Roco, a leader in nanotechnology, identified four phases in the development of nanotechnology products. The fourth phase, the development of molecular nanosystems (2015–2020), includes intelligent design of molecular and atomic devices, leading to "unprecedented understanding and control over the fundamental building blocks of all natural and man-made things" (Roco et al., 2011; Nayyar et al., 2017). There is no doubt that Roco was right, as control and manipulation of matter at the atomic level play a vital role in shaping scientific priorities.

In addition to extensive research and commercialization of nano-products in almost all branches of science, nanomaterials can play a significant role in fire protection. Present-time nanomaterials, components of various products, underscore the need for an adequate safety response (Soutter, 2022). Nanotechnology and nanomaterials, and their applications, offer new opportunities for developing more efficient materials that can improve fire resistance, ensuring greater safety for those at risk. Further research into nanostructured materials contributes to a better understanding of their thermal, electrical, and chemical properties, enabling improved design of equipment and devices for fire protection. Rabajczyk, Zielecka, and Gniazdowska (2022) believe that nanotechnology in fire protection represents a combination of scientific innovation and practical safety.

2. Perspectives and Use of Nanotechnology in Reducing Fire Risk

Fire hazards continue to pose serious threats to human life, the environment, and infrastructure. In recent years, nanomaterials have emerged as a promising frontier in flame retardancy, owing to their superior thermal stability, high surface area, and multifunctional properties. As particles enter the nanometer range, their surface area-to-mass ratio increases, and this is associated with greater reactivity (compared to bulk materials). The impact of using nanomaterials is reflected in shortening response times, the detection and extinguishing of fires, and the reduction of concentrations of toxic, flammable gases and dust, thereby reducing the possibility of combustion products spreading over greater distances and thereby reducing consequences and protecting the environment (Singh et al., 2025).

Nanotechnology is used in materials that reduce fire risk and increase safety, such as construction materials and structures, paints, coatings, fire protection equipment, and devices (e.g., nanosensors) (Temane & Meek, 2024; Mullins-Jaime & Smith, 2022). Nanomaterials incorporated into coatings and protective paints protect materials from fire exposure (Lahtela, Turku & Kärki, 2023), creating a barrier to fire penetration into building materials (Yang et al., 2021). In addition to using fire-resistant paints, fire-resistant glass can be used, which prevents fire spread and enables safe evacuation from the building (Azmy, 2024). The addition of nanoparticles can prevent or slow the spread of flames on materials affected by fire, thereby increasing the time for an adequate response, facilitating evacuation, and facilitating fire extinguishing (Kolya & Kang, 2024). This property is particularly applied in construction and industry, where it contributes to the safety of buildings and equipment in preventive phases.

Rabajczyk *et al.* (2021) state that nanostructures are incorporated in protective clothing and other equipment. The application is reflected in improving the fire resistance of materials and their properties under exposure to flames (Li et al., 2024), elevated temperatures, and combustion products (Qu et al., 2023; Kim, Lee & Yoon, 2021). Nanoparticles, such as metallic oxides (zinc dioxide, titanium oxide) and carbon nanotubes (CNTs), are incorporated into textiles to enhance their flame-retardant properties. Nanotechnology-based fabrics are used to create lighter, more durable, and more effective fireproof clothing for firefighters and other professionals in high-risk environments.

Improving the mechanical characteristics of materials used for personal and protective equipment can enhance material resistance, strength, and flexibility, as well as reduce the amount of material needed to make the equipment. Nanomaterials are also thought to affect the action of water and other firefighting agents, thereby preventing the action of aggressive and dangerous substances that may occur during technological accidents and disasters. Such properties of nanomaterials help make protective and other equipment (footwear, clothing, helmets, goggles, breathing apparatus, protective filters, etc.) used by firefighting and other emergency services (Lin et al., 2024; Zhu, 2025). The increased efficiency of equipment and devices through the introduction of nanotechnology contributes to the efficiency of fire extinguishing (Qu et al., 2023), while the development of lightweight yet durable nanomaterials enables the development of innovative equipment, thereby enabling easier and safer handling by firefighters.

The use of nanomaterials is increasingly prevalent in modern technical protection systems, which are used for fire detection and monitoring, as well as for detecting explosive mixtures, gases, and explosives. Their application is evident in the use of nanodetectors – sensors that monitor changes in defined parameters, indicating early signs of danger. Sensors can be stationary or portable, facilitating widespread and rapid deployment and enabling better monitoring of parameters in working and living environments (Whitehill et al., 2024). This allows precise detection of early fire signs, which, on the one hand, reduces false alarms and, on the other hand, enables detection in its initial stage, making further localization and extinguishing easier.

Concrete, glass, coatings, steel, and wood are the most widely available nano-enabled products in the building construction industry. Silica, TiO_2 , iron oxide, and carbon nanotubes are common nanomaterials added to concrete to increase density and strength, and, in turn, fire resistance (Jones et al., 2019). Fire-proof glass, using either silica fume or nano-silica, can prevent rapid fire spread, enabling safe building evacuation (Gibb et al., 2018). When applied to paint and drywall, the intumescent layer creates a char. This acts as a fire retardant because char is a poor conductor, offering better fire protection for the material behind it. Nanocoatings may include nano-sized boron nitride or nanoclays, which can be used to fortify building materials and aid in fire resistance (Mullins-Jaime & Smith, 2022). When steel structures are exposed to high temperatures, their strength and rigidity are at risk, and nanomaterials can provide excellent fire resistance, in particular nano- TiO_2 (Wang, Han, & Ke, 2006). The flammability of wood products may limit utilisation, with fire safety a significant concern across various applications. To overcome the weaknesses and use wood safely, flame-retardant properties need serious consideration, including the addition of nanoadditives. The use of nanoparticles in wood coatings, such as zinc oxide (ZnO), titanium dioxide (TiO_2), silica (SiO_2), carbon nanotubes, or graphite, can enhance wood's functionality in terms of durability and fire resistance (Turku, Karki, & Lahtela, 2023). The nanoscale and high surface area of nanomaterials make them more effective at low concentrations than conventional compounds, an enormous advantage industrially and economically. For example, the TiO_2 -coated wood was found to reduce the flammability of the wood and the spread of flame, compared to the uncoated sample (Jasmani et al., 2020). Furthermore, the ZnO- TiO_2 double-nanostructures can absorb large amounts of heat, dilute flammable gas concentrations, and adsorb harmful acid gases during the decomposition process.

In addition to benefits, it is necessary to emphasize the potential risks that nanotechnologies bring to the field of fire protection. The rapid pace of nanotechnology development and commercialization has apparently outpaced the availability of health, environmental, and safety data (Dimitrijevic, 2011). Currently, research on the chronic effects of exposure to nanomaterials is insufficient, and many studies indicate adverse health effects (Savolainen et al., 2010; Olawoyin, 2018). For example, ultra-fine titanium dioxide particles are suspected occupational carcinogens, whereas nano-zinc oxide is linked to inflammation, cell proliferation, and cytotoxicity. Amorphous silica nanoparticles are considered to be relatively low risk; however, there is insufficient evidence to declare nanosilica 'safe', as some evidence of cytotoxicity remains. Adverse health effects of carbon nanotubes are inflammation, respiratory distress, clotting, fibrosis, vascular damage, and other cardiovascular effects. On the other hand, there is a general lack of research on the properties of nanoparticles in relation to their ignition and explosion potential (Dimitrijevic, 2010). However, the increasing use of engineered nanomaterials could give rise to concerns about increased risks to human health and the environment.

3. Conclusions and a Look to the Future

Nanotechnology is widely cited as one of the most exciting and important technologies of the twenty-first century. The rapid technological development of engineered nanomaterials is expected to hold enormous potential for new products and applications across several industrial and consumer sectors. In light of the negative impacts that fires can cause, the development of new technologies, such as nanotechnology, promises greater possibilities than ever before, to protect human lives and property. This includes the development of new equipment, construction materials, nanotextiles, monitoring suspended particles and carbon monoxide using nanosensors, firefighter protection, and, of course, economic benefits.

Nanomaterials are widely regarded as having great potential, but they may also pose new classes of problems for human health and the environment. It is not easy to anticipate with certainty what will happen when nanomaterials are released to the general public or into the environment at large. Regulation of nanomaterials has been a highly controversial issue in recent years, as has the capacity of international governance to meet the complex regulatory demands posed by nanomaterials. Therefore, responsible governments should adopt a precautionary approach and be more involved in global regulatory cooperation.

In addition to nanomaterials, the development of the Internet of Things (IoT) is seen as a new concept gaining enormous popularity in modern wireless telecommunications. IoT, rather than merely merging computers and people, is evolving into the unification of smart objects or things in the real world using Information and communications technology (Ashton, 2009; Gubbi et al., 2013; Bresciani et al., 2018). The combination of nanotechnology and IoT has created the Internet of Nano Things (IoNT). The main building blocks of IoNT are nanotechnologies, namely nano-devices ranging from 1 to 100 nm (Akhtar & Perwej, 2020). IoNT uses the most sophisticated and advanced methodologies for data collection, enabling IoNT to expand its base from the existing to a broader circle of new and advanced applications compared to the Internet of Things. This opens up an entirely new dimension of IoNT use, enabling interaction and communication with home appliances, pollutant-monitoring sensors, and surveillance sensors. Moreover, IoNT can provide much more detailed, cheaper, and up-to-date images of cities, homes, and factories. A large amount of information can be collected in real time using numerous nanosensors to improve the quality of life, health, and infrastructure (Jarmakiewicz & Parobczak, 2016). These miniature sensors, interconnected via nanonetworks, can pave the way for new research in fire protection. IoNT, although in its initial stage of research and development, has the capacity to provide highly sensitive sensors for the detection of changes in the concentration of dangerous gases and smoke. Furthermore, it is expected that far more sophisticated fire detection could enable better-coordinated responses from all emergency services. Nevertheless, the potential use of IoNT technology may give rise to issues due to a lack of regulation, thus posing significant security and privacy concerns.

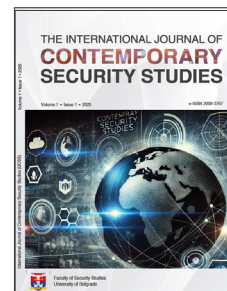
4. References

1. Akhtar, N., & Perwej, Y. (2020). The internet of nano things (IoNT) existing state and future Prospects. *GSC Advanced Research and Reviews*, 2020, 05(02), 131–150. doi: 10.30574/gscarr.2020.5.2.0110
2. Ashton, K. (2009). That 'Internet of Things' thing. *RFID Journal*, 22, 97-114.
3. Azmy, N.Y., Abu EL Azm, E.T., Ahmed A. Rizk, A.A., & El-Haggag Mehanna, W.A. (2024). Using Nano-technology to Achieve Sustainability in interior residential spaces. *Journal of Engineering Research*, 8(6). https://www.researchgate.net/profile/Neveen-Azmy-2/publication/388890797_Using_Nanotechnology_to_Achieve_Sustainability_in_Interior_Residential_Spaces/links/67abc7168311ce680c5e6dcf/Using-Nanotechnology-to-Achieve-Sustainability-in-Interior-Residential-Spaces.pdf
4. Bresciani, S., Ferraris, A., & Del Giudice, M. (2018). The management of organizational ambidexterity through alliances in a new context of analysis: Internet of Things (IoT) smart cities projects, *Technological Forecasting & Social Change*, 136, 331-338.
5. Dimitrijevic, D. (2010). Dangers of nanotechnology: potential fire concerns and safety frameworks. *International Journal of Emergency Management*, 7(3-4), 249-257.
6. Dimitrijević, D. (2011). *Nanotechnology: The Need for the Implementation of the Precautionary Approach beyond the EU*. In: Understanding and Managing Threats to the Environment in South Eastern Europe (NATO Science for Peace and Security Series C: Environmental Security), Gorazd Meško, Dejana Dimitrijević, Charles B. Fields (Eds.), 205-224. Dordrecht: Springer.
7. Drexler, K.E. (1986). *Engines of Creation: the Coming Era of Nanotechnology*. New York: Anchor-Doubleday.
8. Drexler, K.E., Peterson, C., & Pergamit, G. (1993). *Unbounding the Future: the Nanotechnology Revolution*. New York: William Morrow and Company, Inc. <https://www.hailienene.com/resources/The%20Nanotechnology%20Revolution.pdf>
9. European Commission. (2022). Commission Recommendation of 10.06.2022 on the definition of nano-material. https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=oj:JOC_2022_229_R_0001
10. Feynman, R.P. (1960). There's plenty of room at the bottom. *Engineering and Science*, 23(5), 22-36. <https://calteches.library.caltech.edu/1976/1/1960Bottom.pdf>
11. Gibb, A., Jones, W., Goodier, C., Bust, P., Song, M., & Jin, J. (2018). Nanotechnology in Construction and Demolition: What We Know, What We Don't. *Construction Research and Innovation*, 9(2), 55-58. <https://doi.org/10.1080/20450249.2018.1470405>
12. Gubbi, J., Buyya, R., Marusic, S., & Palaniswami, R. (2013). Internet of Things (IoT): A vision, architectural elements, and future directions. *Future Generation Computer Systems*, 28(7), 1645-1660.
13. Hulla, J., Sahu, S., & Hayes A. (2015). Nanotechnology: History and future. *Human & Experimental Toxicology*, 34(12) 1318-1321. doi:10.1177/0960327115603588
14. Jarmakiewicz, J., & Parobczak, K. (2016). On the Internet of Nano Things in healthcare network. 2016 International Conference on Military Communications and Information Systems (ICMCIS)). IEEE, 2016, 1-6.
15. Jasmani, L., Rusli, R., Khadiran, T., Jalil, R., & Adnan, S. (2020). Application of Nanotechnology in Wood-Based Products Industry: A Review. *Nanoscale Research Letters*, 15, 207. <https://doi.org/10.1186/s11671-020-03438-2>
16. Jones, W., Gibb, A., Goodier, C., Bust, P., Song, M., & Jin, J. (2019). Nanomaterials in construction—what is being used, and where? *Proceedings of Institution of Civil Engineers – Construction Materials*, 172, 1–14. doi:10.1680/jcoma.16.00011.
17. Kim, Y., Lee, S., & Yoon, H. (2021). Fire-Safe Polymer Composites: Flame-Retardant Effect of Nanofillers. *Polymers*, 13 - 540. doi.org/10.3390/polym13040540.
18. Kolya, H. & Kang, C.-W. (2024). Eco-Friendly Polymer Nanocomposite Coatings for Next- Generation Fire Retardants for Building Materials. *Polymers*, 16, p. 2045. doi.org/10.3390/polym16142045.
19. Kroto, H.W., Heath, J.R., O'Brien, S.C., Curl, R.F., & Smalley, R.E. (1985). C₆₀: Buckminsterfullerene. *Nature*, 318, 162 - 163. <https://doi.org/10.1038/318162a0>
20. Lahtela, V., Turku, I. & Kä rki, T. (2023). A review of flame protection of wooden material and future potential with nano additives: Review paper. *Baltic Forestry*, 29(2):636. doi.org/10.46490/BF636.

21. Li, Y., Cao, C.-F., Chen, Z.-Y., Liu, S.-C., Bae, J., & Tang, L.-C. (2024). Waterborne Intumescent Fire-Retardant Polymer Composite Coatings: A Review. *Polymers*, 16(16), 2353. doi.org/10.3390/polym16162353.
22. Lin, B., Li, A., De Cachinho Cordeiro, I.M., Jia, M., Lee, Y.X., Yuen, A.C.Y., Wang, C., Wang, W., & Yeoh, G.H. (2024). 'MXene Based Flame Retardant and Electrically Conductive Polymer Coatings. *Polymers*, 16(17), 2461. <https://doi.org/10.3390/polym16172461>.
23. Mullins-Jaime, C., & Smith, T.D. (2022). Nanotechnology in Residential Building Materials for Better Fire Protection and Life Safety Outcomes. *Fire*, 5:174. doi.org/10.3390/fire5060174.
24. Metić, A. (2025). The Significance and Role of Police Officers in Building the School as a Safe Environment for All Students. *International Journal of Contemporary Security Studies*, 1(1), 17–24. https://doi.org/10.18485/fb_ijcss.2025.1.1.2
25. Nayyar, A., Puri, V., & Le, D.-H. (2017). Internet of Nano Things (IoNT): Next Evolutionary Step in Nanotechnology. *Nanoscience and Nanotechnology*, 7(1), 4–8. doi: 10.5923/j.nn.20170701.02
26. Olawoyin, R. (2018). Nanotechnology: the future of fire safety. *Safety Science*, 110, 214–221.
27. Qu, Q., Xu, J., Wang, H., Yu, Y., Dong, Q., Zhang, X., & He, Y. (2023). Carbon Nanotube- Based Intumescent Flame Retardants Achieve High-Efficiency Flame Retardancy and Simultaneously Avoid Mechanical Property Loss. *Polymers*, 15(6), 1406. doi.org/10.3390/polym15061406.
28. Rabajczyk, A., Zielecka, M., & Gniazdowska, J. (2022). Application of Nanotechnology in Extinguishing Agents. *Materials*, 15:8876. doi.org/10.3390/ma15248876.
29. Rabajczyk, A., Zielecka, M., Popielarczyk, T., & Sowa, T. (2021). Nanotechnology in Fire Protection—Application and Requirements. *Materials*, 14(24), 7849. doi.org/10.3390/ma14247849.
30. Roco, M. C. (2011). The long view of nanotechnology development: the National Nanotechnology Initiative at 10 years. *Journal of Nanoparticle Research*, 13, 427–445. doi: 10.1007/s11051-010-0192-z
31. Roco, M. C., Mirkin, C. A., & Hersam, M. C. (2011). Nanotechnology research directions for societal needs in 2020: retrospective and outlook (Vol. 1). Springer Science & Business Media.
32. Sandhu, A. (2006). Who invented nano?. *Nature Nanotechnology*, 1, 87. doi.org/10.1038/nnano.2006.115
33. Savolainen, K., Alenius, H., Norppa, H., Pylkkanen, L., Tuomi, T., & Kasper, G. (2010). Risk assessment of engineered nanomaterials and nanotechnologies—A review. *Toxicology*, 269, 92–104.
34. Singh, N.B., Usman, U.L., & Abdala, A. (2005). Nanomaterials in fire protection: Innovation for enhanced safety and durability. *Nano-Structures & Nano-Objects*, 42, 101497. <https://doi.org/10.1016/j.nano-so.2025.101497>
35. Soutter, W. (2022). Nanotechnology in Explosive Detection. *AZoNano*, 2 November. <https://www.azonano.com/article.aspx?ArticleID=3089>.
36. Taniguchi N., Arakawa C., & Kobayashi T. (1974). On the basic concept of nano-technology; Proceedings of the International Conference on Production Engineering; Tokyo, Japan. 26–29 August 1974.
37. Temane, L.T., & Meek, J. (2024). Review on Processing, Flame Retardant Properties, and Applications of Graphene Based Nanomaterials in Polymers. *Macromolecular Materials and Engineering*. doi.org/10.1002/mame.202400104.
38. Turku, I., Karki, T., & Lahtela, V. (2023). A review of flame protection of wooden materials and future potential with nano additives. *Baltic Forestry*, 29(2), 173–187. <https://doi.org/10.46490/BF636>.
39. Wang, Z., Han, E., & Ke, W. (2006). Effect of nanoparticles on the improvement in fire-resistant and anti-ageing properties of flame-retardant coating. *Surface and Coatings Technology*, 200(20-21), 5706–5716. doi:10.1016/j.surfcoat.2005.08.102
40. Whitehill, A.R., Lunden, M., LaFranchi, B., Kaushik, S., & Solomon, P.A. (2024). Mobile air quality monitoring and comparison to fixed monitoring sites for instrument performance assessment. *Atmospheric Measurement Techniques*, 17, 2991– 3009. doi.org/10.5194/amt-17-2991-2024.
41. Yang, Y., Díaz Palencia, J.L., Wang, N., Jiang, Y. & Wang, D.-Y. (2021). Nanocarbon-Based Flame Retardant Polymer Nanocomposites. *Molecules*, 26(15), 4670. <https://doi.org/10.3390/molecules26154670>
42. Zhu, L., Zhang, W., Luan, S., Wei, J., Yang, Y., & Miao, J. (2025). Nanomaterials for Smart Wearable Fibers and Textiles: A Critical Review. *iScience*, 28(8), 113126. doi.org/10.1016/j.isci.2025.113126.



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Research article

The Use of Simulation Models in Security Studies: An Example of Basketball Games as Mass Sports Events

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ABSTRACT

Within the framework of security studies, the use of software in education about dealing with and solving crises has become an increasingly relevant methodological approach. The use of the software should enable a better understanding of decision-making mechanisms and evaluate security measures in conditions that replicate real operational environments. The aim of this paper is to demonstrate how simulation models contribute to improving the design of a security subsystem by enabling the testing and optimization of procedures. A basketball game was selected as a representative mass sports event due to the predictable presence of large crowds and the potential for security-related incidents. Through scenario manipulation, trainees can modify variables such as the number of security personnel, the placement of barriers, or the number of evacuation routes, and immediately observe how these changes affect the defined performance indicators. XVR simulation software was used to design and evaluate the security subsystem for the event. The results confirm that the software enables the controlled testing of security procedures without risk to people or property, with the possibility of providing quantifiable feedback that improves training efficiency and decision-making accuracy.

KEYWORDS

Simulation model; XVR software; security risks; public gatherings; sports event; basketball game.

1. Introduction

This paper presents a systems-oriented approach to designing security subsystems, emphasizing both structural hierarchy and quality control. Central to this process is the use of a virtual environment through the XVR simulation platform, which enables simulation-based decision-making by modeling crowd dynamics and testing security interventions. By integrating systems theory with practical simulation, the approach facilitates evidence-based strategies for managing public safety in complex event scenarios.

This study investigates how simulation tools such as XVR, can improve crowd safety and emergency response efficiency during indoor basketball events. By combining concepts from security studies with advanced



information and communication technologies, the research investigates how virtual simulations can model realistic crowd behaviors, identify potential security risks, and evaluate the effectiveness of various intervention strategies. The study further considers the role of such simulation-based approaches in training security personnel, informing the design of event-specific safety protocols, and supporting decision-making for the management of public gatherings.

2. Simulation-based modeling with the XVR platform

The theoretical foundation of this research is based on the systems-theoretic security approach developed by Nancy Leveson and William Young. Their systems-theoretic process analysis for security expands traditional hazard and security analysis by emphasizing control of system vulnerabilities instead of threat avoidance (Young & Leveson, 2013; Leveson, 2012). In this approach, system safety and security are achieved by introducing constraints that prevent the system from entering vulnerable states that may lead to losses. As the authors state, “the key question facing security analysts should be how to control vulnerabilities, not how to avoid threats” (Young & Leveson, 2014, p. 35). This makes the method suitable for complex socio-technical environments, such as securing large public events.

To translate this conceptual framework into practice, a simulation-based model was created using the XVR platform. Unlike traditional training methods, XVR enables controlled experimentation, allowing researchers to observe how different decisions influence safety outcomes in real time. Rather than describing the software from a technical standpoint, its selection and use in this study are tied directly to research needs. Specifically, XVR supports: multi-user participation, enabling several roles to act simultaneously (security officer, security shift manager, control room operator); three-dimensional animation, positional sound effects, audio and video streaming, and user interaction (Carrozzino *et al.*, 2005, p. 270); scenario branching and real-time modification, allowing the operator to inject unexpected events (e.g., crowd surge, blocked exit); integrated communication recording, making it possible to analyze communication flow and decision sequencing throughout the exercise (Barta *et al.*, 2016, p. 79); and spatial and resource manipulation (avatars, vehicles, access routes), which supports evaluation of resource allocation efficiency during crowd management.

In 2015, it was estimated that over 150 emergency services in the UK and worldwide were using this software. Also, during the six years preceding this year, the competence of the candidates improved thanks to the work in this software (Lamb *et al.*, 2015, p. 237). It is suitable for civil-military use, for training employees in emergency response and rescue units, but it could also be used to access knowledge and training, check procedures, lines of communication, and evaluate new tools. In the field of disaster management, software could be effectively applied in the Integrated Disaster Management model (Milenković, 2025, p. 178), in the preparation phase when measures to mitigate the consequences of disasters are developed, or the Integrated Disaster Risk Reduction System model (Cvetković, 2015). Technological innovations, such as (risk) simulation software, contribute to improvements in areas such as risk mapping, damage assessment, and resource utilization optimization (Dada *et al.*, 2025, p. 4).

3. A basketball game as a type of mass sports events

Gatherings therefore represent a group of people who deliberately and temporarily gather in a private or public space, for a specific purpose, that is, to express values, attitudes or opinions that are common to all members of the group (UN General Assembly, 2012; Boyle & Vullierme, 2021, p. 11). Gathering means the arrival of a certain or indefinite number of people at a certain place, for the purpose of public presentation or pointing out a problem and presenting an opinion on the possibilities for overcoming it. The moment when an (un)determined number of people arrive at a certain place and form a group in order to realize the goal of the gathering, we can say that a gathering is formed (Misić, 2016, pp. 35-36). From these definitions, it follows that gatherings are called public when they are held in a public space. Public space in the context of this work does not mean open space in the physical sense, nor space that is publicly owned and available anytime, to anyone and without compensation (see more in: Marković, 2021; Marković, 2022). These spaces are often only available during a certain part of the day and are generally publicly owned, which may not always be the case (UN-Habitat, 2018,

p. 10). The last-mentioned feature is important if you take into consideration the fact that many facilities where public gatherings are held, including sports facilities, can be both publicly and privately owned.

As public gatherings can be held in open and closed places, we can distinguish public gatherings in open spaces and public gatherings in closed spaces. An open space would be any space that is accessible for the gathering of persons whose number and identity are not predetermined. A closed space would be a space, or in this case, a facility or room that is fenced off or marked, and thus the number of people who can access it is limited. Bearing in mind that the paper deals with the issue of security risks at basketball games, the focus remains on the closed space where they are most often held. The closed space, together with other factors, conditions certain dangers, which will be discussed later.

Sports events as a type of public gathering were selected taking into account their frequency, the greatest comprehensive security risk that they carry with them with potentially the most serious consequences, and the degree of demanding security (Misić, 2016, p. 158). Sports events, as well as musical events and all other events held indoors, as a rule, involve the gathering of a large number of participants. With the increase in the number of people gathered at these events, the need for planning and undertaking effective safety and security measures increases. The most popular sports around the world are certainly football and basketball. A basketball game was chosen as the subject of the work as a type of sports event. The choice made regarding the type of sports event that will be covered in this work is supported by the following: football is more popular in the United States of America, but basketball is more popular globally (Omar, 2022).

3.1. Security risks at basketball games

Threats at sports events can be viewed through security issues or risks. Since they are related to a specific group of individuals, organization, or, in our case, a type of event, we could also call specialized security risks (Metić, 2025, p. 19). Basically, all these risks can be divided into three groups: natural character, technical character, and social character (Marković, 2022, p. 36).

Risks of a natural nature arise from natural disasters, and although they are partly limited given that basketball games are most often played indoors, they should not be neglected. We are witnessing increasingly frequent natural disasters in the form of storms accompanied by thunder, strong winds and heavy rainfall, both in the world and on the territory of our country.

When it comes to risks of a technical nature, these primarily refer to problems associated with any technical (mechanical and electronic) equipment that is an integral part of the hall for holding this type of sports event. Such problems may lead to incidents such as electric shock, fires and explosions. To this day, the worst fire in football history is the fire at the stadium known as Bradford University Stadium in 1985, which killed 56 and injured more than 250 spectators (Event Insurance Services, n.d.).

The third group of risks is caused by human behaviour. At the highest level of generality, these risks include criminal acts, misdemeanors and deviant behaviour, primarily violent behaviour. They also encompass the use and abuse of psychoactive substances and property crimes such as theft. Most often, it is about vandalism and fights. Just one example is an incident at a stadium in Egypt where fans of one team started attacking fans of another team with knives, stones, bottles and other objects, causing a total of 79 deaths (News Desk, 2022). However, a serious threat to all those present at sports events, which we have had the opportunity to witness several times, is the placement of explosive devices and terrorism. It is enough to mention the terrorist attack in Munich in 1972.

Finally, there are also potential safety problems that have a combined character, for example, fires or explosions caused by lightning strikes in electrical installations. As an example, a combination of natural disaster and uncontrolled mass movement can be cited. In Nepal, in 1988, 93 people died and another 100 were injured when they tried to escape a hailstorm inside the national stadium. Serious consequences for health and life occurred when, due to a hail storm, a crowd of visitors who intended to escape from it, but remained inside the stadium because the exit was locked (News Desk, 2022).

A significant risk that we single out here is the capacity of the sports event venue. This risk comes to the fore when the number of places for visitors is limited, and due to the nature of the event, there is a great interest in watching it live from the stands or another place intended for the audience. At the concert of rock band 'Fish

Stew' in Zagreb in 1982, Željka Marjanović, who was 14 years old at the time, lost her life due to the crowd that prevailed at the concert organized in a closed facility (S.R., 2022). During the 1988-89 FA Cup semi-final event between Liverpool and Nottingham Forest, as many as 96 people died, and 766 injured due to overcrowding at Hillsborough football stadium. Disaster struck when an estimated 2,000 people ran onto the standing terraces when the gate was opened with the intention of easing congestion at the entrance turnstiles (Event Insurance Services, n.d.). Falls and going over the face can sometimes be the main risk in a sports event.

Table 1. Classification of risks at basketball events (Source: Authors)¹

Type of risk	Example of hazard	Probability of occurrence	Impact on safety	Possible consequence	How the risk is modeled in the simulation
Natural	storm, lightning, heavy rain, hail	Low – Medium	High	suspension of the event, evacuation, and injuries due to panic	environmental changes (sound effects, reduced visibility), activation of the evacuation scenario
Technical	fire, electrical failure, equipment malfunction, structural collapse	Medium	High	fire, injuries, evacuation delays	blocked exits, fire source, alarm activation, and lighting failure
Behavioral (Social)	crowd violence, vandalism, bringing weapons, panic movement	High	High	injuries, stampede, property damage	crowd density increase, aggressive actor behavior, trigger-based escalation
Combined risks	fire caused by a lightning strike, panic + technical failure	Low	Extremely high	mass injuries, difficult evacuation	simultaneous multi-incident scenario (e.g., power outage + panic)
Capacity-related	overcrowding, insufficient exits, bottlenecks	High	Extremely high	stampede, blocked escape routes	pedestrian flow simulation, crowd density metrics (persons/m ²)

Security risks can also be viewed from a temporal perspective: *pre-event risks*, *risks during the event*, and *risks after the event*. Risks during the event can be further divided into three subgroups. The **first subgroup** includes risks immediately before the start of the event (time from 5 hours before the start of the event to the first minute of the event), such as those that may arise during the transfer of players from their accommodation to the sports venue, within the premises where players are situated before the event, or in relation to traffic and crowd control. The **second subgroup** covers risks present throughout the duration of the event (time from the first to the last minute of the event), including risks to players or teams, spectators and other attendees, as well as issues related to parking and crowd management. The **third subgroup** pertains to risks that emerge immediately after the end of the event (time from the last minute of the event to the moment of complete emptying/leaving the hall or facility where the event took place) such as those that occur on the way between the sports facility and the accommodation of the players, how to pick up the players, i.e. Teams, as well as spectators (organized fan groups), as well as risks linked to crowd control during exit and dispersal.

Like the form of endangerment (Mandić & Stanojević, 2020, pp. 91-92), security risks at sports events largely depend on the activity and location. Activity is the type of sport for which the event is organized and the (nar-

¹ The listed risks are prioritized using a risk matrix (probability × impact). In XVR, simulation parameters are then assigned to the selected risks, which may include Scenario Parameters (time of event, number of people in the space, number and capacity of evacuation routes); Incident triggers (appearance of aggressive crowd, blocking of exits) and Measurable Outcomes (evacuation time, crowd density, number of injured in the simulation, required number of people to respond).

rower and wider) location is where the sports event is held. A sports facility can be defined as a facility intended for holding sports events, which, in addition to the sports field, has an area for the audience and which may also have an accompanying area (sanitary, wardrobe, storage, etc.), as well as an area to which the entrance and the movement of natural persons conditioned by the possession of a ticket or a permit issued by the organizer of the sports event.

When it comes to the activity, that is, in this case, the type of sport for which the event is organized, there are no security risks that could be singled out only for this type of sport and sports event. What can be noted at this point is that, in addition to football events, basketball events represent the biggest challenge from the aspect of security and their provision is a challenging undertaking for the persons assigned that task. When it comes to location, several parameters are important. First, depending on the competition in which the sports event is held, a distinction can be made between rural and urban areas. Then, the roads that are located in the immediate vicinity of the sports facility, that is, the location of the event, as well as those that are used for the transportation of teams and spectators/fans are important. It should be taken into account whether they are main or minor roads, what their capacity is, as well as the degree of use and eventual congestion. In addition to roads, buildings in the immediate vicinity are also important, primarily their purpose. In the context of security risks, the roads used for the transport of teams and the organized transport of spectators/fans, as well as their gathering places near the sports facility itself and the places where buses and other means of transport used for the aforementioned transport are parked, stand out.

Indirectly related to both activity and location, as one of the elements on which security risks depend, is the type of facility in terms of “degree of openness”. Most often, basketball games are held indoors. The closedness of the space can make it difficult to evacuate people if it was not adequately planned beforehand. The closedness of the space can increase panic among those present in the sports facility or worsen the consequences of certain harmful events such as fire or any act involving an explosion or the use of toxic substances.

4. Simulation methodology

STEP 1: WHO IS THE TARGET GROUP? – Whose training is the simulation designed for? In the case of this simulation, based on which it was designed, it was prepared for the training of security officers (security officer, manager of the security officers and security manager in the control room). At this point, it is determined which competencies the participants must have in order to access the simulation.

STEP 2: WHAT ARE THE TARGETED RESULTS OF THE TRAINING? – It is necessary to define the objectives/outcomes of the training or the criteria for evaluating the results.

STEP 3: HOW WILL THE TRAINING/EXERCISE/ASSESSMENT BE CONDUCTED? – Choose a teaching/training methodology (e.g., self-study, classroom, 1-on-1, team training, etc.), a method for data collection, evaluation and/or assessment; the way the virtual incident is presented (e.g., via XVR Expo, plenary, in different rooms or on VR HMDs). Define the schedule during the session, which hardware and which participants, and where.

STEP 4: DEFINE THE SCENARIO – 1) What happened? Adjust for each scenario: type (incident, weather, hazards, damage, number and severity of casualties, etc.); 2) Where did it happen? (exact location, entry and exit routes); 3) Who is involved? (Emergency services, firefighters, police and other interested parties). This place should include all training participants and all non-playable characters - automation and behavioral algorithms; 4) What is the flow of the story? Include all dilemmas and choices. Record information/communication sources (e.g., SITREPS following METHANE structure).

STEP 5: WORK PLAN OR ELABORATE (DETAILED INSTRUCTIONS/MANUAL) FOR CONDUCTING THE TRAINING/EXERCISE – Develop a work plan for conducting the training or exercise. Use your organization's template for a plan or handbook, or create your own. Include at least the following: Introduction, target group and teaching/training objectives/outcomes, evaluation method; A brief description of the incidents and the overall time frame for (each) incident; Real-time training session timeline and practice time (including setup, start, breaks, evaluation); Points of attention during the session, such as: checklists, evaluation form, evaluation plans, etc.; Scenario injection list and details related to XVR scenarios and Practical issues (location, layout, props, hardware, etc.).

STEP 6: CREATE XVR SCENARIO – Choose an empty XVR environment or use a basic existing scenario and templates; Set incident items (hide, group, lock or disable objects if applicable); Define motions and states; Place salvage items and hide/lock them if applicable. Prepare movements and states (if applicable); Set avatars of participants and vehicles; Define roles and their tools and interactions; Set weather conditions and simulation time. Add flags or vegetation to indicate wind direction; Place other objects (and movements) to make the scene more realistic and dynamic; Add sounds for additional virtual reality immersion (for example ambient sound, crowds, screams); Give important (groups) of subjects recognizable names; Rearrange groups for good findability; Create events (EVENTS), tasks (TASKS) and/or triggers (TRIGGERS) for greater automation and reduction of operator workload (Make them flexible to adapt to different participant choices and allow for improvisation); When creating XVR Expo scenes, add viewpoints and hotspots, export the scene and upload it; Write down in your lesson plan/handout/manual concise explanations for operators of how the XVR scenario can be used (e.g. a list of events/tasks (EVENTS/TASKS) and what needs to happen and when); Save and test often as you build XVR.

STEP 7: TEST/VERIFY – Perform a technical test and then a full simulation test. This will ensure that everything is working and ready for training/practice.

STEP 8: PRACTICAL QUESTIONS – For example, determine date(s), participants and room(s) for training.

STEP 9: EXECUTE THE EXERCISE – After briefing the participants on the objectives of the training/exercise, how to behave as participants and how to use the XVR software. Monitor the implementation of the plan while maintaining flexibility for participant input and creativity.

STEP 10: EVALUATION (AFTER EXERCISE REVIEW/ASSESSMENT) – Perform an evaluation based on the results obtained and the goals set.

Presented as a flowchart, the creation of the simulation methodology can be presented as follows (Figure 1):

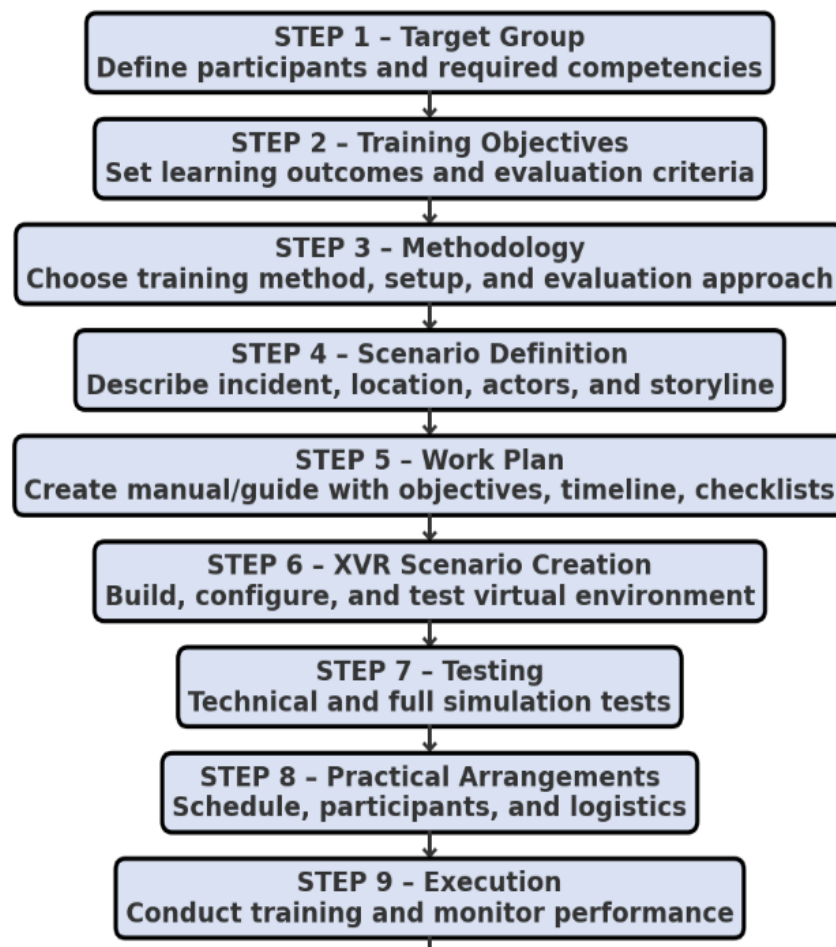


Figure 1. Simulation methodology presented as a flowchart (Source: Authors).

5. Implications of the study – Designing the Security Subsystem of a Basketball Game

As a rule, a basketball game is played indoors, in a sports hall or arena. In this regard, the first step in designing a virtual model of basketball game is designing the hall or arena. The program offers the possibility of importing an arena ('Merge' button), as well as creating an arena taking into account all internal and external elements (Empty Environment; Object Creator). For the following scenario, it was enough to form the terrain (Object Creator Cube with Proportions and Thermal properties, for example).

For example, the security system of a public gathering in a closed space – the security system of a basketball game (in the sports facility itself) consists of three roles, from the lowest hierarchical level to the highest: a security officer who is in direct contact with the audience, the manager of an official in a certain sector in the area of public gathering who is not in direct contact with the audience, but has a visual overview of the area for which he is responsible (manager of the security officer) and the security manager in the control room (desk) who, in addition to the communication system, has a visual inspection using the video security system. The simulation must include certain equipment found in any hall that has a basketball court (for example, air conditioning and ventilation systems, heating, lighting). The implementation of CCTV is significant – in this simulation, two fixed cameras in the hall and one monitor in the control room are placed (2 Fixed CCTV and Monitor (Specific properties, High resolution, 1 Monitor, No detail monitor)).

In the design, we use virtual reality so that we create three avatars for all three roles of the security system – each of the roles has its own representative in the virtual model of the public gathering space. In order to implement a quick quality check of the security subsystem, we use the capabilities of already defined objects in the XVR library. In this regard, we model the audience with the object "Crowd of people". We model the complete audience with multiple crowds (different fan groups, for example).

In this proposed scenario, we define two adjacent crowds, each with its own security officer, who has his own avatar. The crowd object itself has a number of sets of attributes: specific crowd attributes, scale, location and space, the surface on which it is defined, moving the group from one location to another, the sound heard inside the crowd, etc. We define different states for the crowd: DEPARTURE, CROWD, INJURY.

The state of the crowd "DEPARTURE" has defined parameters (Specific properties, Crowd settings: Density (40 people in a space of 10×10 m), Default movement speed (7 km per hour); Sound (Crowd talking, volume middle)). "CROWD" condition with the following object properties: (Specific properties, Crowd settings: Density (200 people in a space of 10×10 m), Default movement speed (3.4 km per hour); Sound (Crowd talking, volume max, maximum distance – crowd area)) (Picture 1 with indicated persons – objects that will participate in the incident). The "INJURY" condition is part of the scenario that starts the accident – a condition that requires the intervention of the safety system. The "INJURY" state is the same as the "CROWD" state, but we change the Sound property (Causality - Female - Calling for help) to a female scream that is heard once and locate the sound in the corner of the crowd space. A security officer, i.e. an avatar of a security officer located in the crowd area (Specific properties, Default movement speed (7 km per hour); Animation (Standing)), comes to the location where the sound originates and when he approaches and enters the defined sound zone, 1) a woman kneeling next to a child (Specific properties, Default movement speed (7 km per hour); Animation (Kneeling both knees)) and 2) a child lying on the ground appear (Specific properties, Default movement speed (7 km per hour); Animation (Crying; Sitting on ground)). For that, we use the Triggers logical item of the XVR simulator.

This is a pre-defined scenario of changing the state of one and the other pile, defined by a special process description Event. However, it may happen that the avatar of the security officer in the neighboring area is closer to the scene, and he leaves his area and arrives at the scene of the incident before the security officer in the area hears that the incident took place (Picture 2).

Picture 1. The scene before the beginning of the incident
(Source: Authors) – XVR Simulation

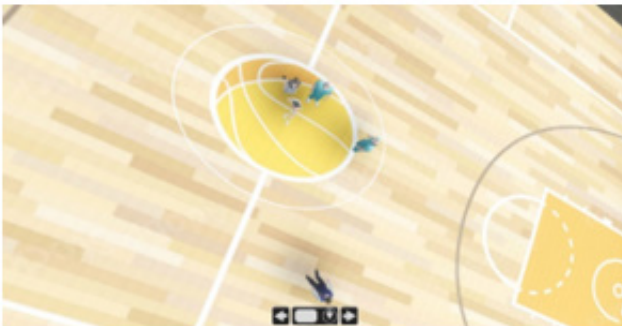


Picture 2. The scene from the point of view of security officers
(security manager, medical team, injured child next to the mother) (Source: Authors) – XVR Simulation



Just a few moments after the security officer has left his area, another incident occurs in his area. On the other hand, the manager of the security officers through his avatar, through the design option XVR Tasks, can have the possibility to have available the programmed roles of security officers instead of real security officers and their avatars. In that case, he is the one who determines which of the programmed security officers will be assigned the task of arriving at the scene of the incident. Finally, in the command room (**Picture 3** and **Picture 4**), they can decide whether a virtual medical team or a real medical team via an avatar should come to the scene of the incident.

Picture 3. The scene from the control room through a camera on the ceiling (Source: Authors) – XVR Simulation



Picture 4. A scene from the control room through the camera on the wall (Source: Authors) – XVR Simulation



The virtual simulation model enables measurable interoperability between security roles, as participants must exchange information, coordinate decisions, and follow reporting protocols to resolve the incident. Evaluation of the training scenario captures observable outcomes such as decision-making sequence, proving that the model improves inter-role coordination in a controlled environment.

6. Discussion

The conducted simulation demonstrated how virtual modeling can be used to design and evaluate a security subsystem for a mass event. The primary goal was to test the efficiency of decision-making and coordination between security roles during an unexpected incident within a crowded indoor space. By observing the same scenario from three different roles, each with a different level of proximity to the audience, the simulation enables analysis of situational awareness, communication flow, and command hierarchy dynamics.

Decentralized communication between on-site security personnel enabled faster information flow and quicker initial response, whereas a strictly centralized command approach introduced delays because decisions had to wait for confirmation from the command post. These findings suggest that a hybrid command hierarchy – centralized supervision combined with decentralized operational decision-making – ensures greater efficiency during time-critical situations.

The simulation model also proved valuable as a training tool for police officers, private security personnel, and event organizers. By replicating realistic scenarios such as medical emergencies or disturbances in the crowd, trainees could test strategies in a safe and controlled environment, improve their situational assessment skills, and develop more effective communication and coordination patterns. Insights generated from the simulation can directly contribute to improving standard operating procedures by identifying critical points and potential risks, optimizing resource deployment – including personnel allocation, access controls, and first-aid station placement – and providing a foundation for developing and testing crisis communication protocols.

7. Concluding remarks

In addition to highlighting the potential for designing security subsystems, this paper contributes by integrating two distinct yet complementary disciplines – security studies and information and communication technologies, specifically programming and simulation modeling. Simulation-based solutions enable the operationalization of theoretical security concepts, transforming them into functional tools for training, analysis, and decision-making in real-world scenarios. From an analytical perspective, the study demonstrates that simulation modeling can serve as a critical interface between conceptual understanding and operational readiness in the security sector. By enabling the visualization and testing of different response strategies within controlled conditions, the model provides measurable insights into the effectiveness of specific interventions and coordination mechanisms. By visualizing different response strategies under controlled conditions, the model helps identify which interventions most effectively reduce bottlenecks and response delays, and how human factors – such as decision-making under pressure – shape overall system performance. However, its broader applicability also depends on continuous refinement through empirical validation and adaptation to different operational contexts.

Future research could explore the application of this simulation model in different sports or other high-risk public events (such as concerts or festivals), as well as in broader crisis management contexts, to further validate and expand its practical utility. Additional development may include integrating sensor inputs or real-time data streams to enable dynamic adjustment of security responses while the event is in progress. Incorporating more complex behavioral patterns or environmental variables would further strengthen the model's scientific foundation and support the development of more adaptive and responsive security management systems.

8. References

1. Barta, J., Michaela, V., & Jiri, J. U. (2016). Evaluation of Simulation Programs Applicable to the Support of Decision-Making Processes in Crisis Management of Critical Infrastructure. *International Journal of Education and Learning Systems*, 1, 74–80.
2. BBC. (2022, January 25). *Hillsborough disaster: 97th victim to be added to memorial*. BBC. Retrieved from <https://www.bbc.com/news/uk-england-merseyside-60127696>.
3. Boyle, M., & Jean-Claude, V. (2021). *A brief introduction to policing public gatherings: A guide for practitioners*. Council of Europe.
4. Carrozzino, M., Franco, T., Sandro, B., Carlo, C., & Massimo, B. (2005). Lowering the development time of multimodal interactive applications: the real-life experience of the XVR project. In *Proceedings of the 2005 ACM SIGCHI International Conference on Advances in Computer Entertainment Technology* (pp. 270–273). New York: Association for Computing Machinery.
5. Ceccato, V., & Andrew, N. (Eds.). (2015). *Safety and security in transit environments: An interdisciplinary approach*. Springer.
6. Cvetković, V. (2015). Integrisano upravljanje u prirodnim katastrofama. U S. Mijalković (Ur.), *Suprotstavljanje savremenom organizovanom kriminalu i terorizmu* (str. 291–322). Beograd: Kriminalističko-policijska akademija.
7. Dada, K. S. J., Mohammed, H. A., & Quadir, R. O. (2025). Disaster Risk Management in Academic Institutions: An Assessment of Preparedness and Recovery at Kashim Ibrahim Library, Nigeria. *International Journal of Contemporary Security Studies*, 1(1), 1–16.
8. Event Insurance Services. (n.d.). *Your Guide to Ensuring Crowd Safety*. Event Insurance Services. Retrieved from <https://www.events-insurance.co.uk/event-insurance-policies/sporting-insurance/sporting-insights/your-guide-to-ensuring-crowd-safety>.
9. Lamb, K., Martijn, B., & Jim, D. (2015). Introspect Model: Competency Assessment in the Virtual World. In L. Palen, M. Büscher, T. Comes, and A. Hughes (Eds.), *12th Proceedings of the International Conference on Information Systems for Crisis Response and Management, Krystiansand, Norway, May 24–27, 2015 – ISCRAM2015 Conference Proceedings* (pp. 235–243). ISCRAM Association.
10. Leveson, N. G. (2012). *Engineering a Safer World*. MIT Press.
11. Mandić, G. J., & Stanojević, P. (2020). *Korporativna bezbednost*. Fakultet bezbednosti, Univerzitet u Beogradu.
12. Marković, J. (2021). Video-nadzor u funkciji prevencije kriminala u otvorenim javnim gradskim prostorima. *Godišnjak Fakulteta bezbednosti*, 1, 31–49.
13. Marković, J. (2022). Javna okupljanja u urbanom prostoru – zaštita i bezbednost muzičkih manifestacija. U S. Stanarević i A. Đukić (Ur.), *Urbana bezbednost i urbani razvoj: Zbornik radova* (str. 33–41). Beograd: Fakultet bezbednosti, Univerzitet u Beogradu.
14. Metić, A. (2025). The Significance and Role of Police Officers in Building the School as a Safe Environment for All Students. *International Journal of Contemporary Security Studies*, 1(1), 17–24.
15. Milenković, D. (2025). Theoretical, Institutional and Organizational Aspects of the Integrated Disaster Risk Reduction System: Towards a Deeper Understanding of Disaster Resilience in Serbia. *International Journal of Contemporary Security Studies*, 1(1), 175–190.
16. Misić, Z. M. (2016). *Bezbednosni menadžment javnih okupljanja*. Doktorska disertacija. Beograd: Fakultet bezbednosti, Univerzitet u Beogradu.
17. News Desk. (2022, October 22). *The Worst Tragedies in Sporting History*. Editorji. Retrieved from <https://www.editorji.com/sports-news/others-sports/the-worst-tragedies-in-sporting-history-1664728394760>.
18. Omar. (2022, March 24). *Football Vs. Basketball: Everything You Need To Know*. Racket Rampage. Retrieved from <https://racketrampage.com/football-vs-basketball/>.

19. S.R. (2022, February 10). *Dan kada je Jugoslavija plakala: Četrdeset godina od smrti Željke (14) na koncertu Riblje Čorbe 'Otišla je srećna...'*. Blic. <https://www.blic.rs/slobodno-vreme/dan-kada-je-jugoslavija-plakala-cetrdeset-godina-od-smrti-zeljke-14-na-koncertu/qnefy95>.
20. UN General Assembly. (1966). *International Covenant on Civil and Political Rights*. United Nations.
21. UN-Habitat. (2018). *SDG Indicator 11.7.1 Training Module: Public Space*. Nairobi: United Nations Human Settlement Programme (UN-Habitat).
22. Young, W., & Leveson, G. N. (2013). Systems thinking for safety and security. In C. Schuba (Ed.), *Proceedings of the 29th Annual Computer Security Applications Conference (ACSAC'13)* (pp. 1-8). New York: ACM, Inc.
23. Young, W., & Leveson, G. N. (2014). An integrated approach to safety and security based on systems theory. *Communications of the ACM*, 57(2), 31–35.





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Research article

UN Peacekeeping: Challenges and Reforms for Civilian Protection and Human Rights

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ABSTRACT

This research explores the changing role of United Nations peacekeeping missions, focusing on their transition from conventional military duties to an emphasis on protecting civilians and promoting human rights. Employing a qualitative comparative case study method, it investigates three missions—Rwanda (UNAMIR), Bosnia (UNPROFOR), and the Democratic Republic of the Congo (MONUC/MONUSCO)—through four specific criteria: outcomes related to civilian protection, accountability systems, resource distribution, and engagement with local communities. The results reveal significant progress in protection strategies and an increasing focus on human rights obligations, though significant deficiencies remain. Weak accountability structures, inconsistent enforcement of conduct standards, and ongoing resource deficits continue to weaken mission credibility and trust from local populations. The analysis posits that effective reform necessitates clearer, context-specific objectives; enhanced independent accountability systems; a more equitable distribution of resources that aids both security and recovery efforts; and compulsory, context-aware training in human rights and trauma-informed practices for peacekeepers. By integrating theoretical insights with cross-case empirical evaluation, this study offers practical recommendations for policymakers looking to enhance civilian protection in modern peacekeeping missions.

KEYWORDS

UN peacekeeping; civilian protection; human rights in conflict zones; UN peacekeeping missions; human rights violations in post-conflict areas.

1. Introduction

Established in 1948, the United Nations (UN) has been instrumental in promoting worldwide peace and security, starting with its inaugural peacekeeping operation—the United Nations Truce Supervision Organization (UNTSO) in Palestine—tasked with overseeing ceasefire agreements between Israel and its neighboring countries. Initially, the focus of UN peacekeeping was on traditional military roles such as monitoring ceasefires and maintaining buffer zones. However, it has gradually transformed into a complex and multifaceted operation that includes civilian protection, human rights advocacy, disarmament efforts, electoral assistance, and post-conflict reconstruction.



In spite of this broadening of scope and objectives, UN peacekeeping missions continue to encounter significant challenges. These issues include insufficient training, logistical and financial limitations, inconsistent mission mandates, and recurring incidents of misconduct among personnel (Di Razza, 2020). The rise of non-state armed groups has further muddled the distinctions between peacekeeping, counterinsurgency, and humanitarian intervention, complicating mission goals and weakening operational cohesion.

The effects of these difficulties have been especially clear in Rwanda, Bosnia, and the Democratic Republic of the Congo (DRC). To tackle these issues, this research performs a comparative case study of United Nations missions within these three settings, utilizing secondary qualitative data. This study provides a critical assessment of the development and effectiveness of UN peacekeeping through a comparative analysis of these three missions. The cases were chosen for their historical importance, geographical variety, and the availability of comprehensive documentation regarding peacekeeping interventions.

While previous research has generally explored the development of peacekeeping, limited comparisons have been made regarding how accountability, resource distribution, and local involvement work together to influence the results of missions. It also integrates psychological insights from peace psychology to comprehend the repercussions of trauma on both peacekeepers and civilians, illustrating the importance of human dignity and resilience in post-conflict environments.

The research is driven by the following inquiries:

1. What elements affect the success or failure of UN peacekeeping missions in safeguarding civilians and advancing human rights?
2. How have the operations in Rwanda, Bosnia, and the DRC fared regarding accountability, resource distribution, and community involvement?
3. What changes are needed to improve the effectiveness and trustworthiness of UN peacekeeping in today's conflict settings?

To address these inquiries, the research utilizes a qualitative comparative case-study methodology, relying on secondary data from UN documents, NGO reports, and scholarly literature. By merging insights from liberal peace theory and realist viewpoints, the study links theoretical concepts with empirical findings to enhance understanding of how fundamental political and institutional factors affect peacekeeping outcomes. Finally, this research aims to contribute to scholarly and policy conversations on restructuring UN peacekeeping to better protect civilians and promote human rights in complex modern conflicts.

2. Literature Review

Since its first mission launched in 1948—the United Nations Truce Supervision Organization (UNTSO)—the UN has evolved peacekeeping from a narrowly military function into a comprehensive tool for global governance. Initial missions focused on maintaining neutrality, limiting involvement, and monitoring cease-fires. As conflicts increasingly occurred within states and grew more complex, peacekeeping roles expanded to encompass civilian protection, disarmament, human rights promotion, electoral assistance, and post-conflict rehabilitation.

This transformation is consistent with the principles of Liberal Peace Theory, which associate lasting peace with processes such as democratization, respect for human rights, and the establishment of institutions. However, putting these principles into action has been challenging. Even with over 120,000 personnel deployed annually across 13 missions, UN operations frequently encounter structural issues such as poor coordination, insufficient resources, and inadequate training (Carnegie & Christoph Mikulaschek, 2022). These obstacles highlight the ongoing conflict between the broadening mandates of peacekeeping and its constrained operational capacity—a persistent challenge in modern missions.

2.1. Human Rights and Civilian Protection

The increasing focus on human rights signifies a significant change in international peacekeeping standards. Missions are progressively prioritizing the Protection of Civilians (POC) and Human Rights Promotion (HRP) as crucial components of stabilizing post-conflict environments. However, as noted by Syali (2024) and Sprik et al. (2022), a persistent gap remains between policy and implementation. Human rights and security sector reforms are often pursued separately, which weakens the long-term effectiveness of peacebuilding efforts.

A grave issue remains the ongoing failure to effectively tackle sexual exploitation and abuse (SEA) by peacekeepers. (Guerrero & Sybil Delaine Rhodes., 2022). Despite the UN's zero-tolerance approach, inadequate jurisdictional mechanisms and the hesitance of troop-contributing countries (TCCs) to prosecute offenders compromise accountability. This disparity between established ideals and enforcement has diminished local trust and tarnished the UN's reputation as a champion of human rights.

2.2. Accountability and Structural Limitations

Accountability remains a fundamental weakness within the structure of UN peacekeeping. Recent data record a 37% decrease in civilian peacekeeping personnel since 2010, which hinders the UN's capability to monitor misconduct and connect with communities. Insufficient oversight and political conflicts between donor nations and TCCs have further entrenched these issues. Predominantly, donor states from the Global North control financial and strategic decisions, while the majority of personnel contributions come from the Global South.

This disparity perpetuates what Duursma (2023) and Sprik et al. (2022) refer to as neo-imperial dynamics, whereby the priorities of powerful nations overshadow local requirements. Such critiques echo a Realist perspective of peacekeeping, interpreting interventions as products influenced by the strategic interests of dominant countries rather than impartial humanitarian objectives. Consequently, missions frequently operate under politically constrained mandates that impede genuine accountability, even in instances of widely recognized misconduct.

2.3. Geopolitical Power and the Global North–South Divide

Global power disparities significantly shape United Nations peacekeeping, despite its frequent portrayal as a neutral and humanitarian initiative. Financial and strategic control tends to be concentrated in a limited number of Western donor nations, whereas countries in the Global South supply most of the peacekeeping personnel. This disparity creates a structural dependency that diminishes the perception of neutrality among host communities (Fleck, 2023). The preeminence of powerful countries enables them to tailor mission mandates to align with their foreign policy objectives rather than addressing the actual needs of local populations. As a result, peacekeeping missions are often seen not as means of collective international support but as extensions of foreign political influence. This situation illustrates the ongoing imbalance between the Global North and South, which continues to influence peacekeeping priorities, resource distribution, and legitimacy within the UN framework.

2.4. Psychological Dimensions

Beyond structural concerns, the psychological and social aspects of peacekeeping are often overlooked. Bellamy (2004) and Berdal (2017) point out that the trauma experienced by both civilians and peacekeepers can influence the outcomes of missions. Distrust, displacement, and collective trauma can hinder reconciliation and the resilience of communities. Peacekeepers, as visible embodiments of international legitimacy, need not only technical skills but also cultural sensitivity, emotional intelligence, and trauma-informed approaches. Incorporating psychological perspectives into training and mission planning can improve trust-building and facilitate long-term recovery.

2.5. Lessons from Key Case Studies

Current studies on Rwanda, Bosnia, and the Democratic Republic of the Congo (DRC) typically analyze these missions in isolation, resulting in fragmented insights. The UNAMIR mission in Rwanda highlights the risks associated with political indecision and inadequately funded mandates. The experience in Bosnia illustrates the necessity for coordinated civilian–military collaboration in post-conflict reconstruction, while the DRC case underscores persistent challenges related to legitimacy, resource limitations, and misconduct by peacekeepers.

The existing literature often focuses on operational shortcomings rather than providing a comparative structural and theoretical assessment (Fleck, 2023). A thorough cross-case analysis using consistent evaluation criteria could uncover more profound trends in accountability, local involvement, and the implementation of mandates. Addressing these aspects is crucial for understanding how peacekeeping can more effectively uphold human rights and safeguard civilians in complex conflict situations.

3. Research Methodology

This research utilizes a qualitative comparative case study approach to analyze the impact of United Nations (UN) peacekeeping operations on the protection of civilians and human rights. The comparative methodology facilitates a detailed exploration of both similarities and differences across three significant missions: Rwanda (UNAMIR, 1994), Bosnia (UNPROFOR, 1992–1995), and the Democratic Republic of the Congo (MONUC/MONUSCO, ongoing). These particular cases were intentionally chosen due to their historical importance, regional variation, and availability of data, along with their relevance in discussions on peacekeeping reform and the protection of human rights.

Case Selection and Rationale

The selected cases illustrate different phases in the development of peacekeeping and highlight recurring structural issues.

- Rwanda (1994): Illustrates the outcomes stemming from constrained mandates and political hesitation in stopping mass violence.
- Bosnia (1992–1995): Shows both successes and shortcomings in the protection of civilians amid intricate political dynamics.
- DRC (2000–present): Demonstrates the ongoing issues of accountability, misconduct, and sustainability in prolonged missions.

Collectively, these cases offer a varied yet cohesive framework for evaluating peacekeeping results across different geopolitical and institutional environments.

Data Collection

This study is based solely on secondary qualitative information, sourced from:

1. Official UN materials—including mission reports, Security Council resolutions, and mandates from the Department of Peace Operations.
2. Human rights organizations—such as reports from Human Rights Watch, Amnesty International, and the Office of the High Commissioner for Human Rights (OHCHR).
3. Academic literature—comprising peer-reviewed articles, books, and policy assessments regarding UN peacekeeping and human rights.
4. Statistical information—publicly accessible data on mission size, funding, and troop contributions (e.g., Statista, World Bank). The combination of multiple data sources guarantees a thorough and evidence-based analysis of the effectiveness of peacekeeping operations.

Analytical Framework

The analysis utilizes thematic analysis, informed by both deductive and inductive reasoning:

- Deductive reasoning employs established theoretical frameworks—Liberal Peace Theory and Realism—to investigate how peacekeeping mandates, power dynamics, and accountability mechanisms influence mission outcomes.
- Inductive reasoning seeks to identify themes that emerge from the data, particularly regarding local perceptions, community involvement, and the credibility of missions. Themes were manually classified using the four comparison criteria, and recurrent patterns were evaluated via the theoretical lenses of liberal peace and realist viewpoints.

Four central comparative criteria inform the analysis:

- 1. Outcomes related to civilian protection and human rights**
- 2. Mechanisms for accountability**
- 3. Allocation of resources and operational directives**
- 4. Engagement of local communities and trust-building efforts**

These dimensions facilitate a systematic comparison across the three missions, connecting theoretical expectations to observed results.

Triangulation and Validity

To bolster credibility, methodological triangulation is implemented. Findings from UN documents are corroborated with independent reports from academic sources and NGOs. Any contradictory evidence is acknowledged and contextualized instead of disregarded, promoting analytical transparency and reducing bias.

Ethical Considerations

As the study relies solely on secondary sources, there is no direct interaction with human subjects. Nevertheless, all discussions concerning atrocities and human rights violations are approached with care and accuracy. All data are appropriately cited following APA guidelines.

Limitations

The main limitation stems from the dependence on secondary data, which may lack the firsthand insights of peacekeepers or affected civilians. Moreover, the emphasis on three specific cases limits generalizability but enables a thorough contextual comparison. Future research could expand on this framework through field studies, interviews, or mixed-methods approaches to capture lived experiences and psychological aspects of peacekeeping.

4. Findings and Discussion

The research uses Liberal Peace Theory and Realism consistently throughout the three scenarios to analyze how normative aspirations interact with political limits.

This research explores the changing effectiveness of United Nations (UN) peacekeeping missions in safeguarding civilians and advancing human rights through three critical cases: Rwanda, Bosnia, and the Democratic Republic of the Congo (DRC). Each case represents unique political, social, and operational environments, yet they collectively underscore the ongoing challenges and gradual advancements in peacekeeping practices. The results are structured around four main themes that surfaced from the comparative analysis: civilian protection, accountability, resource allocation, and local involvement. These themes are examined through the frameworks of liberal peace theory and realism, which together provide insight into the interplay between humanitarian principles and political limitations within UN interventions.

The safeguarding of civilians serves as the primary measure of UN peacekeeping success. The genocide in Rwanda in 1994 serves as a stark reminder of the devastating outcomes caused by insufficient mandates and de-

layed reactions. The United Nations Assistance Mission for Rwanda (UNAMIR) was hindered by a weak mandate under Chapter VI of the UN Charter, inadequate troop numbers, and political reluctance among member states. From a realist standpoint, this failure illustrated the reluctance of powerful nations to allocate resources without strategic interests at play.

The mission's failure to take decisive action exposed the constraints of peacekeeping when limited by political prudence and procedural inflexibility.

Conversely, the UN's involvement in Bosnia in the early 1990s showcased progressive changes but still revealed notable shortcomings. The United Nations Protection Force (UNPROFOR) was able to create "safe areas" and deliver humanitarian aid, yet these efforts fell short when faced with aggression, culminating in the Srebrenica massacre in 1995. The Bosnia instance exemplifies the mismatch between Liberal Peace Theory's normative goals—securing peace via institutional development and human rights—and the practical obstacles of enforcing them in ethnically split wars. While the mission facilitated humanitarian access and post-war governance under the Dayton Accords, it also revealed the ethical and operational inconsistencies of UN peacekeeping amid active conflict.

The DRC provides a more recent example of both progress and enduring challenges. MONUSCO, recognized as one of the largest and most intricate operations of the UN, has decreased violence in certain regions but still encounters difficulties related to security and coordination. It has made significant strides in decreasing armed violence in certain areas and aiding electoral processes. However, ongoing insecurity, resource limitations, and fragmented political authority continue to obstruct its comprehensive effectiveness. The introduction of the Force Intervention Brigade (FIB) in 2013 marked a transition to a more robust Chapter VII mandate, indicating a gradual evolution of peacekeeping to address contemporary hybrid warfare. Nonetheless, inconsistent execution and poor coordination with local institutions remain significant barriers to lasting civilian protection.

Throughout all three cases, accountability proves to be a crucial challenge. In Rwanda and Bosnia, the lack of immediate accountability for perpetrators of atrocities and peacekeeper misconduct weakened public confidence in international bodies. The subsequent establishment of the International Criminal Tribunal for Rwanda (ICTR) and the International Criminal Tribunal for the Former Yugoslavia (ICTY) marked important milestones towards post-conflict justice and institutional reform. These tribunals embodied the ideals of liberal peace theory, focusing on the rule of law and human rights, though they often faced criticism for being disconnected from local contexts and slow in achieving justice.

In the DRC, ongoing accusations of sexual exploitation and abuse by peacekeepers have compromised the UN's moral authority. Despite the implementation of "zero tolerance" policies and reforms within the Department of Peace Operations, enforcement remains uneven. The absence of transparent oversight mechanisms and unclear jurisdictional boundaries between the UN and troop-contributing nations continues to weaken accountability. This trend reflects a realist dynamic in which state sovereignty and political convenience overshadow moral obligations to uphold global governance standards (Wani, 2021).

Resource distribution significantly influences the effectiveness of peacekeeping operations. Instances in Rwanda and Bosnia revealed that insufficient financial and logistical support hindered prompt actions, showcasing the structural reliance of peacekeeping on contributions from member states. These cases illustrated that inadequately funded missions struggle to provide protection even when there is political will on paper. Conversely, the mission in the DRC benefits from a more substantial and consistent budget; however, issues in coordination and allocation continue to exist. Financial resources are frequently directed towards military stabilization rather than long-term community recovery, highlighting a disparity between immediate security objectives and broader human development goals associated with peacebuilding.

This disconnect highlights the tension between liberal ideals and the practical constraints emphasized by realism.

Community involvement is a crucial factor in determining the success of missions. In Rwanda, community-oriented initiatives such as the Gacaca courts exemplified an approach to justice and reconciliation rooted in local engagement. Despite facing criticism for procedural inadequacies, these initiatives fostered community participation and played a role in rebuilding trust following extensive violence. In Bosnia, the push for interethnic dialogue and institutional reform was primarily led by international entities, resulting in minimal

local ownership and persistent ethnic rifts. In the DRC, a lack of community consultation and inconsistent interactions with local civil society have fueled public skepticism about MONUSCO's role. The absence of genuine inclusion undermines the perceived legitimacy of peacekeeping initiatives and hampers the sustainability of peace.

From a theoretical standpoint, Liberal Peace Theory supports inclusive governance and participatory rebuilding, while Realism warns that the success of peacekeeping efforts often hinges on achieving stability prior to implementing liberal reforms. Evidence from these comparisons indicates that missions that incorporate local knowledge and promote empowerment—such as Rwanda's hybrid justice model—yield more lasting outcomes compared to those predominantly driven by external agendas.

The comparative analysis indicates that although UN peacekeeping has increasingly focused on the protection of civilians and human rights, its efficacy varies widely. The experiences from Rwanda, Bosnia, and the DRC highlight several essential areas for reform:

Strengthening Directives and Quick Action: Missions need well-defined, adaptable directives that are bolstered by prompt political and logistical support.

Improving Accountability: Creating independent oversight mechanisms and enhancing coordination with contributing nations are crucial for maintaining credibility.

Optimizing Resource Allocation: Financial resources should be distributed in a way that equally supports security efforts and fosters community recovery and institution-building.

Fostering Local Collaborations: Peacekeeping efforts should incorporate local leadership, civil society, and traditional approaches to establish trust and guarantee sustainability.

Including Psychological Support: Tackling trauma among peacekeepers and impacted communities can strengthen resilience and foster long-lasting stability.

This comparative perspective reveals that the interplay between normative ideals and political dynamics influences the UN's peacekeeping effectiveness. To achieve effective civilian protection and lasting peace, there need to be not only robust institutional structures but also authentic engagement with the communities that peacekeepers are meant to assist. The lessons learned from Rwanda, Bosnia, and the DRC demonstrate both the possibilities and ongoing challenges of modern peacekeeping amidst a more intricate global security landscape.

5. Recommendations

To improve the efficacy of UN peacekeeping operations in safeguarding civilians and promoting human rights, several interconnected reforms are essential. These suggestions tackle strategic, operational, and structural shortcomings highlighted in earlier missions, emphasizing clearer objectives, sufficient resources, accountability, and community involvement.

- **Specific and Contextual Mandates**

Peacekeeping missions ought to operate under clear, context-specific mandates that prioritize civilian protection and human rights. Vague or politically constrained mandates—such as those observed in Rwanda and the DRC—hinder peacekeepers' capacity to respond promptly to threats. Thus, each mission should incorporate measurable objectives and adaptable strategies aligned with ongoing conflict evaluations.

- **Sufficient Resources and Logistical Support**

Missions must receive ongoing financial and logistical support that goes beyond troop mobilization. Investments in medical assistance, communication technologies, and transportation infrastructure are crucial. The success of well-funded missions, as demonstrated in various post-conflict situations, highlights how sufficient backing can help stabilize vulnerable environments.

- **Training in Cultural Sensitivity and Human Rights**

Peacekeepers should undergo specialized training in cultural, linguistic, and gender-sensitive issues tailored for each mission's context. This preparation builds trust, minimizes misunderstandings, and enhances collabora-

oration with local populations. Incorporating peace psychology and trauma-informed strategies can bolster mission resilience and improve peacekeepers' interactions with affected communities.

- **Strong Accountability and Transparency**

The legitimacy of UN peacekeeping relies on the enforcement of strict accountability measures for misconduct. Independent oversight bodies must be empowered to investigate violations, ensuring transparency and justice for victims. Enhancing ethical oversight will restore trust among host communities and reinforce the UN's dedication to human rights.

- **Engagement with the Community and Local Collaboration**

Authentic interaction with local communities and leaders is vital for sustainable peace. The Gacaca courts in Rwanda illustrate how community-driven justice can promote reconciliation and bolster legitimacy. Peacekeepers should incorporate local perspectives into decision-making processes to enhance mission adaptability and long-term effectiveness.

- **Flexible and Data-Driven Operations**

Peacekeeping needs to adapt to the ever-changing landscape of modern conflicts. Utilizing real-time data analysis, local intelligence, and digital tools can help in anticipating emerging threats. Collaborations with civil society organizations and regional entities can offer crucial insights, enabling missions to remain agile and responsive.

- **Long-Term Political and Financial Support**

Enduring global backing is crucial for sustaining peace once immediate violence diminishes. Stable funding and political support from the UN Security Council and donor nations ensure that missions remain effective through post-conflict reconstruction and state-building efforts.

- **Addressing Psychological and Social Effects**

Both peacekeepers and local communities experience significant psychological challenges in conflict areas. Implementing systematic mental health initiatives and trauma-informed care can improve operational effectiveness, prevent burnout, and aid in societal healing. Acknowledging and addressing these human factors is essential for achieving lasting peace. Acknowledging these human factors is essential for sustainable peace and institutional credibility.

6. Conclusion

This research highlights the critical role of UN peacekeeping in fostering peace, protecting civilians, and promoting human rights in complicated conflict situations. Through a comparative examination of Rwanda, Bosnia, and the Democratic Republic of the Congo, the study identifies ongoing deficiencies in accountability, resource allocation, and community involvement as significant barriers to mission success. While advancements have been made, contemporary peacekeeping necessitates a renewed dedication to clarity, flexibility, and inclusivity. Missions must be anchored in clearly defined objectives, backed by adequate resources, and informed by the cultural and psychological realities of the host societies. The incorporation of technological advancements, local partnerships, and trauma-sensitive practices can further enhance peacekeeping results.

Ultimately, the future of peacekeeping hinges on cooperation among states, international organizations, and local stakeholders. By merging ethical rigor with operational innovation, the United Nations can reestablish its legitimacy and effectiveness in upholding human dignity and fostering sustainable peace in a continually changing global environment.

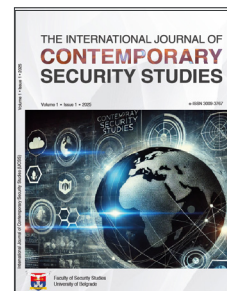
7. References

1. Akilimali, A., et al. (2022). Self-medication and anti-malarial drug resistance in the Democratic Republic of the Congo (DRC): A silent threat. *Tropical Medicine & Health*, 50(1), 73.
2. Attinà, F. (2010). Global power competition and the rise of minilateralism in peace operations. *Multilateral Security & ESDP Operations*, 19, 19.
3. Ayetor, G. K., Mbonigaba, I., Ampofo, J., & Sunnu, A. (2021). Investigating the state of road vehicle emissions in Africa: A case study of Ghana and Rwanda. *Transportation Research Interdisciplinary Perspectives*, 11, 100409.
4. Bellamy, A. J., & Williams, P. D. (2005). Who is keeping the peace? Regionalization and contemporary peace operations. *International Security*, 30(4), 157–188.
5. Beloff, J. R. (2024). *What is missing in peacekeeping? The role of strategy*.
6. Berdal, M. (2023). *Whither UN peacekeeping?* London: Routledge.
7. Besiou, M., Pedraza-Martínez, A. J., & Van Wassenhove, L. N. (2021). Humanitarian operations and the UN Sustainable Development Goals. *Production & Operations Management*, 30(12), 4343–4355.
8. Blocq, D. S. (2006). The fog of UN peacekeeping: Ethical issues regarding the use of force to protect civilians in UN operations. *Journal of Military Ethics*, 5(3), 201–215.
9. Bonner, A. (2024). Appendix A: Key dates in the history of the United Nations. In *Social determinants of health in Europe: Direct and indirect consequences of war* (pp. 332–333). Bristol University Press.
10. Bratt, D. (1996). Assessing the success of UN peacekeeping operations. *International Peacekeeping*, 3(4), 64–81.
11. Call, C. T., & Stanley, W. (2002). Civilian security. In *Ending civil wars: The implementation of peace agreements* (pp. 303–326).
12. Carnegie, A., & Mikulaschek, C. (2022). The promise of peacekeeping: Protecting civilians in civil wars. *International Organization*, 76(4), 810–842.
13. Clarence, W. (1995). The human rights field operation in Rwanda: Protective practice evolves on the ground. *International Peacekeeping*, 2(3), 291–306.
14. da Costa, H. B. M., & Duarte, R. de S. (2024). Global South versus geopolitical South: A debate on the analytical relevance of the concepts.
15. Daboh, F., Fatoma, S., & Kuch, M. (2010). Disarmament, demobilization, rehabilitation and reintegration (DDRR): A case study of Liberia, Sierra Leone, and South Sudan. *New York Science Journal*, 3(6), 6–19.
16. Debarre, A. (2022). *Safeguarding medical care and humanitarian action in the UN counterterrorism framework*. International Peace Institute.
17. Dellmuth, L. M., et al. (2021). Humanitarian need drives multilateral disaster aid. *Proceedings of the National Academy of Sciences*, 118(4), e2018293118.
18. Di Razza, N. (2020). *The accountability system for the protection of civilians in UN peacekeeping*. International Peace Institute.
19. Dodd, W., et al. (2021). Humanitarian food security interventions during the COVID-19 pandemic in low- and middle-income countries: A review of actions among non-state actors. *Nutrients*, 13(7), 2333.
20. Dorussen, H., Böhmelt, T., & Clayton, G. (2022). Sequencing United Nations peacemaking: Political initiatives and peacekeeping operations. *Conflict Management & Peace Science*, 39(1), 24–48.
21. Durant, E. (2014). UN peacekeeping impacts on human rights.
22. Durch, W. J. (2006). *Twenty-first-century peace operations*. U.S. Institute of Peace Press.
23. Duursma, A. (2021). Pinioning the peacekeepers: Sovereignty, host-state resistance against peacekeeping missions, and violence against civilians. *International Studies Review*, 23(3), 670–695.
24. Echavarría, J., & Cremin, H. (2024). Education for territorial peace in Colombia: What role for transnational peace? In *Transnational perspectives in peace education* (pp. 70–92). Routledge.
25. Estoque, R. C., et al. (2021). Monitoring global land-use efficiency in the context of the UN 2030 Agenda for Sustainable Development. *Habitat International*, 115, 102403.

26. Fleck, A. (2023). The largest UN peacekeeping operations in 2023. *Statista*. <https://www.statista.com>
27. Giray, B. (2024). Do UN missions have an expiration date? Ideational commitment to UN peacekeeping and the length of missions. *International Peacekeeping*, 31(1), 1–28.
28. Haass, F., & Ansorg, N. (2018). Better peacekeepers, better protection? Troop quality of United Nations peace operations and violence against civilians. *Journal of Peace Research*, 55(6), 742–758.
29. Hegre, H., Hultman, L., & Nygård, H. M. (2019). Evaluating the conflict-reducing effect of UN peacekeeping operations. *Journal of Politics*, 81(1), 215–232.
30. Hoare, M. A. (2014). Towards an explanation for the Bosnian genocide of 1992–1995. *Studies in Ethnicity & Nationalism*, 14(3), 429–442.
31. Horne, C., & Barney, M. (2019). The impact of UN peacekeeping operations on human trafficking. *International Migration*, 57(3), 3–19.
32. Hultman, L., Kathman, J., & Shannon, M. (2013). United Nations peacekeeping and civilian protection in civil war. *American Journal of Political Science*, 57(4), 875–891.
33. Hunt, C. T. (2019). Analyzing the co-evolution of the Responsibility to Protect and the Protection of Civilians in UN peace operations. *International Peacekeeping*, 26(5), 630–653.
34. Julian, R. (2020). The transformative impact of unarmed civilian peacekeeping. *Global Society*, 34(1), 99–115.
35. Kumar, A. (n.d.). *United Nations peacekeeping missions: Transition, challenges and reform*.
36. Larmer, M., Laudati, A., & Clark, J. F. (2013). Neither war nor peace in the Democratic Republic of Congo (DRC): Profiting and coping amid violence and disorder. *Review of African Political Economy*, 40(135), 1–12.
37. Levin, A. S. (2025). Teaching the United Nations. In *Teaching international organizations* (pp. 41–57). Edward Elgar Publishing.
38. Lewis, F. (2014). Human rights abuses in UN peacekeeping: Providing redress and punishment while continuing peacekeeping missions for humanitarian progress. *Southern California Interdisciplinary Law Journal*, 23, 595–622.
39. Lipson, M. (2007). A ‘garbage can model’ of UN peacekeeping. *Global Governance*, 13(1), 79–96.
40. Malone, D. M., & Thakur, R. (2001). UN peacekeeping: Lessons learned. *Global Governance*, 7(1), 11–12.
41. Månsson, K. (2005). The forgotten agenda: Human rights protection and promotion in Cold War peacekeeping. *Journal of Conflict & Security Law*, 10(3), 379–398.
42. Mbala-Kingebeni, P., et al. (2024). The time is now (again) for Mpox containment and elimination in Democratic Republic of the Congo. *PLOS Global Public Health*, 4(6), e0003171.
43. Mfizi, E., et al. (2023). Analysis of pharmaceutical inventory management based on ABC-VEN analysis in Rwanda: A case study of Nyamagabe District. *Journal of Pharmaceutical Policy & Practice*, 16(1), 30.
44. Quinn, M. (2022). Book review—Rebuilding the education sector in East Timor during UNTAET: International collaboration and Timorese agency. *International Education Journal: Comparative Perspectives*, 21(2), 142–145.
45. Rhoads, E. P. (2024). The future of protection in UN peace operations. *Ethics & International Affairs*, 38(4), 418–432.
46. Roy, R. (2024). Humanitarian organisations as gendered organisations. In *Handbook on humanitarianism & inequality* (pp. 222–236).
47. Suhrke, A. (1997). UN peacekeeping in Rwanda. In *Out of conflict: From war to peace in Africa* (pp. 97–113). Uppsala: Nordiska Afrikainstitutet.
48. Syali, A. (2024). Striving for peace: Addressing human rights challenges in UN peacekeeping operations. *DME Journal of Law*, 5(1), 23–31.
49. United Nations and human development: From ideology to global policies. (1999). *Global Governance*, 3(2), 277–296.
50. Van der Lijn, J. (2008). Successes and failures of international peacekeeping operations. *Journal of International Peacekeeping*, 12(1–2), 11–30.
51. Wills, S. H. (2021). *Mapping humanitarian access constraints*. UK House of Commons.



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Research article

Use of Small Unmanned Aircraft Vehicles (SUAV) in Police Work

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ABSTRACT

The technical and technological revolution and the development of artificial intelligence are accelerating the development of technical means, both those used for military, civilian, and police purposes. Small unmanned aerial vehicles (sUAV) have become a modern means of warfare in world hotspots in just a few years, while domestically, the police forces of developed countries have recognized the potential for their application within the framework of their operational duties and tasks. Many police operational duties and tasks can be performed more effectively or efficiently with sUAVs. Taking all of the above into account, this paper aims to present the potential of sUAVs for police work using a descriptive-analytical approach. The scientific justification of the theoretical study of this topic is reflected in the topicality and the need to expand scientific knowledge about the subject of research. The authors collected data through a qualitative analysis of existing literature on the use of sUAVs by police forces in developed countries and on positive examples of their use. The limitation of this research is reflected in the analysis of the possibility of using sUAVs only within specific police organizational units. It encourages other researchers to approach this topic in a multidisciplinary manner to more fully and comprehensively analyze the needs for the use of sUAVs in the work of the police and the Ministry of Internal Affairs.

KEYWORDS

sUAV; drones; police; artificial intelligence; police technical equipment.

1. Introduction

Small unmanned aerial vehicles (sUAVs) are among the most dynamic and fastest-growing technologies today. Equipped with advanced sensors, GPS systems, and autonomous control capabilities, these aircraft are widely used in fields ranging from agriculture and surveying to security and rescue missions, as well as scientific research and commercial services.

The development of sUAVs over the last decade has been driven by advances in robotics, artificial intelligence, telecommunications, and the miniaturization of electronic components. Their ability to perform tasks in difficult-to-reach, dangerous, or inaccessible places while reducing costs and risks for the human factor makes them an indispensable tool in many sectors.



Despite significant progress, sUAV systems face numerous challenges, including limited battery power, navigation in complex environments, data security, and regulatory frameworks. Further research and development in this area is essential to improve their performance and safety, as well as to increase their integration into everyday activities.

Many governments believe that drones can bring a competitive advantage to their country's development, which is why they are taking political and economic measures to encourage this sector and urban air mobility. It is expected that citizens in urban areas will widely accept drones, but it is necessary first to address key challenges, such as safety and social issues (Çetin et al., 2022).

The development of drones for civilian and military purposes has proceeded in two tracks. With their development, today we have drones ranging from small dimensions, 2cm x 2cm x 2cm, to those weighing several tons. Their prices also vary, but today they are more affordable than ever for the average citizen.

The totality of all these factors ultimately led to a massive increase in the number of private drones in many developed countries, including, of course, the European Union, where the European Aviation Safety Agency (EASA) estimates that their share of the aviation market will reach as much as 10% in the next 10 years, which is about 15 billion euros per year, and that they will create up to 150,000 jobs by 2050 (European Commission 2014).

The research question we are starting from is: What are the advantages and potential of using small drones in police work? In this regard, using the analysis method, we will describe (descriptive role) the research problem and explain (explanatory role) the characteristics inherent to small drones in the police sector, given the differences relative to the role of drones in the military sector. We will also explain how small drones function, in what situations they are used, and what their scope of action is. Based on the described and explained phenomena and processes, using the synthesis method, we will try to understand the complex whole, that is, to connect the individual segments in order to understand the potential of using small drones in police work. Through a qualitative analysis of available documents and reports (primarily from relevant institutions and organizations involved in the development of artificial intelligence, such as unmanned aerial vehicles), we will collect and process data relevant to the paper's topic. We will use relevant domestic and foreign literature to define the theoretical framework. The primary goal of the paper is to review relevant sources on the research problem, as this field remains underresearched. Therefore, we used the available literature and research on representative samples from around the world.

2. Drones – definition and classification

As drones have developed and their capabilities have evolved, their names have also changed. The terminology used today for UAVs (unmanned aerial vehicles) is still not clearly and/or universally defined (Pavlović, 2017). Drones can be divided into two main categories: remotely piloted and autonomous drones. The term UAV refers to an autonomous drone, while RPA (remotely piloted aerial vehicle) refers to a drone remotely piloted by a human operator. Since neither of these drones has a pilot on board, and UAVs can have varying levels of autonomy – either under operator control or via a pre-programmed trajectory – less autonomous UAVs can be considered a subcategory of RPA drones.

The term “drone” originates from military terminology (Mendes de Leon & Scott 2016), but has become widely accepted to refer to both UAVs and RPAs. Broader terms, such as unmanned aircraft systems (UAS) and remotely piloted aircraft systems (RPAS), encompass not only the aircraft but also the complete support for its operation, including ground command stations, communication networks, and operational equipment. The lack of standardization of terminology further complicates the situation. For example, the European Aviation Safety Agency (EASA) considered several terms, including UAS and RPAS (a subcategory of UAS), before settling on the widely accepted term “drone.” EASA defines a drone as an aircraft without a pilot on board, which is controlled autonomously or remotely from the ground or another vehicle. In contrast, the International Civil Aviation Organization (ICAO) does not use the term “drone,” but prefers RPAS and UAV. The drone industry is developing rapidly, which leads to the emergence of new terms and the redefinition of existing ones. When discussing the police, we encounter the term “police robot” in the literature (Glaser, 2016) and the term “police drone,” which, in a certain sense, specifies their purpose (Yefimenko, 2022).

In Serbia, the term “drone” is much more commonly used in everyday speech than “unmanned aircraft”. The European Aviation Safety Agency defined that “Drone shall mean an aircraft without a human pilot on board, whose flight is controlled either autonomously or under the remote control of a pilot on the ground or in another vehicle” (European Aviation Safety Agency 2015). Although there is no consensus on the term, the authors believe that unmanned aircraft refers to a wide range of aircraft without a pilot for non-military purposes. In contrast, drones are equipped with weapons and designed to destroy manpower. In addition, the French Directorate for Civil Aviation (DGAC) uses the term “drone” to refer to an unmanned aircraft equipped with weapons for military purposes. UAS systems can be classified by various characteristics, including aircraft type (fixed-wing or rotorcraft), altitude capability (high, medium, low), weight, speed, resistance, capacity, etc. (Table 1). In police practice, UAS systems weighing up to 25 kg are most commonly used. According to aviation industry standards, they are known as small unmanned aircraft systems (sUAS). These lightweight and portable vertical take-off and landing aircraft are powerful enough to carry high-quality cameras, sensor packages, and advanced technologies such as GPS, allowing them to fly autonomously along a predetermined route. Typical flight times for these devices range between 10 and 45 minutes. Given their frequent use in the police, the term sUAS will be used in the remainder of this paper.

Table 1. Classification of unmanned aerial vehicles¹

UAS				
Size/Weight	Purpose	Range/Endurance	Altitude	Flight Mechanism
Nano UAS (micro drones for surveillance)	Civilian UAVs (Hobby drones and personal use)	Very Short-Range UAVs (Up to 5 km)	Low-Altitude UAVs (Operate below 300 m)	Fixed-Wing UAVs (Airplane-like design)
Micro UAVs (Light-weight and portable)		Short-Range UAVs (5–50 km)		
Mini UAVs (Under 25 kg, used in commercial and military applications)	Commercial UAVs (Delivery, photography, mapping)	Medium-Range UAVs (50–200 km)	Medium-Altitude UAVs: Operate between 300 m and 9000 m	Rotary-Wing UAVs (Helicopter-like, multirotors)
Small UAVs (SUAVs) (Up to 150 kg, often used for tactical operations)	Industrial UAVs (Used in agriculture, construction, and energy)	Long-Range UAVs; MALE - Medium Altitude Long Endurance (Up to 1000 km)		Hybrid UAVs; VTOL - Vertical Take-Off and Landing (Combine fixed-wing and rotary capabilities)
Medium UAVs (Up to 600 kg, with greater endurance and range)	Research UAVs (Deployed for scientific data collection)	Strategic UAVs; HALE - High Altitude Long Endurance (Over 1000 km)		High-Altitude UAVs: Operate above 9000 m
Large UAVs (Above 600 kg, used for long-range missions and heavy payloads)				

¹ Authors based on NATO Classification

3. Possibilities of using small unmanned aerial vehicles in police work

The use of small unmanned aerial vehicles in police work is a recent development, with police in modern countries recognizing their advantages for performing duties more efficiently and effectively. Their accessibility has increased exponentially since 2000, as evidenced by more than 1,578 state and local public safety agencies in the United States using sUAS (Gettinger, 2020).

In line with the technical and technological development of society, police organizations also use modern capabilities to perform their duties more easily, faster, and with higher quality. Citizens' expectations of the police are always at the highest level; therefore, police organizations must follow modern trends in the use of technical means to meet the requirements of the end users of their services. The police are expected, through their organization and functioning in society, to increase the likelihood of providing rapid protection to the lives, health, and property of citizens whenever necessary. Their work includes preventing and solving crime, controlling traffic, searching for fugitives or missing persons, and securing significant public events, among other everyday tasks. In such situations, to enable rapid action and collect important information from the air, the assistance of air units may be required (Milić & Milidragović, 2019).

The advantages of using sUAS are multiple, both in preventive and repressive police work. The ability to view the situation from a "bird's eye view", the speed of arrival at the scene, access to inaccessible terrain, as well as documentation in the form of photographs and videos in correlation with accessibility in terms of procurement and maintenance are just some of the advantages for their use or introduction into the organizational units of the Ministry of Internal Affairs, if this has not been the case so far. Organizational units of the Ministry of Internal Affairs can use small unmanned aerial systems in both regular and emergency tasks (rescue), in crises (hostage or terrorist), maintaining public order and peace during public gatherings, in detecting violations of road traffic safety, search activities, conducting on-site inspections, secret surveillance of persons, surveillance of the state border, etc. For these purposes, many countries around the world, such as the USA, Germany, France, Canada, the UK, Brazil, China, as well as cities such as Dubai, use small drones to support the work of police units (de Castro Quirino et al.; Gettinger, 2020; Saulnier & Thompson, 2016; Yefimenko, 2022). A 2021 DroneResponders survey shows that more than 600 law enforcement agencies use drones worldwide (Martin, 2022). It has been shown that the way drones are used plays a key role in shaping public opinion. In the US, citizens see them as applicable in situations such as search and rescue, highway traffic accidents, and emergency response during bomb threats or armed incidents (Heen et al., 2018; Sakiyama et al., 2017).

The positive practices of world police forces in the use of sUAVs for police tasks, as well as the operational and cost-effectiveness of unmanned aerial vehicles, justify their introduction into our police work. The first task in this regard would be to standardize authorization for the use of UAVs under the Police Act. The legal basis for the use of unmanned aerial vehicles capable of processing personal data should be defined with a clear goal and purpose (Milidragović & Milić, 2023).

When discussing the limitations of unmanned aerial systems, the first significant challenge is weather conditions, because the atmosphere, as a variable and unpredictable element shaped by wind, precipitation, and fog, imposes restrictions on their use (Ranquist et al., 2017). Police are increasingly facing how atmospheric instability and unevenness affect the operational capabilities of drones. Another key factor is limited battery life, which directly affects the range and shape of the areas where drones can be used. In third place, but with a more minor impact compared to the previous two factors, is the already mentioned legal framework that regulates their use and raises questions such as: the legitimacy and ethical aspects of using drones for monitoring, surveillance and protection, the right to privacy, freedom of movement, ethical principles of the use of force and issues of potential abuse (Klauser, 2021).

The way in which drones are introduced into police organizational units varies. Some organizational units have systematized drone operator positions within their organizations. In contrast, in the Netherlands, a special organizational unit was formed that works closely with the regional police departments. The members of these drone teams come from various professional fields, including members of local police units, motorized patrols, emergency services and control centers, criminal investigations, dog handler teams, anti-human trafficking units, and water and traffic surveillance teams. Compared to tasks in other police units, working with small drones carries significantly less risk and does not involve the use of force. Police activities involving small drones are primarily limited to providing real-time imagery and recording material later used in investigations to support other teams (van der Maarel, 2025).

3.1. The possibility of using small drones in the work of the general police

Small drones have not yet become a standard tool for general police use. Of course, in more developed countries, this is in full swing, while in Serbia, whether due to legal uncertainty or a lack of material resources, the use of drones is currently the exclusive right of only specific organizational units.

Before small drones were introduced into police work, police officers could only receive air support from helicopters. Today, every police patrol can have its own "air support" in the trunk of a patrol vehicle, ready to use when needed. Although the advantages of small drones are obvious and confirmed by numerous successful cases of their use in police practice, they should not be seen as a replacement for traditional manned aviation, but as a complement to it (Shinnamon & Cowell, 2019). However, for the general police, the use of air support, such as helicopters, is unattainable, and small drones are the only option they can afford. Therefore, we will write about the possibilities of using small drones in the regular work of the general police, and about the tasks that fall within the competence of police officers in Regional Police Directorates that are directly connected to the Police Directorate.

Regular tasks of police officers certainly include going to the scene of an incident. This is preceded by a report from citizens or from police officers themselves, who learn about the incident. Every situation in which police officers intervene carries a particular risk, while certain situations where participants have cold or fire-arms with them, or who are under the influence of alcohol, carry a higher risk of victimization of police officers (Petrović, 2021). The use of small drones in such cases implies a kind of "precedent" for police officers. Of course, this would not affect the responsiveness of police officers, as the drone would arrive at the scene faster and collect important information by observing the scene for the patrol arriving. This information would relate to the location of the incident itself (terrain configuration, weather conditions, access to the scene of the incident), then to the people (number and arrangement of people, whether someone is armed, whether there are any injured people) and a lot of other information that police officers may not have received from the person reporting the incident. This information can be crucial in preparing police officers for intervention and on-duty service, and, if necessary, could send additional forces to the scene of the incident even before the patrol arrives and requests reinforcements. The "first response" function of small drones was developed by the Chula Vista Police Department in San Diego in 2018 and implies that, in emergency cases, they are the first to arrive on the scene after the call. Thus, drones can be on the scene before police officers arrive and, by transmitting live images, provide information to approaching officers, allowing for incident assessment and decision-making (Werner, 2025). In many situations (not all), this way of using drones can replace more expensive and demanding actions involving helicopters and crews.

Since 2020, Dubai Police has been using a network of small drones to combat crime. These drones are deployed in special bases with sliding roofs, which allows them to enter the field quickly. They can patrol autonomously or be sent to a specific location, where operators from the police headquarters use them to monitor the situation, track suspicious people or vehicles, and coordinate with other police units. Thanks to this system, the police are expected to respond to incidents within 1 minute, almost 4 times faster than before (Hambling, 2021).

Police officers directly carry out work to prevent violations and restore public order on a larger scale, as well as to increase security measures at sporting events and other public gatherings. The use of drones in performing such tasks is reflected in the preventive surveillance of the gathered crowd from a "bird's eye view" as well as documenting video recordings of rioters when violating public order and peace for their later identification and prosecution. Also, drones in these situations can be a powerful tool to support managers' decision-making because they can provide a "live" broadcast of crowd movement to inform possible redeployment of police forces.

3.2. The possibility of using small drones in the work of traffic police

The traffic police is an organizational unit of the Ministry of Internal Affairs with which citizens most often come into contact, and constant work is underway to improve its work. With the development of large cities worldwide and increasing population density and traffic, it is necessary to introduce innovative systems that can adequately respond to tasks. In Serbia, a lot of attention has recently been paid to improving the technical capacities of the Traffic Police Directorate by introducing body cameras and increasing the presence of inter-

ceptors to enforce speed limits. Also, many cities in Serbia have cameras for automatic detection of violations, such as running a red light, driving without a seat belt, exceeding the speed limit, driving in the stop lane, using a mobile phone while driving, and the like.

Aerial traffic surveillance can be crucial for quickly detecting the location of an incident and the level of response required. Specific categories of incidents, such as collisions, stalled or stranded vehicles, and other road debris, often lead to severe traffic congestion, especially during “rush hour,” when it may be difficult for ground vehicles to quickly reach the scene (Spasovic et al., 2017). The main advantage of small unmanned aerial vehicles (sUAS) compared to traditional traffic control resources (e.g., police cars and speed cameras) is their ability to provide a “bird’s eye view” of drivers, as well as their mobility, which is not limited by the road network and traffic congestion (Rosenfeld, 2019). The use of small unmanned aerial vehicles can significantly improve traffic surveillance and violation identification. For example, they can more easily spot drivers who ignore traffic signs, use the stop lane when it is not allowed, overtake at risk, or behave irresponsibly on the road. Research shows that drones for traffic control are perceived as a more efficient and effective means of preventing violations compared to helicopters. At the same time, they are considered equally reliable as speed cameras in terms of surveillance accuracy (Rosenfeld, 2019). Also, the use of drones is efficient in rural areas, where there are few technical means for automated detection of violations. In these situations, police officers can use drones as an “extra pair of eyes” that is less conspicuous than a patrol car, which controls traffic; drivers often show solidarity and warn each other of the presence of a police patrol using so-called flashing lights. It is important to keep in mind that road traffic accidents are the cause of numerous deaths worldwide, approximately 1.19 million per year, and that road traffic injuries are the leading cause of death for children and young people aged 5 to 29 (WHO, 2023). Therefore, additional traffic control using small drones could also have a preventive character, that is, reducing the likelihood of serious violations by, first of all, showing solidarity with drivers or by prior knowledge that a fixed traffic control camera is located in a particular place. The usefulness of drones would be particularly pronounced in video surveillance of traffic curves where overtaking is prohibited, and traffic accidents have occurred.

Small drones can be helpful in situations where a vehicle is stopped, as they provide a quick insight into the driver’s condition – whether he is injured, ill, or has a problem with the vehicle. Based on this information, a tow truck can be called promptly and given precise arrival instructions. In addition, they can be used to monitor pedestrian traffic, especially in densely populated areas (Zhu et al., 2019).

Small drones are also invaluable during serious traffic accidents, as they provide an overview of the extent of the collision and its impact on traffic, facilitating vehicle rerouting and more efficient emergency services intervention and evacuation (Werner, 2015). Thanks to advanced recording technologies, GNSS systems, and photogrammetry, aerial video footage is becoming increasingly accurate, enabling detailed analysis of the scene of a traffic accident. This is especially important when investigating multiple collisions, where marking and collecting evidence can be time-consuming. At the same time, it is important to record information as soon as possible to normalize traffic and reduce the risk to police officers on the scene and other road users (Milić & Milidragović, 2019). “When sUAS is utilized to map the crash scene, research has shown that the time taken to clear a crash scene and reopen the road can be reduced by 56% to 73% when compared to other measurement tools. Furthermore, the time officers were at risk in the roadway was reduced by approximately 28 minutes (78%)” (Gambold & Freeborn, 2015). Therefore, previous research shows that drones can address problems such as traffic congestion (Zhang et al., 2019), collision avoidance (Kumar et al., 2021), safety analysis (Chen et al., 2017), and driver assistance based on the “first response” principle (Butilă & Boboc, 2022).

3.3. The possibility of using small drones in the work of the criminal police

Drones, given the wide range of criminal police work, have almost inexhaustible uses as an auxiliary tool for operatives. Operative work also involves the detection, collection, interpretation, and storage of information, and this process could be significantly improved by using new technologies (Boštjan, 2016). When a crime or some other event that requires direct observation to establish the facts occurs, one of the first actions of the police is to conduct an investigation. The advantages of using drones in the investigation of criminal offenses are similar to those in traffic accident investigations. The first task is to detect criminal offenses, such as the production, possession, and sale of drugs and weapons, human trafficking, and the like (Boštjan, 2016). Then, the

photographs and recordings that miniature drones can capture are beneficial for reconstructing a crime scene and the relationships among people, objects, and traces at the scene. Research has shown that photographs taken by small drones “can provide measurements with generally acceptable levels of errors using photogrammetric techniques” (Jurkofsky, 2015). The use of small unmanned aerial vehicles can also extend to the creation of 3D models of crime scenes, ensuring the highest level of accuracy in representing the overall context, spatial arrangement, and interrelationships among relevant objects and traces (Bjelovuk et al., 2022).

The use of small drones can be helpful when implementing the operational-tactical measure of ambush. In the traditional sense, an ambush involves only the conspiratorial presence of police officers at the place where a crime is expected to be committed or the place where the perpetrators of the crime will appear in order to deprive them of their liberty. An ambush involves police officers being positioned to visually cover the security-sensitive area in which they will operate without being noticed. This is often not an easy task, and in such situations, small drones would serve as the “eyes” of police officers, while they would remain hidden nearby and not have to observe the area directly. Also, the use of small drones can improve special investigative measures, such as covert surveillance and surveillance of criminal groups’ communications (Jenks, 2015). In combination with larger drones, it is possible to create a network of drones that will, on the one hand, eavesdrop on and monitor objects and persons of interest. On the other hand, cover police officers. In this context, the aim of using small drones would also be to reduce the risk to police officers’ lives. FBI statistics for the period from 2015 to 2022 show that the number of police officers killed in the line of duty is increasing year by year, from 41 police officers in 2015 to 73 police officers killed in 2021 (Federal Bureau of Investigation 2020 a, 2020 b). Therefore, there is a need to introduce additional measures that would reduce the potential harm to police officers.

When it comes to police search operations, small drones can significantly enhance the effectiveness and efficiency of police officers in this area as well. Small drones equipped with cameras with automatic face detection and software connected to a database can easily recognize the persons being searched for. Here, of course, the issue of human rights and freedoms arises, as it is also a subject of public discussion regarding video surveillance cameras on city streets that have this capability (Jenks, 2015).

3.4. The potential of small drones for border policing

The need to secure borders requires new technologies that will strengthen border patrol capabilities to detect, deter, and apprehend smugglers, terrorists, and those attempting to cross the border illegally (Constantinescu & Nedelcut, 2011). Border police have always been pioneers in the use of modern technical means, precisely because protecting the state border from smuggling is a high priority for every state, and significant funds are invested in their equipment. The justification for funding small drones (and several decades of previous ‘high-tech’ surveillance programs) is often based on the claim that non-urban border zones are so vast that they are difficult, if not almost impossible, to monitor by any other means (Kaplan & Miller, 2019).

Land borders pass through various types of terrain: from flat alluvial areas and cliffs, to vast plains and hilly areas, as well as through mountain ranges intersected by deep valleys. Small drones can easily reach inaccessible terrains that are always a target for illegal border crossings in a short period of time. Such “air patrols” equipped with thermal imaging can serve as a replacement for pedestrian or motorized border police patrols, where, after spotting persons violating the border zone, they would alert the first stationary patrol to arrive at the critical point. Viktor Tyshchuk believes that drones have significant potential for securing and protecting national borders, but to fully utilize this potential, it is necessary to improve legal regulations and develop strategies for the use of drones in the border zone (Tyshchuk, 2024).

3.5. The possibility of using small unmanned aerial vehicles in special intervention forces (SWAT)

When we talk about the use of air forces by special and special-purpose police units, traditional understandings associate them with helicopters for faster transport of special forces to the scene of a crisis, landing on the ground or on an object. Although there is no alternative to helicopters for the rapid transport of special forces, other uses for which they were employed have been entirely replaced by small unmanned aerial vehicles.

As a means of observation, small unmanned aerial vehicles can approach inaccessible terrain and observe the scene of an event from a better position, such as a barricade, hostage situation, terrorist attack, or any other crisis requiring the engagement of special police units. The obvious and immediate advantage of using small unmanned aerial vehicles instead of a police officer in dangerous situations is that this approach protects the police officer from physical harm. Risk avoidance also has a moral significance, as states must ensure the human rights of their police officers. Providing appropriate training and equipment (including protective gear) and careful planning and management of police operations help prevent officers from being put at unintentional risk (Enemark, 2021). Thanks to advanced cameras, police can obtain crucial information about the number of suspects, the type of weapons they possess, and their exact location. Small drones with multi-rotor systems allow easy access to high-altitude or difficult-to-reach locations. At the same time, inaccessible areas that would be impassable on the ground can be easily inspected from the air (Wallace & Loffi, 2017). SWAT USA member Mark Lang said, "If we are there for less time, we can save several thousand dollars per call by using the drone" (Frieze, 2022). Lang believes that drones are a cost-effective tool and should be used by special forces. "A single drone or multiple drones can break the suspect's OODA - observe, orient, decide, act - loop," explained Lang (Frieze, 2022).

During an arrest, small drones provide real-time footage from a bird's-eye view, or directly from the object, allowing officers and the command center to monitor the situation and make appropriate decisions simultaneously. In emergencies, where every second can be crucial, quick access to visual data is essential. If a suspect tries to escape, a small drone can recognize the movement and alert police officers securing the perimeter. Also, if he decides to surrender, the drone can confirm that he has dropped his weapon, allowing police officers to safely approach him and deprive him of his liberty (Milić & Milidragović, 2019). Lang states that the mere presence of a drone with light and sound signals could cause a suspect to reconsider his position, distract him, or even induce him to surrender (Frieze, 2022).

3.6. *The possibility of using small drones in rescue operations*

Some authors have already investigated the possibilities of using small drones in rescue operations and the benefits they bring to police officers (Liu et al., 2022). Also, the public generally supports the use of small drones for police responses to disasters, search and rescue, and the medical transport of the injured (Eißfeldt et al., 2020; Sabino et al., 2022; Tan et al., 2021).

Police officers, primarily fire and rescue units, take preventive measures to prevent fires and mitigate the consequences of natural disasters, technical and technological accidents (Metić, 2025; Janković, Cvetković, Gačić, Renner, & Jakovljević, 2025; Kalanj, 2025), etc., as well as to prevent threats to citizens' health due to hazardous substances and other dangerous situations. Small drones can significantly enhance the safety of police officers. At the same time, they perform their duties, whether localizing fires, searching for lost children in inaccessible terrain, or extracting injured persons from rubble. In such situations, time is of the essence, where every hour reduces the chance of successfully saving a life. Therefore, the primary goal of search and rescue missions is to rapidly and accurately locate, exchange information, and deliver supplies, all within strict time constraints (Quero & Martinez-Carranza, 2025).

The multi-rotor flight platform and its integrated avionics are designed to meet the requirements of the mountain environment, such as low temperatures, high altitudes and strong winds, ensuring the possibility of carrying various payloads (single or combined), such as: an avalanche beacon (ARTVA) with automatic signal recognition and path-following algorithms that allow for the rapid location of bodies covered in snow; cameras (visible and thermal) for the search and rescue of missing persons in snow and forests, both during the day and at night; payload deployment for the release of emergency packages or special explosive cartridges for controlled avalanche separation (Silvagni et al., 2017). In certain situations, a person may be trapped in a place that rescue teams cannot reach, even by helicopter. In such cases, small drones are more practical due to their compact size, as they can reach inaccessible terrain and, if necessary, deliver necessities such as radios, first aid, or medicine (Milić & Milidragović, 2019).

The development of technology and the integration of systems with artificial intelligence, including automated flight, high-precision sensors, and machine learning algorithms, means that drones can collect significant amounts of data, including images, videos, audio recordings, and electromagnetic signal detection. This

leads to more efficient terrain analysis, preventive action, and faster rescue operations (Khan et al., 2020; Nath et al., 2022; Quero & Martinez-Carranza, 2025).

4. Legal and Ethical Dilemmas in the Use of Small Unmanned Aerial Vehicles in Police Work

When discussing the use of UAVs in police work, numerous legal and ethical dilemmas arise. This topic occupies a central position at the intersection of law, technology, ethics, and criminal justice. It should be noted that in most modern states, this issue is at least partially regulated. In contrast, in others — including Serbia — the use of UAVs in police operations remains legally (and therefore ethically) unregulated, even though such devices are already widely used in various policing activities.

The primary legal dilemmas associated with the use of small UAVs concern privacy rights. Modern lightweight drones are often equipped with high-resolution cameras, thermal imaging devices, facial recognition systems, and other sensors, whose use may conflict with an individual's right to privacy, as guaranteed by Article 8 of the European Convention on Human Rights. The problem is further complicated by the fact that the boundary between legitimate police surveillance and unlawful intrusion into private life is not clearly defined, which leads to inconsistent interpretation of legal provisions and uneven application in practice.

Alongside the issue of privacy arises the question of the legal basis and conditions for the use of UAVs in specific operational contexts. The absence of clear regulations defining when, where, and under what conditions the police may deploy drones leads to inconsistent conduct and potential arbitrariness in practice.

A critical issue concerns judicial oversight and the procedure for issuing warrants for the use of UAVs. In cases of prolonged or targeted surveillance, it would be both legally and ethically appropriate to obtain a judicial warrant to confirm the legality of the operation and to ensure that any video recordings or photographs obtained through UAV use are admissible as evidence in court.

A gray area emerges in emergencies, when the police cannot wait for a judicial warrant— for example, during search and rescue missions, active shooter incidents, terrorist attacks, natural disasters, or traffic accidents. Although in such cases the use of UAVs may be considered justified and proportionate to the objective pursued, these situations simultaneously open the door to potential abuse and overreach of authority under the pretext of urgency.

A crucial ethical consideration concerns the principles of proportionality and necessity. The moral justification for deploying drones in policing depends on whether their use corresponds appropriately to the gravity of the incident and the level of threat to public safety. Utilizing UAVs for minor offenses or routine observation may, therefore, raise ethical concerns. Furthermore, the issue of mission creep—the gradual extension of technologies initially intended for exceptional or emergencies into ordinary policing—poses a serious challenge by enabling continuous surveillance and diminishing civilian oversight.

Equally important are the principles of transparency and accountability, which are fundamental to ethical and democratic law enforcement. Public confidence requires that citizens are fully informed about the conditions under which drones are operated. At the same time, independent supervisory mechanisms are needed to curb potential abuses of authority and ensure institutional integrity. Simultaneously, the integration of artificial intelligence into UAV systems raises complex questions about data ethics, including the accuracy of algorithmic analyses, the risks of false identification, and the safeguarding of sensitive information against misuse or data breaches.

In addition to legal and procedural issues, the deployment of UAVs influences the psychological and social environment of policing. The persistent or visible presence of drones can foster anxiety and distrust, particularly within socially vulnerable or marginalized communities. Excessive reliance on surveillance technologies risks undermining the interpersonal aspect of police work, thereby weakening cooperation and mutual trust between law enforcement and the public.

Ultimately, the ethical governance of UAVs in policing requires a delicate equilibrium between public security needs and the protection of fundamental human rights. This balance should be guided by the principles of legality, legitimacy, proportionality, and accountability, which together form the ethical foundation of respon-

sible drone use. Accordingly, legislators and policymakers should establish transparent legal frameworks that specify the scope and conditions for drone deployment, ensure judicial authorization for surveillance beyond emergencies, apply stringent data protection standards, and introduce independent oversight bodies to maintain public confidence and democratic control.

In a modern nation-state, governance is primarily about meeting the basic needs and desires of the populace through governmental institutions and procedures that are led, motivated, and guided by a well-structured and functional education system (Onimisi, 2025).

The aspiration for security, alongside the preservation of individual freedoms and rights, calls for responsible legal regulation to achieve a balanced, proportionate framework. The demonstrated effectiveness of sUAS in global policing, alongside their operational efficiency and cost advantages, underscores the rationale for integrating them into Serbian police practices. Accordingly, the Police Law should serve as the foundational legal instrument for regulating and authorizing their use.

5. Conclusions

The use of small unmanned aerial vehicles has become an indispensable part of a country's technical and technological progress in recent years. Their versatility and adaptability to diverse tasks make them a key tool across the military, civilian, and commercial sectors. The possibilities of using small unmanned aerial vehicles in police work are a problem that requires a multidisciplinary approach. Their use in police work shows significant benefits in both the qualitative performance of tasks and the new opportunities that small unmanned aerial vehicles provide. They enable rapid data collection, surveillance of difficult-to-access areas, and documentation of events from an aerial perspective, which is why they have become a key tool for general police, traffic police, and criminal investigation services. We can conclude that their application is reflected in both preventive and repressive police work, from reporting incidents and collecting necessary data to searching the area, observing crimes and misdemeanors, and identifying their perpetrators.

Although there are certain limitations, such as weather conditions, battery life, and legal regulations, the experience of police services worldwide shows that the use of drones is justified and highly useful. Their regular use would require further improvement of the legal framework, staff training, and investments in technological infrastructure.

With advances in security and technology, drones should not be seen as a replacement for traditional police assets but as a valuable addition that improves operational efficiency. Their use contributes to faster response in emergencies, better monitoring of public order and traffic, and more efficient collection of evidence in criminal investigations.

The use of small unmanned aerial vehicles by the Ministry of the Interior of the Republic of Serbia would be a significant technical and technological breakthrough, primarily at the operational level of management. The authors believe that it is primarily necessary to legally regulate this area concerning the use of small unmanned aerial vehicles, in terms of misdemeanor and criminal liability, because the current Article 11 of the Law on Public Order and Peace, which defines the penal policy for the use of remotely controlled devices that endanger the safety of citizens or disrupt public order and peace, is insufficient. It is also necessary to legally regulate the use of small unmanned aerial vehicles by the Ministry of the Interior. The legal "gap" in their application to the Ministry of the Interior of the Republic of Serbia is reflected in the lack of a defined legal framework for their procurement and use, as well as for licensed personnel who would operate small unmanned aerial vehicles. Also, the question of the conditions for applying specific measures and actions to disable or capture other small unmanned aircraft in the airspace when necessary is raised. When regulating this matter, it is important to take into account human rights and the right to privacy protection, particularly in the part related to filming and photography carried out by technical means using unmanned aircraft. The Ministry of Interior should develop detailed operational guidelines and ethical standards for the use of small UAVs in policing, ensuring compliance with privacy and data protection laws. On the other hand, the the Serbian Parliament should amend the Law on Police to explicitly define the legal grounds for UAV deployment, establish oversight mechanisms, and mandate judicial authorization for surveillance outside emergency contexts. Both institutions should collaborate to create an independent supervisory body responsible for monitoring UAV use, ensuring transparency, and maintaining public trust.

In the coming years, with further technological development and better integration into police systems, unmanned aircraft will play an even greater role in maintaining citizens' safety and improving law enforcement.

6. References

1. Bjelovuk, I., Kesic, T., and Zarkovic, M. (2022). The possibilities of using unmanned aerial vehicles (drones) in crime scene investigation. *Archibald Reiss Days*, 12.
2. Boštjan, S. 2016. "Drones in (Slovene) criminal investigation". *Kriminalistička teorija i praksa* 3 (2): 7-25.
3. Butilă, E. V., and Boboc, R. G. 2022. "Urban traffic monitoring and analysis using unmanned aerial vehicles (UAVs)". A systematic literature review. *Remote Sensing* 14 (3): 620.
4. Çetin, E., Cano, A., Deransy, R., Tres, S., and Barrado, C. 2022. "Implementing mitigations for improving societal acceptance of urban air mobility". *Drones* 6 (2): 28.
5. Chen, P., Zeng, W., Yu, G., and Wang, Y. 2017. "Surrogate safety analysis of pedestrian vehicle conflict at intersections using unmanned aerial vehicle videos". *Journal of advanced transportation* 2017 (1): 5202150.
6. Constantinescu, S.-G., and Nedelcut, F. 2011. UAV systems in support of Law Enforcement forces. *International Conference of Scientific Paper AFASES*.
7. de Castro Quirino, C., dos Santos, F. P., and da Cunha, M. B. F. Poder de polícia volante: a utilização de drones pela Administração Pública e sua regulação no Brasil, Alemanha, União Europeia e nos EUA.
8. Eißfeldt, H., Vogelpohl, V., Stolz, M., Papenfuß, A., Biella, M., Belz, J., & Kügler, D. 2020. "The acceptance of civil drones in Germany". *CEAS Aeronautical journal* 11 (3): 665-676.
9. Enemark, C. 2021. "Armed drones and ethical policing: risk, perception, and the tele-present officer". *Criminal justice ethics* 40 (2): 124-144.
10. Gambold, K., and Freeborn, E. 2015. A Comparison of Small Un-manned Aircraft System (SUAS) Aerial and Terrestrial Methods for Accident Scene Investigation Information Collection. Final Summary Overview.
11. Gettinger, D. 2020. "Public safety drones". Center for the Study of the Drone at Bard College, 7.
12. Hambling, D. 2021. "Dubai police will use citywide network of drones to respond to crime. <https://www.newscientist.com/article/2284387-dubai-police-will-use-citywide-network-of-drones-to-respond-to-crime/>.
13. Heen, M. S., Lieberman, J. D., and Miethe, T. D. 2018. "The thin blue line meets the big blue sky: Perceptions of police legitimacy and public attitudes towards aerial drones". *Criminal Justice Studies* 31 (1): 18-37.
14. Janković, L., Cvetković, V. M., Gačić, J., Renner, R., & Jakovljević, V. (2025). Integrating psychosocial support into emergency and disaster management and public safety: The role of the Red Cross of Serbia. *International Journal of Contemporary Security Studies*, 1(1), 99–124.
15. Jenks, C. 2015. "State Labs of Federalism and Law Enforcement Drone Use". *Wash. & Lee L. Rev.* 72: 1389.
16. Jurkofsky, D. A. 2015. "Accuracy of SUAS photogrammetry for use in accident scene diagramming. *SAE International Journal of Transportation Safety* 3 (2): 136-152.
17. Kalanj, S. (2025). Gender-based violence in armed conflicts. *International Journal of Contemporary Security Studies*, 1(1), 125–138.
18. Kaplan, C., and Miller, A. 2019. "Drones as "Atmospheric Policing" From US Border Enforcement to the LAPD". *Public Culture* 31 (3): 419-445.
19. Khan, A., Gupta, S., and Gupta, S. K. 2020. "Multi-hazard disaster studies: Monitoring, detection, recovery, and management, based on emerging technologies and optimal techniques". *International Journal of Disaster Risk Reduction* 47: 101642.

20. Klauser, F. 2021. "Police drones and the air: Towards a volumetric geopolitics of security". *Swiss Political Science Review* 27 (1): 158-169.
21. Kumar, A., Krishnamurthi, R., Nayyar, A., Luhach, A. K., Khan, M. S., and Singh, A. 2021. "A novel Software-Defined Drone Network (SDDN)-based collision avoidance strategies for on-road traffic monitoring and management". *Vehicular Communications* 28, 100313.
22. Liu, Y. V., Kang, W., Maskály, J., and Ivković, S. K. 2022. "Policing from the Sky: A Case Study of the Police Use of Drones in South Korea". In: *Exploring Contemporary Police Challenges*, 167-180.
23. Mendes de Leon, P., and Scott, B. I. 2016. "An analysis of Unmanned Aircraft Systems under air law". *Drones and Unmanned Aerial Systems: Legal and Social Implications for Security and Surveillance*, 185-213.
24. Metić, A. (2025). The Significance and Role of Police Officers in Building the School as a Safe Environment for All Students. *International Journal of Contemporary Security Studies*, 1(1), 17-24.
25. Milić, N., and Milidragović, D. 2019. "The possibilities and challenges of UAV implementation in serbian police". *Thematic conference proceedings of international significance. Vol. 2/International scientific conference "Archibald Reiss Days"*, Belgrade, 6-7 November 2019.
26. Milidragović, D., and Milić, N. 2023. "Normiranje novih policijskih ovlašćenja u Zakonu o policiji". *Zbornik radova Pravnog fakulteta u Nišu* 98.
27. Nath, N. D., Cheng, C.-S., and Behzadan, A. H. 2022. "Drone mapping of damage information in GPS-Denied disaster sites". *Advanced Engineering Informatics* 51: 101450.
28. Onimisi, T. (2025). Improved Security and Education: Pathways to National Development. *International Journal of Contemporary Security Studies*, 1(1), 205-212.
29. Pavlović, I. 2017. "Informacioni sistem za kontrolu letenja bespilotnih vazduhoplova". *International Scientific Conference on Information Technology and Data*.
30. Petrović, J. M. 2021. "Characteristics of the situations where police officers are victimised". *Temida* 24 (3): 329-347.
31. Quero, C. O., and Martinez-Carranza, J. 2025. "Unmanned aerial systems in search and rescue: A global perspective on current challenges and future applications". *International Journal of Disaster Risk Reduction*: 105199.
32. Ranquist, E., Steiner, M., and Argrow, B. 2017. "Exploring the range of weather impacts on UAS operations". *18th Conference on Aviation, Range and Aerospace Meteorology*, Seattle, WA.
33. Rosenfeld, A. 2019. "Are drivers ready for traffic enforcement drones?". *Accident Analysis & Prevention* 122: 199-206.
34. Sabino, H., Almeida, R. V., de Moraes, L. B., da Silva, W. P., Guerra, R., Malcher, C., Passos, D., and Passos, F. G. 2022. "A systematic literature review on the main factors for public acceptance of drones". *Technology in Society* 71: 102097.
35. Sakiyama, M., Miethe, T. D., Lieberman, J. D., Heen, M. S., and Tuttle, O. 2017. "Big hover or big brother? Public attitudes about drone usage in domestic policing activities". *Security Journal* 30: 1027-1044.
36. Saulnier, A., and Thompson, S. N. 2016. "Police UAV use: Institutional realities and public perceptions". *Policing: An International Journal of Police Strategies & Management* 39 (4): 680-693.
37. Shinnamon, D., and Cowell, B. M. 2019. *Building and managing a successful public safety UAS program: Practical guidance and lessons learned from the early adopters*. National Police Foundation.
38. Silvagni, M., Tonoli, A., Zenerino, E., and Chiaberge, M. 2017. "Multipurpose UAV for search and rescue operations in mountain avalanche events". *Geomatics, Natural Hazards and Risk* 8 (1): 18-33.
39. Spasovic, L., Dimitrijevic, B., Besenski, D., Lee, J., Zhong, Z., and Gutesa, S. 2017. "Small Unmanned Aircraft Systems (UAS) for Traffic Incident Management".
40. Tan, L. K. L., Lim, B. C., Park, G., Low, K. H., and Yeo, V. C. S. 2021. "Public acceptance of drone applications in a highly urbanized environment". *Technology in Society* 64: 101462.

41. Tyshchuk, V. V. 2024. "A Review of Legal Regulation Regarding the Use of Unmanned Aerial Vehicles for Border Security and the Impact of Global Technologies". *International Comparative Jurisprudence* 10 (1): 61-81.
42. van der Maarel, S. 2025. "Drones for good': innovation, meaning and remoteness in the Dutch police drone team". *Critical Studies on Security*: 1-18.
43. Wallace, R. J., and Loffi, J. M. 2017. "How law enforcement unmanned aircraft systems (UAS) could improve tactical response to active shooter situations: The case of the 2017 Las Vegas shooting". *International Journal of Aviation, Aeronautics, and Aerospace* 4 (4): 7.
44. Werner, C. 2015. *Using Drones in the Fire Service*. Firehouse; Fort Atkinson.
45. Yefimenko, I. M. 2022. "Modern possibilities of using unmanned aerial vehicles by Police authorities and units: Analysis of foreign and Ukrainian experience". *Scientific Journal of the National Academy of Internal Affairs* 27 (3): 65-77.
46. Zhang, H., Liptrott, M., Bessis, N., and Cheng, J. 2019. "Real-time traffic analysis using deep learning techniques and UAV based video". *16th IEEE International Conference on Advanced Video and Signal Based Surveillance (AVSS)*.
47. Zhu, J., Chen, S., Tu, W., and Sun, K. 2019. "Tracking and simulating pedestrian movements at intersections using unmanned aerial vehicles". *Remote Sensing* 11 (8): 925.



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