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Sustainable development, Artificial intelligence and Sustainable Education

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Abstract.
Sustainable development is a concept defined as meeting the needs of the present without compromising the ability of future generations to meet their own needs. The article addresses the challenges which the humanity meets when trying to maintain sustainable development in contemporary world.

The author considers the elements of the sustainable development, the goals for achieving it, and the targets related to these goals. A focus is put on the dual role of Arti-ficial Intelligence (AI) in global sustainability. On one hand, AI is increasingly viewed as a key enabler for achieving global sustainability goals. On other hand, AI generates the profound risks for achieving global sustainability.

Keywords: sustainable development; technologies; AI; sustainable learning

Introduction

In the complex and interconnected global landscape of the 21st century, humanity faces a convergence of formidable challenges: a rapidly changing climate, shifting geopo-litical alignments, and profound economic transformations driven by technological in-novations. These forces collectively threaten to undermine the principles of sustainable development—a concept defined as meeting the needs of the present without compro-mising the ability of future generations to meet their own needs.

As the urgency to address these issues intensifies, a critical question emerges: how can technology, and specifically Artificial Intelligence (AI), be purposefully harnessed to navigate this turbulent environment? This report explores how to steer technology toward a more resilient and equitable future.

Sustainability and sustainable development

If security is a state of absence of significant risks for a given system, sustainability is security viewed over time as a process. So, some models applied to security can be also applied to sustainability, for example, the model of National Security System(Stoynov, 2017, pp. 28-30). According to this model, the four areas where security and hence sus-tainability manifests itself are the society, the policy, the economy, and the environment.

Sustainable development is a holistic concept that balances the needs of the society, the policy, the economy, and the environment. While traditional economic development has historically focused on growth without regard for its long-term impact on planetary integrity, sustainable development seeks to ensure that human needs are met without undermining the ability of ecosystems to support future generations.

The social aspect of the sustainable development is expressed in sustainable demo-graphic dynamics and social wellbeing.

Demographic sustainability addresses the long-term balance between population dynamics and resource availability, ensuring that current and future generations can meet their needs without compromising ecological integrity. It is concerned with managing population size and distribution to mitigate environmental impacts and promote social equity, especially in the face of rapid urbanization. There are cases however, when demographic sustainability addresses the fast decreasing of population, like in Bulgaria where the population decreased in the period 1989-2021 by about 2 million people (Sugareva and Murgov, 2021). Social sustainability, meanwhile, focuses on the well-being of people and communities, promoting human rights, health, and access to education and decent work.

Political sustainability is a state of stability and continuity in which a smoothly functioning government can avoid significant disruptions. It is characterized by the preservation of consistent institutions and policies, which are essential for long-term development, economic growth, and social unity. A key aspect of political sustainability is the empowerment of citizens to participate in the democratic renewal of their political institutions.

The economic aspect of the sustainable development is expressed in economic se-curity and growth. Economic sustainability is centered on practices that support long-term economic growth without negatively

impacting social, environmental, and cultural aspects of the community. It requires a healthy balance between growth and responsible resource use, driven by innovation and adaptation.

The environmental aspect of the sustainable development is expressed in the eco-logical security and space exploration.

Ecological sustainability centers on preserving the diversity and functioning of natural ecosystems, as well as the ecosystem services they provide. It means ensuring that nature can regenerate utilized resources. A primary challenge is the alarming rate of biodiversity loss, with populations of mammals, fish, birds, reptiles, and amphibians having declined by an average of 68% between 1970 and 2016.

Space exploration is increasingly recognized as a vital contributor to sustainability on Earth. Artificial Intelligence (AI) is a key enabler of this effort, providing the techno-logical foundation for advanced monitoring and autonomous operations.

Sustainable development goals and targets

The United Nations Sustainable Development Goals (SDGs), adopted in 2015 (United Nations Sustainable Development Goals, 2025), provide a global framework for addressing challenges such as poverty, climate change, and bio-diversity loss.

Here we will consider how the 17 goals are distributed on the four pillars – society, poli-tics, environment, economy.

The goals are as follows:

1. No poverty – economy.
2. Zero hunger – society.
3. Good health and well-being – society.
4. Quality education – society
5. Gender equality – society
6. Clean water and sanitation – environment
7. Affordable and clean energy – economy
8. Decent work and economic growth – economy
9. Industry, innovation and infrastructure – economy
10. Reduced inequalities – politics
11. Sustainable cities and communities – economy
12. Responsible consumption and production – economy
13. Climate action – environment
14. Life below water – environment
15. Life on land – environment
16. Peace, justice and strong institutions - politics
17. Partnerships for the goals - politics

For each and every goal, there are several targets.

For Goal 1, No Poverty, the targets are oriented around reducing by 2030 at least by half the population living in poverty through nationally appropriate social protection systems, equal right to economic resources and access to basic services, building resilience of the poor to the economic, social and environmental shocks and disasters.

For Goal 2, Zero Hunger, the targets are oriented to the end of all forms of malnutrition by 2023, doubling the agricultural productivity and income of small-scale food producers by 2023 and ensuring sustainable food production systems by 2030.

For Goal 3, Good Health and Well-being, the targets are oriented to reducing the global maternal mortality rate to less than 70 per 100 000 live births, reducing neonatal mortality to at least as low as 12 per 1000 live births and under-5 mortality to at least as low as 25 per 1000 live born and to end by 2030 the epidemics of AIDS, tuberculosis, malaria and neglected tropical diseases and combat hepatitis, water-borne diseases and other com-municative diseases.

For Goal 4, Quality Education, the targets are oriented to ensuring by 2030 that all girls and boys complete free, equitable and quality preprimary, primary and secondary edu-cation as well as ensuring equal access for all women and men to affordable and quality technical, vocational and tertiary education, including university.

For Goal 5, Gender Equality, the targets are oriented to ending all forms of discrimination against all women and girls everywhere, eliminating all forms of violence against all women and girls in the public and private spheres, including trafficking and sexual and other types of exploitation, ensuring universal access to sexual and reproductive health and reproductive rights as agreed in accordance with the Program of Action of the In-ternational Conference on Population and Development and the Beijing Platform for Ac-tion.

For Goal 6, Clean Water and Sanitation, the targets are oriented to achieving by 2030 universal and equitable access to safe and affordable drinking water for all and implementing integrated water resources management at all levels, including through transboundary cooperation as appropriate..

About Goal 7, Sustainable and Clean Energy, the targets are mainly related to ensuring till 2030 of universal access to affordable, reliable and modern energy services, with sub-stantial increase of the share of renewable energy. To double the global rate of im-provement in energy efficiency, to enhance the international cooperation to facilitate ac-cess to clean energy research and technology

About Goal 8, Descent Work and Economic Growth, the targets are oriented to achieving by 2030 at least 7 percent gross domestic product growth per annum in the least devel-oped countries and sustainable per capita growth in accordance with national circum-stances. The higher level of productivity should be achieved through diversification, technological upgrading, innovations and achieving full and productive employment and descent work for all women and men, including young people and persons with disabilities. This Goal includes policies for sustainable tourism to be designed and im-plemented that create jobs and promote local culture and products.

About Goal 9, Industry, Innovation and Infrastructure, the targets are oriented to creating quality, reliable, sustainable and resilient infrastructure, including regional and trans-border infrastructure, to promoting sustainable industrialization and, by 2030, sig-nificantly raising industry's share of employment and gross domestic product, in line with national circumstances, and double its share in least developed countries.

About Goal 10, Reduced Inequalities, the targets are oriented to achieving by 2030 income growth of the bottom 40% of the population at a rate higher than the national average, empowering social, economic and political inclusion of all, irrespective of age, sex, disability, race, ethnicity, origin, religion or economic or other status as well as reducing by 2030 to less than 3 per cent the transaction costs of migrant remittances and eliminat-ing remittance corridors with costs higher than 5 per cent.

About Goal 11, Sustainable cities and communities, the targets are oriented to ensuring by 2030 adequate, safe and affordable housing and basic services, providing access to safe, affordable, accessible and sustainable transport systems for all, providing universal access to safe, inclusive and accessible, green and public spaces, supporting positive economic, social and environmental links between urban, peri-urban and rural areas by strengthening national and regional development planning

About Goal 12, Responsible consumption and production, the targets are oriented to achieving by 2030 the sustainable management and efficient use of natural resources, halving by 2030 per capita global food waste at the retail and consumer levels and reduce food losses along production and supply chains, including post-harvest losses; substan-tially reducing by 2030 waste generation through prevention, reduction, recycling and reuse.

About Goal 13, Climate action, the targets are oriented to strengthening resilience and adaptive capacity to climate-related hazards and natural disasters in all countries and integrating climate change measures into national policies, strategies and planning.

About Goal 14, Life below water, the targets are oriented to preventing and significantly reducing marine pollution of all kinds, in particular from land-based activities, including marine debris and nutrient pollution; effectively regulating harvesting and end over-fishing, illegal, unreported and unregulated fishing and destructive fishing practices.

About Goal 15, Life on land, the targets are oriented to the conservation, restoration and sustainable use of terrestrial and inland freshwater ecosystems and their services, in par-ticular forests, wetlands, mountains and dry lands; promoting the implementation of sustainable management of all types of forests and reforestation globally; combating by 2030 desertification, restore degraded land and soil, including land affected by desertifi-cation, drought and floods, and strive to achieve a land degradation-neutral world; en-suring by 2030 the conservation of mountain ecosystems, including their biodiversity, in order to enhance their capacity to provide benefits that are essential for sustainable de-velopment.

About Goal 16, Peace, Justice and strong Institutions, the targets are oriented to signifi-cantly reducing all forms of violence, ending abusing, exploitation, trafficking and any form of violence and torture of children, promoting the rule of law at the national and international levels and ensure equal access to justice for all, by 2030, significantly re-ducing illicit financial and arms flows and combat all forms of organized crime, substan-tially reducing corruption and bribery, developing effective, accountable and transparent institutions at all levels, by 2030, providing legal identity for all, promoting and enforcing non-discriminatory laws and policies for sustainable development

About Goal 17, Partnership for the Coals, the targets are oriented to strengthening do-mestic resource mobilization, including through international support to developing countries, to improve domestic capacity for tax and other revenue collection; transfers of percentage of GNI of developed countries to developing countries, transfer of technologies (enhance North-South, South-South and triangular regional and international cooperation on and access to science, technologies and innovation; dissemination of environmentally sound technologies to developing countries on favorable terms), trade (promoting universal, rule-based, open, non-discriminating trading system under the World Trade Organization).

AI Role in Global Sustainability

The role of AI in global sustainability is dual. On one hand, AI is increasingly viewed as a key enabler for achieving global sustainability goals. The term "AI for Sustainability" refers to leveraging AI to address urgent societal, environmental, and economic challenges. On other hand, AI generates the profound risks for achieving global sustainability. This section will explore AI's dual-edged impact on various dimensions of sustainability, examining both the promising benefits and the profound risks.

The application of AI in the political sphere presents a profound duality. On one hand, AI has the potential to enhance democratic health by improving the quality of public service delivery and fostering citizen trust. For example, a chatbot could assist a citizen in navi-gating a complicated bureaucracy, thereby bolstering civic engagement. To increase political sustainability, government officials can use AI tools like ChatGPT, GreatGov GPT, Perplexity.ai, Lumen5, TLDR (Top 5 AI tools for those in government, 2023) which can streamline their processes, improve decision-making capabilities, and ultimately enhance the overall efficiency of government operations. However, these same technologies pose a substantial threat to democratic values and generate risks such as mass surveillance, data privacy violations, behavioral monitoring, and predictive policing, all of which threaten individual freedoms. Furthermore, generative AI's ability to produce highly convincing false content at scale and to flood the media with disinformation, thereby corroding social and political trust. The concept of "Algocracy," where an over-reliance on algorithms allows them to structure and limit human participation in rule-making decisions, raises concerns about a systemic shift away from procedural frameworks of democracy.

The economic implications of AI are complex, balancing the promise of a productivity boom with concerns over labor market disruption. AI is a powerful productivity multi-plier, theoretically freeing professionals from monotonous tasks to focus on creativity, strategy, and problem-solving. Some envision a future of shorter workweeks, with a study showing promising productivity gains of up to 24% from a four-day week. This could mean fewer working hours without compromising output, a transformation comparable to the shift from six-day to five-day weeks during the industrial era.

However, this optimism is tempered by the reality of job displacement. Reports from Goldman Sachs and others estimate that AI could replace the equivalent of 300 million full-time jobs globally (How will AI affect the global workforce?, 2025). While the impact on overall employment levels is projected to be "modest and relatively temporary" as displaced workers seek new roles, certain oc-cupations like computer programmers, accountants, and legal assistants are at high risk. Navigating this transition requires workers to acquire "AI literacy," which is emerging as a critical professional asset that can determine career trajectories and redefine workplace expectations. The capacity to apply AI intelligently and with a strategic mindset is be-coming more valuable than technical mastery alone. A critical observation is that the so-cietal and cultural adoption of AI's economic benefits is not a given. While the technology could enable greater work-life balance, the corporate narrative in some regions, such as India, seems to be moving in the opposite direction, valorizing long hours and a "hustle culture." This demonstrates that AI adoption could paradoxically increase work pressure by accelerating project cycles and raising performance benchmarks if cultural and policy choices do not align with the technology's potential for efficiency.

AI presents a similar duality in its social and demographic impacts. On the positive side, AI offers significant benefits in areas such as healthcare, providing fast and accurate di-agnostics and suggesting various treatment options for physicians to consider. Socially therapeutic robots can provide companionship for the elderly, easing loneliness and im-proving their quality of life. AI also reduces human error, a frequent and costly problem, particularly in high-stakes environments where fatigue is a risk.

Conversely, the rapid development of AI carries the risk of profound social disruption. The displacement of labor, particularly for lower-earning groups, can lead to increased unemployment and a widening gap between the rich and the poor, exacerbating wealth inequality. The benefits of AI may not be evenly distributed; the technology risks rein-forcing existing inequalities and introducing new forms of exclusion, especially in low- and middle-income countries. This "digital divide" can limit the participation of margin-alized groups, further concentrating power and wealth among privileged groups. The societal impact of AI is therefore largely a function of whether its benefits are democra-tized or concentrated. When the benefits are concentrated in privileged groups and the risks are imposed on vulnerable groups, AI will inevitably perpetuate existing power imbalances and social disparities.

AI is becoming an indispensable tool in the fight against climate change and for ecological conservation. It has the ability to transform complex systems and accelerate innovation in key domains like power, transport, and land use. For environmental monitoring, AI-powered platforms can analyze satellite imagery and sensor data to track deforesta-tion, global emissions, and air quality in near real-time. Companies are turning to AI-powered platforms to automate carbon tracking and make smarter, greener decisions. In Best 10 AI Tools for Sustainability & ESG Industry (2025), 10 AI Tools for Sustainability & ESG Industry are considered: Persefoni, Watershed, Datamaran, Sweep, Envizi (by IBM), FigBytes, Emex, Interos, DiginexESG, Sinai Technologies.

A critical paradox, however, is that AI itself presents a significant ecological footprint. The energy and water consumption of data centers, particularly for training large models, cannot be overlooked. While AI is celebrated for its ability to optimize energy use, as seen in Google's use of DeepMind's algorithms to achieve a 40% reduction in cooling energy consumption in its data centers (DeepMind AI Reduces Google Data Centre Cooling Bill by 40%, 2025), the environmental cost of the technology itself must be addressed for it to be a truly sustainable solution.

AI is a foundational technology for modern space exploration, enabling missions that would be impossible for humans alone. AI allows spacecraft to autonomously make de-cisions and continue functioning even when out of contact with Earth. The Perseverance rover, for example, has performed 88% of its driving autonomously, using its on-board computers to analyze camera images and navigate around hazards on terrain no human has ever seen (Mars 2020: Perseverance Rover, 2025). AI is also used to process the massive datasets collected by telescopes, helping astronomers identify exoplanets and gain deeper insights into the universe. By allowing satellites to autonomously avoid space debris and other hazards, AI reduces risk and human intervention in high-stakes situations.

Sustainable education and its role for sustainable development

Central to achieving sustainable development is education, particularly sustainable ed-ucation, which empowers individuals and communities with the knowledge, skills, and values necessary to promote sustainability in all aspects of life.

Sustainable education integrates principles of sustainability into the curriculum, teaching methods, and institutional practices. It emphasizes systems thinking, critical thinking, and participatory learning to foster awareness of environmental, social, and economic issues. According to the United Nations Educational, Scientific, and Cultural Organiza-tion (UNESCO), sustainable education aims to develop "the skills, values, and attitudes" needed to understand and address sustainability challenges.

The Role of Sustainable Education in Sustainable Development is in several directions.

First, Sustainable Education promotes awareness and knowledge. Sustainable education raises awareness about pressing global issues such as climate change, biodiversity loss, and resource depletion. By equipping learners with scientific knowledge and under-standing, it encourages informed decision-making and responsible behavior. For example, integrating climate science into school curricula enables students to grasp the causes and consequences of climate change, fostering a sense of urgency and responsibility.

Second, Sustainable Education fosters Values and Attitudes. Beyond imparting knowledge, sustainable education aims to shape values that support sustainability, such as respect for nature, social justice, and equity. It nurtures a sense of global citizenship and ethical responsibility, motivating individuals to contribute positively to society. Values-based education can inspire community engagement and grassroots action to-ward sustainability goals.

Third, Sustainable Education. develops skills for sustainable practices. Sustainable edu-cation equips learners with practical skills like resource management, energy efficiency, and sustainable agriculture. It promotes critical thinking, problem-solving, and innova-tion—skills essential for developing sustainable solutions. For instance, training pro-grams in renewable energy technologies empower communities to adopt cleaner energy sources.

Fourth, Sustainable Education encourages Participatory and Experiential Learning. Ex-periential learning methods, such as community projects, outdoor education, and ser-vice-learning, connect learners with real-world sustainability challenges. These ap-proaches cultivate leadership and collaboration skills while fostering a sense of agency and empowerment.

Despite its importance, implementing sustainable education faces challenges, including limited resources, curriculum rigidity, and lack of trained teachers. However, techno-logical advancements and global initiatives like the Sustainable Development Goals (SDGs) present opportunities to mainstream sustainability into education systems worldwide.

Sustainable education and AI

AI-powered educational tools can significantly enhance awareness by providing per-sonalized, interactive, and up-to-date information on critical sustainability issues. For example, AI-driven platforms can deliver real-time data visualizations on climate change impacts, helping students understand complex environmental phenomena through im-mersive simulations. AI chatbots can answer students' questions about sustainability challenges with scientifically accurate information. Virtual reality (VR) environments powered by AI can simulate climate scenarios or deforestation impacts, making abstract concepts tangible. Machine learning

algorithms analyze vast data sets to identify trends and generate insights, which educators can incorporate into lessons.

AI can facilitate the inculcation of sustainability values by customizing content that ap-peals to learners' cultural contexts and personal interests. AI-driven storytelling or gamified learning experiences can evoke empathy and ethical considerations related to environmental and social justice. For example, AI-adapted narratives can highlight local sustainability success stories, fostering pride and responsibility. Gamification platforms can reward sustainable behaviors, encouraging a mindset shift toward environmental stewardship.Sentiment analysis of learner responses can help educators tailor discus-sions to nurture humility, responsibility, and global citizenship.

AI can provide personalized training modules and simulations for developing practical skills in sustainability. For instance, virtual labs or interactive scenarios enable learners to experiment with renewable energy systems or sustainable farming techniques in a risk-free environment. For example, AI-powered apps can teach energy-efficient home practices by analyzing user behavior and offering customized recommendations. Simu-lations powered by AI can train students in sustainable resource management, such as water conservation strategies. Data analytics can help communities optimize renewable energy deployment or waste management practices.

AI can facilitate collaborative learning environments by connecting learners worldwide through intelligent platforms that support community projects, competitions, or shared problem-solving tasks. AI-driven analytics can also assess participant contributions, providing feedback and motivating continued engagement.

For example, AI moderation and organization of global sustainability challenges or hackathons, encouraging youth participation. Intelligent mentoring systems can provide guidance on local environmental initiatives, fostering hands-on experience. Adaptive learning systems that adjust content difficulty and support based on learner engagement levels in experiential tasks.

Using AI however also raises some challenges. Ensuring the accuracy and reliability of AI-generated content is needed to prevent misinformation. Digital divide issues may limit access to advanced AI tools, exacerbating educational inequalities. Overreliance on AI might reduce opportunities for critical thinking if not balanced with traditional education. AI systems must be culturally sensitive to avoid biases that could reinforce stereotypes. There’s a risk of manipulation if AI content is used to influence values without transparency. Balancing emotional engagement with factual accuracy requires careful design.

High development costs for sophisticated AI training tools may limit scalability. Ensuring the transfer of virtual skills to real-world contexts can be complex. Resistance is possible from traditional educational institutions toward adopting new, AI-based practical training methods.

Maintaining active and meaningful participation in AI-facilitated collaborations can be difficult. Ensuring equitable access to digital platforms to avoid marginalizing learners with limited resources can be difficult. Data privacy concerns can arise related to sharing community-specific sustainability projects.

Example of PhD program for Sustainable development

Here we present an example of PhD program for Sustainable Education. This doctoral program aims to develop advanced expertise in designing, implementing, and evaluating educational strategies that promote sustainability. It integrates interdisciplinary ap-proaches spanning education, environmental science, social sciences, and technology, with a focus on innovative solutions like AI and digital learning tools.

The PhD program could heve the following curriculum:

Year 1: Foundations and Core Courses
Introduction to Sustainability and Education
Educational Theories and Pedagogies for Sustainability
Environmental and Social Challenges
Research Methods in Education and Sustainability
Data Analytics and AI in Education
Year 2: Specialized Topics and Methodologies
Curriculum Design for Sustainable Development
Technology-Enhanced Learning and AI Applications
Cross-Cultural and Global Perspectives on Education
Qualitative and Quantitative Research Methods
Ethics in Sustainability Education
Year 3: Research and Dissertation
Proposal Development and Gap Analysis
Advanced Data Analysis Techniques
Fieldwork / Experimental Design

Dissertation Writing
Teaching and Dissemination of Research
Research Plans
Potential research areas include:
The Role of AI in Personalized Sustainable Education
Developing and Assessing Curriculum Models for Sustainability
Evaluating the Impact of Digital and Experiential Learning on Sustainability Attitudes
Cross-Cultural Adaptations of Sustainability Education
Barriers and Opportunities for Implementing Sustainability Content Globally
Sample Research Question:
"How can AI-driven adaptive learning systems enhance student engagement and un-derstanding of sustainability concepts across diverse educational contexts?"

Literature References for the PhD Course could include the following information sources: UNESCO (2024), Sterling (2001), Tilbury (2011), UNESCO (2017), UNESCO (2020), Barrett and Cummins (2016), Lee, Kwon and Park (2020), Selby and Kagawa (2013).

Possible Projects related to the PhD thesis could be:
Development of an AI-Driven Adaptive Curriculum for Sustainability Education in Primary Schools
Evaluating the Effectiveness of Virtual Reality Immersions in Teaching Climate Change
Designing and Testing a Gamified Learning Platform to Promote Sustainable Practices Among Youth
Cross-Cultural Study of Sustainability Education Policies and Implementation Barriers
Creating a Digital Repository of Sustainability Case Studies Leveraging AI for Educational Use
Assessing the Role of Teacher Training in Delivering Sustainability Education Using Technology

Conclusions

Sustainable development is the way the humanity could survive in future. Today the goals and targets for sustainable development are well established, but not easily achievable. Technologies and AI specifically can help achieving sustainability but they could generate also risks for global sustainability.

Sustainable education is a vital tool for achieving sustainable development. By integrating knowledge, values, and skills related to sustainability, it empowers individuals and communities to address global challenges effectively. Strengthening sustainable education systems is essential for fostering a sustainable future where economic prosperity, social inclusion, and environmental health coexist harmoniously.

AI offers immense potential to revolutionize sustainable education by personalizing learning, enhancing engagement, and providing practical tools. However, deploying AI effectively requires overcoming challenges related to accuracy, access, cultural sensitivity, and ethical considerations. When integrated thoughtfully, AI can serve as a catalyst in cultivating a globally responsible and skilled generation committed to sustainable development.

References

Barrett, A., Cummins, M. (2016) Transformative Learning for Sustainability. 2016.

Best 10 AI Tools for Sustainability & ESG Industry (2025). https://greenwolftechlabs.com/best-10-ai-tools-for-sustainability-esg-industry/, 2025.

DeepMind AI Reduces Google Data Centre Cooling Bill by 40%. (2025) https://deepmind.google/discover/blog/deepmind-ai-reduces-google-data-centre-cooling-bill-by-40/, 2025.

How will AI affect the global workforce? (2025) https://www.goldmansachs.com/insights/articles/how-will-ai-affect-the -global-workforce , 13 of August, 2025.

Lee, H., Kwon, Y., Park, S. (2020) AI in Education: Opportunities and Challenges. 2020.

Mars 2020: Perseverance Rover (2025). https://science.nasa.gov/mission/mars-2020-perseverance/, 2025.

Selby, D., Kagawa, F. (2013) Education for Sustainability: A Critical Review. 2013.

Sterling, S. (2001) Sustainable Education: Re-visioning Learning and Change. 2001.

Stoynov, P.T. (2017) Security, technologies and economic competitiveness. In Proceedings of the 7th international conference Globalization: Business, Finance and Education, Varna, Bulgaria (24 September 2017).

Sugareva, M., M. Murgova (2021)What are the real demographic problems of Bulgaria?. In Statistical surveys and analysis; Bogdanov, B., Tsanov, V., Eds.; National statistical institute, Bulgaria, 2021; Volume 3, pp. 9–40.

Tilbury, D. (2011) Education for Sustainability: An Expert Review of Processes and Learning. 2011.

Top 5 AI tools for those in government (2023) https://www.limitlesslab.org/blog/top-5-ai-tools-for-those-in-government, 5 of May, 2023.

UNESCO (2017) Education for Sustainable Development Goals: Learning Objectives. 2017.
UNESCO (2020). Global Action Programme on Education for Sustainable Development. 2020.
UNESCO (2024) Education for Sustainable Development: From Learning Objectives to Action. 2024.
United Nations Sustainable Development Goals (2025) https://www.undp.org/sustainable-development-goals, 2025.

Homework: a study with reference to the performance of mathematics students

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Abstract.
Homework in Mathematics is a common instructional practice aimed at motivating students and developing their skills (Radović et al., 2019). It also enables parents to understand students' educational level and comprehension, and it improves students' performance. In this study, hierarchical multiple regression analysis is used to examine the influence of mathematics homework on student performance across four different schools, taking into account each school's optimal homework frequency. The results indicate that homework frequency has implications for the performance of ninth-grade students. The study also indicates a change in homework trends from 2016 to 2021, with an increase over the years in all four schools except one.
Keywords: ոathematics, homework, education, 9th standard, frequency, influence

Introduction

Homework is a frequent instructional method intended to encourage students, enhance their learning abilities and practices, and inform parents about their children's learning. It may also contribute to improving student achievement (Urauchi & Tanno, 2022). Homework is usually described as any assignment given to pupils by teachers that is to be completed outside of school hours. It is a significant addition to the learning opportunities available in the classroom. Homework is a useful tool for extending instruction and monitoring student progress in several subject areas, and homework activities can benefit both learners and educators. When students work on homework, they review and strengthen their problem-solving abilities and prepare for examinations. Furthermore, by examining students' work, teachers can use homework as a form of feedback to determine whether their instructional techniques are effective (Abd Algani, 2021).

Homework allows students to review daily topics, enhance their understanding of arithmetic ideas and problem-solving skills, learn from past mistakes, and prepare for assessments. Although assigning homework is often viewed as a good way to improve students' learning, there is disagreement about its value and relevance with regard to student achievement. Teachers also have differing viewpoints on the impact of homework. While some instructors assign homework regularly, others seldom use it, and some believe that homework should be prohibited in elementary schools because it is a waste of time for students, teachers, and parents (Abd Algani & Gross, 2024).

Teachers have been assigning homework to children for a long time, yet the impact of homework on student progress remains debatable. Previous research has been inconclusive regarding the benefits of homework, as some studies have found that homework positively influences student success, while others have reported negative effects (Abd Algani & Gross, 2023).

Research on the association between homework and student progress, particularly in mathematics education, has yielded mixed results. Keith, for example, examined the academic achievement of high school students and the amount of time they spent on homework, and found a positive relationship. In elementary, middle, and high schools, however, several studies have reported negative overall relationships between academic progress and time spent completing homework. Other studies have found strong positive links between homework and mathematics proficiency. For instance, Ladson and Fernández-Alonso, Suárez-Álvarez, and Muñiz examined the relationship between mathematics achievement and homework time and reported substantial effects (Fernández-Alonso et al., 2015; Ladson, 2012; Rosário et al., 2011).

However, when homework is appropriately designed—aligned with students' learning needs, interests, and age- it may enhance academic achievement and skills. Kunter and Baumert, and Fernández-Alonso, Trautwein, Lüdtke, Suárez-Álvarez, Dettmers, and Muñiz reported positive relationships between homework frequency and academic success when they focused on homework frequency rather than time spent on homework (Atamna, 2021; Cooper et al., 2006; Cooper & Valentine, 2001; Dettmers et al., 2009, 2010; Fernández-Alonso et al., 2015; Trautwein et al., 2009). Research also suggests that assigning homework to younger students has minimal

influence on academic achievement and may contribute to negative attitudes toward school. Cooper, Robinson and Patall, for example, observed that students in grades 7-12 show stronger correlations between homework and achievement than students in grades K–6. Kalenkoski and Pabilonia also found that homework time has a positive impact on high school boys' academic achievement (Atamna, 2021; Cooper et al., 2006; Cooper & Valentine, 2001; Dettmers et al., 2009, 2010; Fernández-Alonso et al., 2015; Trautwein et al., 2009).

A recent Spanish study suggested that assigning homework that takes about one hour per day is optimal. A Department of Education study reported that focusing on homework for two to three hours per day can significantly improve student proficiency in subjects such as English, mathematics, and science. However, a Stanford University study indicated that excessive schoolwork may lead to increased stress, physical health problems, imbalance, and social isolation. As this discussion suggests, the optimal frequency and amount of homework remain unclear and may vary by subject and country. Therefore, using data from students in four schools, this study aims to estimate the ideal frequency of assigning mathematics homework across different schools. The data also enable researchers to track changes in homework frequency over time. In addition, this study examines how frequently teachers assigned homework between 2018 and 2021.

Mathematics is an essential part of the human world and a fundamental element of human reasoning and cognition, enabling individuals to understand and engage with the world, including themselves. It supports the development of mental discipline while encouraging logical thinking and intellectual rigor. Moreover, mathematics underpins learning in many other academic subjects that depend on mathematical knowledge.

To begin, it is important to consider why mathematics is significant and distinctive among school subjects. Put differently, what role does mathematics play within the overall curriculum? The following points highlight why mathematics should be regarded as a core subject:

- Mathematics is a cross-cutting discipline. Historically, mathematics (geometry and algebra) constituted two of the seven liberal arts in both Greek and medieval education. This historical role supports the view that mathematics contributes to the mental discipline required for learning in other subjects.
- Individuals who aim to live productive lives as constructive, caring, and thoughtful citizens need to be mathematically literate. Mathematical literacy includes basic computation skills, numerical reasoning, spatial ability, and related competencies.
- Mathematical concepts and processes are used to solve problems in science, engineering, economics, and other disciplines. For example, understanding complex numbers is necessary for studying many topics in electronics. Compared with basic mathematical literacy, such applications often require more advanced mathematical concepts and processes.
- Mathematics is an important part of humanity's cultural legacy, and efforts should be made to preserve it.

Second, because mathematics provides foundational knowledge and skills for other school subjects—such as science, art, and economics- the relationship between mathematics and other academic areas deserves attention. In some curricula, mathematics is presented as an "instrumental subject" that supports the study of other disciplines, whereas other curricula offer integrated courses that combine mathematics with additional subject areas.

Finally, the number of hours (or the percentage of instructional time) devoted to mathematics in national curricula can be examined in comparison with other subjects. Beyond quantitative comparisons, qualitative descriptions of mathematics instruction in relation to other disciplines are also required. Although such comparisons may not fully explain why some countries place a high value on mathematics, they may encourage further discussion.

The primary goal of this research project is to investigate the relationship between homework frequency and ninth-grade students' achievement in mathematics across a number of countries. The second goal is to determine the frequency of homework in different schools. The final goal is to identify the optimal homework frequency across schools.

Theoretical Background

The significance of homework for educational achievement is an age-old debate that has shifted across eras—at times viewed as a tool for increasing a country's competitiveness, and at other times nearly abolished. Cooper discusses this homework controversy, and the arguments and disputes continue. It is regarded as a difficult yet intriguing topic. Cooper et al. argue that homework is an activity full of paradoxes, producing both positive and negative consequences. As a result, depending on one's perspective, it is possible to find evidence supporting the idea that homework benefits all children, or that it is irrelevant and should be eliminated. Similarly, one may claim that homework has a compensatory effect because it supports pupils who face greater challenges, or that it functions as a form of oppression because it advantages those higher on the socioeconomic ladder. Moreover, this issue has moved beyond the classroom into the home and has become a popular topic on

which people may hold opinions without being well informed, as Goldstein warned decades ago after reviewing nearly 300 articles on the subject in the *Education Index* and finding that only 6% were scientific research (Goldstein, 1960, Abd Algani, 2019).

Homework can be classified as (a) revision or (b) other, depending on its aim. The most common objective of revision homework is to provide students with opportunities to review and practise what they learned in school. Extension homework is designed to allow students to apply what they have learned in class to new settings. Another form of homework is intended to help students learn new skills independently, which may be achieved through individual reading, project creation, or problem solving.

Homework can serve a variety of purposes in addition to increasing
learning. It may be used to:

- increase communication between students and their parents,
- adhere to pedagogical guidelines,
- discipline students, and
- update parents about what is happening at school.

Homework is likely to influence students' learning progress. Many educators believe that homework plays an important role in education. Various studies indicate, however, that not all teachers assign homework, and not all students complete it (Abd Algani, 2019).

It is vital for students to enjoy a subject in order to be effectively motivated for autonomous study in that area. A lack of understanding of the curriculum, the use of inappropriate teaching approaches and methods, or a teacher's inability to present the material in a clear and engaging manner are common causes of subject unpopularity. Unfortunately, mathematics is frequently perceived as an unpopular subject among students.

Maňák offers a variety of homework options for students studying mathematics. He highlights that problem-centred tasks, exercises that explain specific phenomena, and exercises that integrate theoretical ideas into practice—particularly those that use real-life variables—are appropriate forms of mathematics homework (Maňák & Šalé, 1992; Blum & Niss, 1991). Mathematical puzzles and enjoyable exercises, as well as activities requiring students to interpret mathematical conundrums and real-life situations, are also effective task types (Glasnovic Gracin, 2018). In addition, there are many activities involving graphs, schematic representations, sketching, model representation, and similar approaches. This wide range of assignment types allows teachers to vary tasks and keep them engaging. Exercises linked to students' everyday experiences and needs may encourage them to work at home. Word problems are often discussed separately in mathematics exercises (Crandall & others, 1987). They are frequently unpopular, primarily because students struggle to translate verbal statements into mathematical language and solve them; consequently, students are often confused by word problems.

According to some researchers, the following features of quantitative assignments are essential:

- Solving a clearly defined problem;
- Solvability through individual pupil activity;
- Solution using arithmetic methods; and
- Pupils experiencing different correct solutions.

"Formal exercises", in which diverse forms and connections are explored apart from context, hold a specific position in mathematics instruction (Blum & Niss, 1991). Formal exercises may include arithmetic, construction, proof-based, and other types of tasks. Completing such activities supports the development of students' mathematical thinking. However, formal assignments should be complemented with factual and applied tasks so that students can use mathematical reasoning in real-world contexts (Abd Algani, 2022; Harsy et.al, 2021).

More than many other educational activities, completing homework requires a complex interaction among school, family, peer, and community influences. Teachers use a range of methods to communicate homework expectations and track completion. Parents may also set homework standards and establish a home environment that supports their children's homework experiences. Teachers, family members, and classmates all provide cues about the value of homework. Finally, the wider society plays a role by offering sports and recreational activities that may compete with time available for homework. Together, these factors can contribute to disagreements among children, parents, and teachers and may become a source of family stress. Most people do not rely on research publications to form opinions and judgments about children's schoolwork; instead, many rely on less reliable sources of information (Kulik et. al, 2019; Abd Algani, 2024).

The disadvantages of homework are frequently highlighted in mainstream periodicals and the popular press, particularly regarding elementary school students. Parents complain that their children have too much or too little homework, that it is too easy or too difficult, or that it is confusing. Teachers lament insufficient parental support for homework completion, a lack of training in designing effective homework tasks, and limited time to create them. Students complain that homework takes away from their free time; indeed, many view homework as a primary source of stress. In addition, reviews of empirical studies on homework—which are intended to bring educators closer to a shared understanding of homework's influence on student progress—often fail to do so. Due to limited evidence, teachers have begun to question the effectiveness of homework, particularly in primary

school. Homework tasks rarely have a single goal and often combine instructional and non-instructional purposes. Practice homework is the most common instructional form and is assigned to give students opportunities to practise skills and concepts learned in class. Other types include preparation homework (introducing topics that will be covered more fully in class), extension homework (applying prior knowledge and skills to new situations), and integrative homework (combining separately learned concepts and skills in activities such as writing tasks or scientific investigations and projects) (Kulik, 2019).

In addition to improving learning, homework is often assigned for non-instructional reasons, including strengthening communication between parents, children, and schools, adhering to school or district policies, and, in some cases, disciplining students. The most common justification for assigning homework is that it can enhance academic performance. However, studies involving elementary school students consistently show that homework and academic achievement at the primary level are largely unrelated (Abd Algani, 2024). Despite recent unfavourable findings and limited empirical support, elementary teachers continue to assign homework (Abd Algani & Gross, 2023).

Although findings have varied over time, the relationship between homework time and educational outcomes has been the most frequently examined factor. Early experimental research assumed that time spent studying reflected dedication and effort; therefore, a positive relationship between homework and achievement was expected. This view was common toward the end of the twentieth century, when more positive than negative effects were reported. At the same time, it was acknowledged that the relationship was not strictly linear and that its strength varied by student age—stronger in post-compulsory secondary education than in compulsory schooling, and near zero in primary education (Abd Algani & Gross, 2023; 2023).

At the turn of the century, hierarchical linear models challenged this assumption by demonstrating that homework is a multilevel phenomenon, in which its effect on outcomes is influenced more by classroom factors (e.g., the frequency or amount of homework assigned) than by individual attitudes (Abd Algani & GROSS, 2023). Multilevel research suggests that individual differences in time spent on homework have little influence on academic performance; when statistically significant results are observed, the effect is often negative. Factors that are positively associated with homework time may work in opposite directions when predicting achievement, which can explain null or negative relationships. For instance, some students may spend little time on homework because they learn quickly, have strong cognitive abilities and prior knowledge, or are not diligent and do not complete homework tasks. In contrast, students may spend more time on homework because they struggle with learning or concentration, have low expectations and motivation, require more direct support, or devote substantial care and attention to their work. Gender may show a similar pattern: girls often spend more time on homework than boys, yet they perform better in reading and worse in mathematics on standardised tests (Fives, 2003; Abd Algani, 2022).

When homework time is examined at the classroom or school level, multilevel research has reported more systematic effects on achievement. De Jong et al. found that the annual amount of assigned homework was positively and substantially associated with mathematics scores. Similarly, both the amount of homework assigned and the frequency of assignments have been linked to improved achievement. When frequency and volume are examined together, evidence suggests that frequency has a stronger effect than volume. It has been estimated that students in classes where homework is regularly assigned gain about 20% of a standard deviation in mathematics and science compared with students in schools where homework is assigned only occasionally. Significant results have also been found in studies examining homework volume at the classroom or school level. After controlling for school and student background variables, Dettmers et al. reported that the school-level effect of homework is positive in most participating PISA 2003 countries, and the OECD, using PISA 2012 data, reported that schools in which teachers assign more homework per week tend to show better outcomes (Dettmers et al., 2009; Abd Algani, Hibi, Abo Al-Hija, 2021). Overall, homework appears to be multidimensional, with effects that vary across levels of analysis—often positive at the classroom or school level, and negative or null at the individual level. The fact that stronger effects appear at classroom and school levels also highlights the importance of school homework policies and instructional practices, in addition to the amount of time students spend on homework individually.

Importance of Research

The significance of this research extends beyond identifying the relationship between homework frequency and mathematics achievement. In mathematics, the optimal homework frequency remains unclear. Therefore, this study uses data from four schools to analyse the association between homework frequency and eighth-grade mathematics achievement in order to identify an appropriate homework frequency in mathematics. The study also examines trends in homework frequency over time. In addition, this research compares four schools with different homework frequencies to explore how they differ from schools in Israel (Abd Algani, Abu Alhaija, Awad, 2021; Abd Algani, 2022).

Despite the perceived benefits of homework, there is no consensus among teachers regarding how often homework should be assigned (Fitzmaurice et al., 2020). Previous survey findings indicate that both the frequency of assigning homework and the time spent on mathematics homework vary, even from one teacher to another. Teachers' homework practices differ because they hold different views about its benefits. Schools may also have different policies regarding homework, leading to variation in implementation. Moreover, homework can create challenges for teachers, students, and parents. Teachers report that some students show limited effort in completing assignments, students complain about spending time on homework rather than leisure, and parents express dissatisfaction because they may disagree about when, where, or how homework should be completed.

1. Method. Quantitative method is used in this study. This study used four different school students across the Arab countries. The students who are considered for this research include both high performing and low performing students. The block diagram of the study is shown in Figure 1.

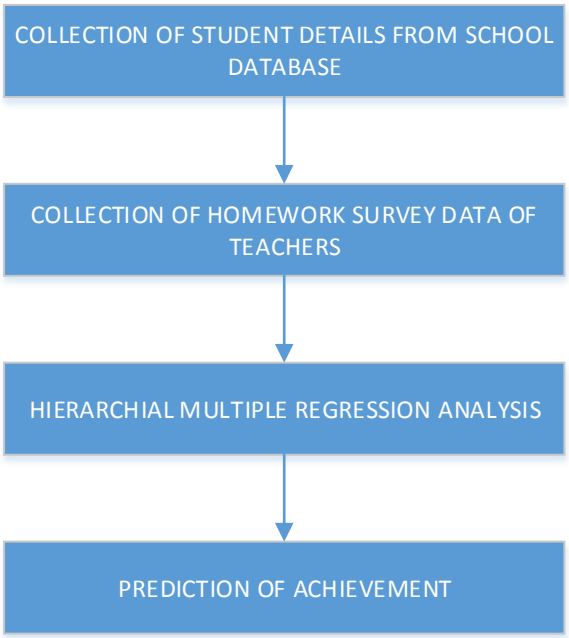


Figure 1: Block Diagram of the Study

The data used for the study was received from all the four different schools(Wechsler et al., 2002). Table 1 represents the number of students who are from Mathematics students from all the four schools. A two-stage stratified cluster design is deployed from the school data collection end for a clear representation of the students in the exams. In the case of the first sampling phase, initially, the class of students were selected based upon the Probabilities Proportional Size (PPS) across the three different classes of students and a random selection of two classes were further done for replacing the students who were not initially not willing to participate in the first place. More than 300 students participated from all the school.

In the study, two variables are considered. The first one is the homework frequency which is the independent variable. This is derived out of the Mathematics questionnaire. The other variable is the student scores which is the dependent variable involved in the study. The teachers are asked to answer the questionnaire as per the codes represented in Table 2.

The questionnaire was further modified for the years 2020 to 2021 as how often the teachers assign the homework as represented in Table 3.

The answers of the teachers were recorded using the SPSS software tool.

Table 1: The number of students form the four schools considered for the research

	School 1	School 2	School 3	School 4
2018	357	601	600	791
2019	404	459	449	737
2020	441	592	692	476
2021	452	611	607	220

2. Results. For each of the schools in 2018, 2019, 2020, and 2021, hierarchical multiple regression models were used to determine the association among homework frequency & student accomplishment. In all regression studies, some Specific homework frequency was chosen as a constant/reference group. Without the IDB analyzer tool that has been built, the data cannot be processed. IDB analyzer considers the hierarchical structure of the data while preparing a data set for statistical data (Arikan, 2014).

Table 2: Homework frequency as per 2018 to 2019 survey

Sl. No.	Frequency of homework	Code Number
1	Almost everyday	1
2	On completing half the lesson	2
3	On the completion of a few lessons	3

SPSS was used to analyse the data in this investigation. However, when using SPSS with IDB Analyzer, the ANOVA table is not available, but the t-value is available in regression analysis. The result can be considered statistically significant on the 95 percent level if the absolute value of the group difference divided by the standard error of such difference exceeds a t-value of 1.96, according to IADB. As a result, t value is used to conduct significance tests. Year with the 9th grade results, the results are reported in the following parts.

Table 3: Homework frequency as per 2020 to 2021 survey

Sl. No.	Frequency of homework	Code Number
1	I do not assign any homework	1
2	I assign homework less than once in a week	2
3	I assign homework once or twice in a week	3
4	I assign homework three or four times in a week	4
5	Everyday	5

Homework Frequency vs Student Achievement. 9th grade regression results for the four years starting from 2018 to 2021 are interpreted in table 4, 5 and 6. As a result, significant relationship is found between the achievement of the students and the frequency of homework given to them.

Table 4: Hierarchical Multiple Regression Analyses for predicting mathematics achievement in 9th grade from homework frequency in 2019

School	R-Square		Category Name		
			Constant	Half Lesson	All Lesson
1	0.01	B	467.30	35.60	10.80
		SE B	26.40	26.98	27.77
		B		0.08	0.08
		t-value		1.32	0.38
2	0.05	B	544.52	40.57	62.68
		SE B	19.05	22.70	19.97
		B		.10	.10
		t-value		1.80	3.23
3	0.00	B	422.73	1.87	11.28
		SE B	10.81	16.44	14.14
		B		0.06	0.07
		t-value		.10	0.79
4	0.03	B	466.53	13.52	46.89
		SE B	6.33	8.31	7.19
		B		0.03	0.04
		t-value		1.71	3.33

The findings of the hierarchical linear regression analysis are shown in Table 4. Homework frequency predicted 1% of the variance in student success (R2=.01) in School 1, 5% (R2=.05) in School 2, and 3 percent (R2=.03) in School 4, but none in School 3 (R2=.00). Table 7 further shows that homework frequency boosted student success in all four schools. However, only school 2 **and** 4 show statistically significant improvements.

Table 5: Hierarchical Multiple Regression Analyses for predicting mathematics achievement in 9th grade from homework frequency in 2020

School	R-Square		Category Name		
			Constant	Half Lesson	All Lesson
1	0.01	B	444.25	61.98	45.20
		SE B	34.29	34.27	35.91
		B		0.11	0.11
		t-value		1.86	1.26
2	0.05	B	526.32	91.58	93.43
		SE B	15.05	14.94	17.14
		B		0.07	0.07
		t-value		6.41	5.75
3	0.00	B	423.16	37.70	12.01
		SE B	10.66	12.11	21.34
		B		0.04	0.04
		t-value		3.19	0.56
4	0.03	B	480.14	30.60	41.80
		SE B	9.38	10.40	10.04
		B		0.06	0.05
		t-value		2.94	4.11

The findings of the hierarchical linear regression analysis are shown in Table 5. In the United States, homework frequency accounted 1% (R2=.01) of the variance in student success in school 1, 9% (R2=.09) in school 2, 2% (R2=.02) in school 3, and 3% (R2=.03) in school 4. Table 8 also shows that in schools 2, 3, and 4, there was a significant association between homework frequency & student success, but not in school 1. The data also shows that the frequency of homework enhanced student achievement in all of the schools.

Table 6: Hierarchical Multiple Regression Analyses for predicting mathematics achievement in 9th grade from homework frequency in 2021

School	R-Square		Category Name		
			Constant	Half Lesson	All Lesson
2.80	0.01	B	516.08	-14.08	3.27
		SE B	2.80	5.24	4.05
		B		0.02	-2.6
		t-value		0.03	0.80
2	0.05	B	541.65	81.10	68.75
		SE B	56.18	56.82	60.85
		B		0.21	0.20
		t-value		1.45	1.14
3	0.00	B	442.53	18.86	1.64
		SE B	11.56	13.47	21.51
		B		0.05	0.04
		t-value		1.41	0.07
4	0.03	B	484.30	25.83	58.39
		SE B	8.08	8.76	9.43
		B		0.05	0.05
		t-value		2.92	6.32

The findings of said hierarchical linear regression analysis are shown in Table 6. Homework frequency explained 3% (R2=.03) of the variance in student academic achievement 2, 1 percent (R2=.01) in school 3, and

5% (R2=.05) in school 4, but none in school 1 (R2=.00). Table 9 shows that homework frequency boosted student success in schools 2, 3, and 4, but reduced in school 1. There were statistically significant changes in 1 and 4.

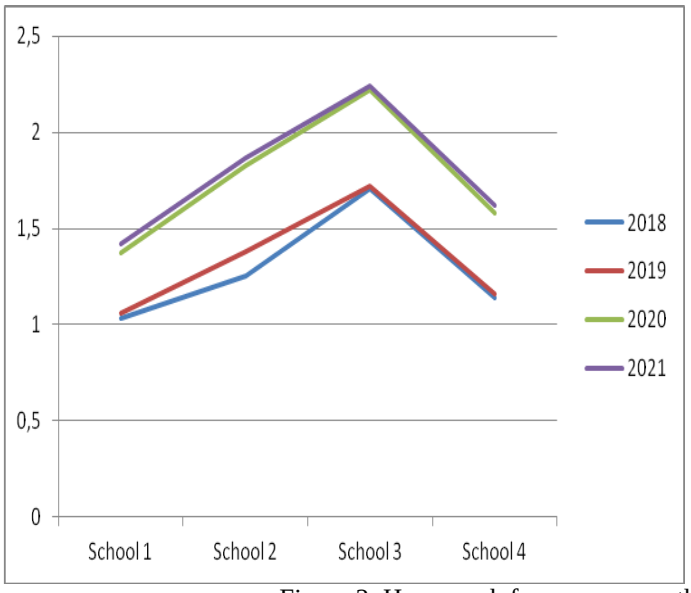


Figure 2: Homework frequency over the years of 2018 to 2021

The trend of providing homework in mathematics courses is seen in Figure 2. It revealed that teachers in all the chosen schools are assigning fewer and fewer homework assignments. Despite the fact that there was a substantial link among homework frequency & student success in grades 4 and 2, instructors in those schools were also giving less homework in contrast to prior years.

Tables 4, 5, and 6 show that, with the exception of school 1, there is a substantial association between homework frequency & student accomplishment in all of the schools studied. In general, the increased homework frequency in schools 2 and 4 resulted in considerable increases in student achievement. Schools 1 and 3, on the other hand, did not show this tendency. The ideal homework frequency in school 2 and 4 is virtually every day. However there is no optimal homework frequency in school 1 or school 3 since no association between student success and homework frequency was identified in these schools in general.

Discussion

In 9th grade, the study discovered that homework frequency has a substantial impact on student success. According to Trautwein's research, the frequency of homework has a considerable impact on student progress. Trautwein also discovered that the amount of time spent on homework had a negative correlation with student success(Atamna, 2021). Previous research has revealed that homework in middle school is more beneficial than homework in elementary school. It's likely that elementary school children spend a lot of time on homework whereas middle school students have ample time to do it. It's possible that this is one of the causes for the substantial relationship in 9th grade.

Despite the fact that there is a tiny association among homework frequency & student success in 9th grade, and there are complaints about assigning and doing homework, the mass of educational stakeholders think that homework is a good instructional method. Despite the fact that different opinions & policies exist regarding homework assignment, Patnam believes that teachers should allocate a balanced amount of tasks as homework on a regular basis that is aligned with students' needs so that it is not too easy for certain students while being too difficult for others (Patnam, 2013). Students may benefit from challenging guided activities since they will feel more satisfied and gain self-confidence by answering practise questions.

In all of the schools studied, the trend of assigning homework is negative from 2018 to 2021, with the exception of 9th grade students in school 3. Despite the fact that homework frequency has a beneficial impact on student progress in grades 2 and 3, instructors in grades 2 and 4 assign homework less often. However, at all of the schools studied, the frequency of homework is higher in 9th grade.

Conclusion

In four schools, this study looked at the link between homework frequency & student success in ninth grade mathematics. While there was no statistically significant link between 3 homework frequencies at schools 1 and 3, schools 2 and 4 showed a significant relationship. Despite the fact that homework frequency has no influence on student accomplishment in any school, instructors should continue to give homework since it emphasizes commitment, preparation, timekeeping, and working independently. However, it is critical to provide the appropriate quantity of homework at the appropriate times. The general principle behind giving homework is that instructors should do it every day, but the amount of time it takes to finish it should vary by grade level. At each grade level, there should be time set up to focus on assignments. 5th students, like 3rd graders, should devote one hour each day to homework completion. The amount of time spent on homework for various grades is shown in the graphical form in Figure 3.

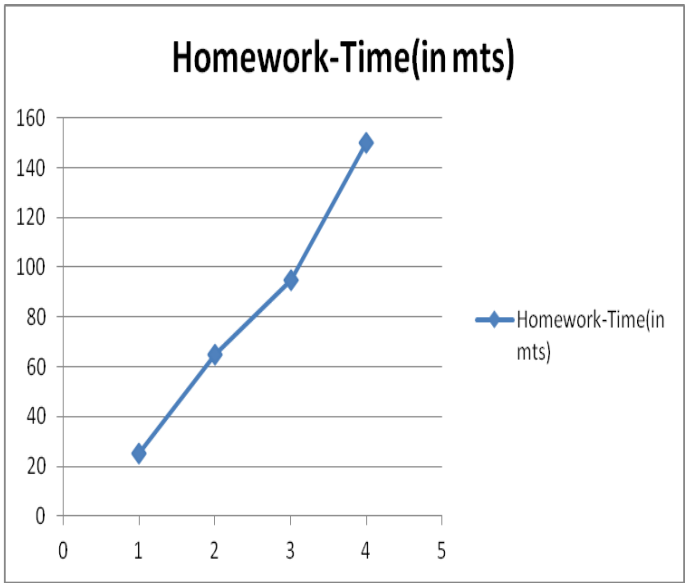


Figure 3: Homework time of Students

While the declining trend in homework frequency, despite increasing student achievement in grades 2 and 4, is startling, it is even more shocking to see how much homework frequency is a major predictor of student performance in 9th grade. More research is needed to examine homework practises in various schools in order to determine why it boosts student progress in certain nations and not in others. This study only looked at homework frequency; however, future research might look at the amount of time it takes to finish assignments, homework kinds, homework tracking, and other components of homework practises to identify which parts of homework contribute to improved student accomplishment (Abd Algani, 2019; Abd Algani, Abu Alhaija, Awad, 2021).

Limitations

The major limitation of the study is the number of schools involved in the study. More number of schools can be incorporated in future studies(Pathan et al., 2014). Also, the Mathematics marks involved in the study are reported from the school database itself. This can be substituted with the marks of students in their Public exams. Also students from different grades can be used for the study.

References

Abd Algani, Y.M. (2024). Solving mathematics anxiety, lack of confidence and negative attitude with artificial intelligence models: insights from stakeholders. Journal for the Mathematics Education and Teaching Practices, 5(2), 89-100

Abd Algani, Y., & Gross, Z. (2024). Effectiveness of Digital Versus Printed Arabic Text on the Literacy mathematics tasks of Seventh- and Eighth-Grade Students. Research Journal in Advanced Humanities, 5(1).

Abd Algani, Y. & GROSS, Z. (2023). Lecturers-based evaluation on the role of technological advancements in teaching. Texto Livre, 16, e46036.

Abd Algani, Y. M. (2022). Role, Need and Benefits of Mathematics in the Development of Society. Journal for the Mathematics Education and Teaching Practices, 3(1), 23-29.

Abd Algani, Y., Hibi, W., Abo Al-Hija, Y. (2021). The Impact of Using the Mathematical Modeling in Communication and Mathematical Achievement in Preparatory School Students. Psychology and Education Journal, 58(2), 5482-5492.

Abd Algani, Y., Abu Alhaija, Y., Awad, N., (2021). The Impact of Using Digital Books on The Level of Motivation of Teachers and Students to Teach and Learn Mathematics in Elementary Schools in Palestinian Arab Society in Israel, Turkish Journal of Computer and Mathematics Education, 12 (14), 3025-3043.

Abd Algani Y. (2019). The Effect of Mathematics Events on The Adjustment of Students' Error in Fractions. International Journal of Development Research, 09, (11), 35-39

Arikan, S. (2014). A Regression Model with a New Tool: IDB Analyzer for Identifying Factors Predicting Mathematics Performance Using PISA 2012 Indices. Online Submission, 4(10), 716–727.

Atamna, J. (2021). The Relationship between Homework and Motivation for Learning among Arab Elementary School Students in Israel. Rocznik Pedagogiczny, 44, 151–162.

Blum, W., & Niss, M. (1991). Applied mathematical problem solving, modelling, applications, and links to other subjects—State, trends and issues in mathematics instruction. Educational Studies in Mathematics, 22(1), 37–68.

Cooper, H., Robinson, J. C., & Patall, E. A. (2006). Does homework improve academic achievement? A synthesis of research, 1987–2003. Review of Educational Research, 76(1), 1–62.

Cooper, H., & Valentine, J. C. (2001). Using research to answer practical questions about homework. Educational Psychologist, 36(3), 143–153.

Crandall, J. & others. (1987). ESL through Content-Area Instruction: Mathematics, Science, Social Studies. Language in Education: Theory and Practice, No. 69. ERIC.

Dettmers, S., Trautwein, U., & Lüdtke, O. (2009). The relationship between homework time and achievement is not universal: Evidence from multilevel analyses in 40 countries. School Effectiveness and School Improvement, 20(4), 375–405.

Dettmers, S., Trautwein, U., Lüdtke, O., Kunter, M., & Baumert, J. (2010). Homework works if homework quality is high: Using multilevel modeling to predict the development of achievement in mathematics. Journal of Educational Psychology, 102(2), 467.

Fernández-Alonso, R., Suárez-Álvarez, J., & Muñiz, J. (2015). Adolescents' homework performance in mathematics and science: Personal factors and teaching practices. Journal of Educational Psychology, 107(4), 1075.

Fitzmaurice, H., Flynn, M., & Hanafin, J. (2020). Primary teachers' homework practices: Identity, expectations, policies and cultural values. Issues in Educational Research, 30(3), 897–919.

Fives, H. (2003). Exploring the relationships of teachers' efficacy, knowledge, and pedagogical beliefs: A multimethod study. University of Maryland, College Park.

Glasnovic Gracin, D. (2018). Requirements in mathematics textbooks: A five-dimensional analysis of textbook exercises and examples. International Journal of Mathematical Education in Science and Technology, 49(7), 1003–1024.

Goldstein, A. (1960). Does homework help? A review of research. The Elementary School Journal, 60(4), 212–224.

Ladson, F. V. (2012). The effect of homework completion on standardized math scores of fifth grade African American students [PhD Thesis]. Walden University.

Maňák, J., & Šalé, F. (1992). Problém domácích úkol\uu na základní škole. Masarykova univerzita.

Pathan, M. M., Zamzam Emhemad Mari Aldersi, & Ergaya Ali Gerair Alsout. (2014). Speaking In Their Language: An Overview Of The Major Difficulties Faced By The Libyan Efl Learners In Speaking Skill. https://doi.org/10.5281/ZENODO.15956

Patnam, V. S. (2013). Factors related to student achievement in mathematics and comparison of the US with other countries: A study based on TIMSS 2007 report. George Mason University.

Radović, S., Marić, M., & Passey, D. (2019). Technology enhancing mathematics learning behaviours: Shifting learning goals from "producing the right answer" to "understanding how to address current and future mathematical challenges." Education and Information Technologies, 24(1), 103–126.

Rosário, P., Mourao, R., Trigo, L., Suárez, N., Fernández, E., & Tuero-Herrero, E. (2011). English as a foreign language (EFL) homework diaries: Evaluating gains and constraints for self-regulated learning and achievement. Psicothema, 23(4), 681–687.

Trautwein, U., Schnyder, I., Niggli, A., Neumann, M., & Lüdtke, O. (2009). Chameleon effects in homework research: The homework–achievement association depends on the measures used and the level of analysis chosen. Contemporary Educational Psychology, 34(1), 77–88.

Wechsler, H., Lee, J. E., Kuo, M., Seibring, M., Nelson, T. F., & Lee, H. (2002). Trends in college binge drinking during a period of increased prevention efforts: Findings from 4 Harvard School of Public Health College Alcohol Study surveys: 1993–2001. Journal of American College Health, 50(5), 203–217.

Appendix - Survey Questionnaire for teachers

How often you give homework for students?

2018 & 2019

Sl. No.	Frequency of homework	Code Number
1	Almost everyday	1
2	On completing half the lesson	2
3	On the completion of a few lessons	3

2020 & 2021

Sl. No.	Frequency of homework	Code Number
1	I do not assign any homework	1
2	I assign homework less than once in a week	2
3	I assign homework once or twice in a week	3
4	I assign homework three or four times in a week	4
5	Everyday	5

Funding for sustainable development through advanced technologies and education. A case study for Bulgaria

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Abstract.
In this article, we consider current status of Bulgarian economic and social life and outline some means to overcome the severe problems which appeared in last four decades in economy, society and environment. The listed measures could be systematized in program followed by non-government non-profit organizations.
Further we consider a case study with a non-government non-profit organization in process of establishment.
After that we consider the most popular ways to rise fund to finance the program of such a non-profit organization.
Keywords: industry, debt spiral, demgraphic catastrophy, technologies, innovations, education, unity, financing, funds rising

Introduction

In this article, we consider current status of Bulgarian economic and social life and outline some means to overcome the severe problems which appeared in last four decades in economy, society and environment. The listed measures could be systematized in program followed by non-government non-profit organizations.
Further we consider a case study with a non-government non-profit organization in process of establishment.
After that we consider the most popular ways to rise fund to finance the program of such a non-profit organization.

Current status of Bulgarian economy and society

As a result of the industry collapse in 90-ies of XX century, Bulgarian economy is destroyed. The balance between the expenditures and revenues is broken and Bulgaria is on verge of entering debt spiral (Yanev, 2024).
As a result of negative growth and migration processes for the past 40 years the country's population decline is estimated at more than 2 400 000 people. Some regions of the country are completely depopulated, so Bulgaria is at the edge of demographic catastrophy (BNR, 2024).
Corruption and criminalization are at all levels of the society and state and create permanent physical and psychological pressure on population which is one of the reasons for low fertility and for sure is reason for the poisoned social environment in the country and the total loss of moral values.
Bulgaria faces immense environmental problems (Hill, 1990).

Possible measures to address the problems

All these crises need to be addressed urgently. Since institutions and profit organizations are severely corrupted, a solution could come from new, non-government, non-profit organizations. Such organizations should attract resources for its activity.
As all money in the country are in the hands of mafia, the only way to rise funds is by voluntary donations and economic activity of the non-profit organizations. Then raised funds can be used to achieve the objectives – to overcome the crises and to return to normal sustainable development of the society, economy and the environment.
With the raised funds, a program for sustainable development of economy, society, demography and ecology should be set up and realized mainly through unifying people, raising advanced technologies and building effective education.

TOMORROW-BG – a case study of non-profit organization in process of creation

An example of non-government, non-profit organization in Bulgaria with objectives addressing the critical crises of Bulgarian society is the non-profit organization TOMORROW –BG which is currently in process of creation. The name in Bulgarian is actually acronym of the objectives: Sustainable Technology-based Development and Unity.

The main objectives of the organization are:

1. Promoting sustainable economic, social, demographic, environmental and technological development based on innovation and high technologies in Bulgaria and around the world.
2. Promoting cooperation between people and organizations in Bulgaria and around the world with the aim of achieving sustainable and technology-based growth.
3. Development of high and cutting-edge technologies and industries in Bulgaria and around the world.
4. Development of education in Bulgaria and around the world.

Ways to rise a fund

To follow the objectives of the organization, considerable funds are needed. Raising funds is difficult task in Bulgaria. The mass of population are poor. The mass of money is with criminal groups which spend their money for luxury goods and services.

Nevertheless, the experience of people devoted to raising funds for non-profit has shown some effective ways for gathering funds.

1. Peer-to-peer fundraising is effective because it builds on relationships, uses your already-existing donor base. Peer-to-peer fundraising allows your nonprofit's supporters to raise funds on behalf of your mission.

Raising money for nonprofits can be more effective and efficient when your supporters help champion your cause. After all, nonprofit fundraising is all about connecting people with the causes they’re most passionate about! Choose your best supporters – volunteers, donors, friends, family, colleagues, board members, etc. – and invite them to try peer-to-peer fundraising.

A common example of peer-to-peer fundraising is a charity walkathon. A donor signs up to support the cause. Then, they raise money from their network of family, friends, coworkers, and neighbors. The fundraising software you choose for your nonprofit should make this process as simple for you and your fundraisers to use as possible.

With Donorbox Peer-to-Peer, you can create a peer-to-peer campaign and invite your supporters right from your account in just a few minutes. Your fundraisers will then be guided to create and customize their own fundraising pages. It’s the most effective way to boost your outreach as a nonprofit and multiply donations through the power of your supporters’ network.

We love how this organization allowed anyone to sign up to fundraise for their campaign. This makes it super easy for donors to multiply their impact!

Best practices for peer-to-peer fundraising:

Equip your peer-to-peer fundraisers with photos, graphics, and templates for emails and social media.

Opt for an online peer-to-peer solution that automates the process of inviting supporters and helps them create customized donation pages on their own.

Encourage friendly competition by recognizing your top fundraisers in a special way, or giving them some special swag items from your organization.

2. Volunteer grants are programs within companies that promote volunteering. These typically come as paid time off when volunteering. Volunteer grants are not just about saying “thank you”, but also empowering your volunteers to become mini-advocates.

3. Charity Gala. Benefit galas are a traditional fundraising event. To attract more guests, you can move beyond the traditional black-tie affair.

4. Fashion shows could technically fall into the seasonal event category as you're most often scheduling these events for spring or fall when new styles are introduced.

5. Donation request letters are a formal way to ask supporters for donations. They allow you to formally request donations and provide a forum to properly state the objective of the donaton.

Everyone likes getting mail, but many nonprofits are moving away from the traditional direct mail method. However, there are some compelling reasons why you shouldn’t remove it from your fundraising strategy entirely.

Did you know that 90% of direct mail gets opened? You may have a unique opportunity to connect with donors and all it takes is a stamp!

Get creative and send out new types of mailers, including postcards with QR codes to your online donation form. Just be sure to include supporting materials that might interest prospective donors. For example, share a brief success story about your most recent project or something else that demonstrates value to your donors.

A direct mail campaign can be as simple or as complex as you wish. Print fundraising letters on your letterhead and put everything together in-house. Or outsource any parts of this project you might need support with, especially if your mailing list is large. This might include a graphic designer, copywriter, printer, and/or mail house.

Best practices for direct mail fundraising:

Combine direct mail with digital fundraising. This helps you cover all your bases while providing options to your donors.

Track the success of your mailed campaigns by reviewing the funds raised compared with your design, printing, and postage costs.

Bonus resource: Looking for more guidance on how to do a mailed letter fundraising campaign? Check out this blog post.

6. Create a branded donation page. Your first step in any solid fundraising strategy is to get your donation page in shape. Your page should be secure, up-to-date, and on-brand – with minimal effort required from your end! To make the process hassle-free, use fundraising software like Donorbox for an all-in-one donation page solution, helpful resources, and lightning-fast customer support. Getting started with Donorbox takes just four simple steps. Sign up for free, create your donation form, customize your Donorbox-hosted donation page to add branding, and connect your payment processor (Stripe or PayPal). That's it!

Best practices for a donation page:

Make sure it's easy to find on your organization's website.

Include an option for recurring giving to make regular giving easy (more on this below!).

Have a goal meter on the page to create a sense of urgency among donors.

Include social media sharing options on the page so donors can help spread the word.

Customize your page with your organization's colors, fonts, and other brand elements. Add images and video to make it more engaging.

Be sure to test your page on a mobile device! Half of U.S. citizens alone spend approximately 5-6 hours on their smartphones every day. Choosing the right fundraising software will ensure you have a mobile-ready strategy!

7. Set up a donation kiosk. Not everyone has cash on them these days. Roughly four in 10 Americans claim they don't use cash for any of their regular weekly purchases. That's why savvy nonprofits are modernizing the way they accept in-person donations. Enter the Donorbox Live Kiosk app. Use this app to easily turn your tablet and card reader into a powerful donation kiosk that collects donations from credit cards, smartphones, and smartwatches. Use donation kiosks at fundraising events to boost revenue. This is great for events with silent auctions where guests are circulating and getting ready to spend money!

8. Offer a convenient text-giving option. That's why text giving should be a vital part of your modern fundraising strategy. Text-to-give allows donors to donate to your cause simply by sending a text message with their mobile phones. With Donorbox Text-to-Give, all you have to do is share your campaign ID or unique keyword and number with your supporters. Once a donor sends a text, they'll receive a mobile-friendly fundraising page link to make their donation. Repeating their gift is even easier – no need to fill out a donation form again.

Use text-to-give campaigns selectively to avoid overwhelming your donors.

Consider text-to-give campaigns for emergency fundraising initiatives, political campaigns, church fundraising, and celebrating significant milestones.

Keep your text-to-give message simple and on-brand. It should be short, easy to remember, and relevant to your mission.

9. Steward those donor relationships. Raising money doesn't end once your organization has received a donation. In fact, many fundraisers believe that this is where the true work of fundraising begins – stewarding those relationships so your donors give again and again. Donor retention is a key metric all nonprofits should track to measure the effectiveness of their donor engagement. For most nonprofits, this is around 40%.

But…what practical steps can you take to steward relationships and increase your donor retention rate? Having the right tools is the first step.

Donorbox CRM is a robust, AI-driven solution that helps you manage donor information, automate engagement, and turn one-time donors into long-term supporters. With a built-in Mail Center for small group or individual emails and Email Marketing platform for mass communications, you can communicate with and manage your donors all in one place.

Best practices for using a CRM:

Choose a CRM with a powerful fundraising solution so you can streamline your workflows and enjoy all of your data in one place.

Keep the data in your CRM clean by choosing a solution that will automatically suggest duplicate records to remove, saving you time and energy.

Invest in donor stewardship so you will see a return in the long run with repeat, loyal donors.

10. Launch a crowdfunding campaign for time-bound projects

A crowdfunding campaign harnesses the power of a crowd to fun a specific project or program. Each person contributes a small amount toward an overall goal. A crowdfunding campaign is great for urgent projects such as funding a new facility, brand-new equipment, mission trips, or renovation work.

This popular nonprofit fundraising type isn't going anywhere. In fact, the current average donation to a crowdfunding campaign is $66 – which can significantly add up. If crowdfunding isn't a part of your fundraising strategy, the time to add it.

Donorbox makes it easy to create a crowdfunding page, post dedicated updates to your campaign on a separate tab, add a donor wall to build social proof, add social media sharing buttons, and much more.

Best practices for crowdfunding campaigns:

Include a fundraising meter on your nonprofit fundraising page to track your progress.

Make sure your website is mobile-friendly and you have included options to share on social media!

Be sure to update your donors about your project and your progress along the way. Campaigns with updates raise 126% more than those with no updates.

Choose fundraising software that can do it all so you're not stuck switching between platforms for crowdfunding and regular/recurring donors.

11. Host fundraising events and sell tickets.

One revenue stream many nonprofit fundraisers miss out on is selling tickets to fun, brand-focused fundraising events. These events provide an opportunity for prospective and current donors to engage with your cause.

Whether you host an in-person, virtual, or hybrid event, selling tickets can help you meet your fundraising goals for the year and should be an important part of your fundraising strategy.

And Donorbox Events can help you do it! Build your event page online with as many ticket tiers as you need. Mark both the fair market and tax-deductible amount for each ticket type to encourage ticket purchasers to buy at higher levels. Plus, ask for additional donations on top of ticket sales to boost your event's success. They'll get their receipts and tickets delivered automatically via email.

Best practices for fundraising events:

Engage an event committee of supporters and stakeholders to help plan your nonprofit fundraising event.

Keep your event true to your organization's personality and donors' interests. You don't have to host a gala or a golf tournament. If your donors are a "blue jeans and BBQ" crowd, embrace it! Unique events can be especially memorable and fun.

Choose an event ticketing solution that automates the work and gives you a platform to manage all information in one place.

Sell t-shirts, have a raffle game, include silent auctions, a bake sale, etc. to spice up your event fundraising.

12. Turn one-time donors into recurring donors

Also sometimes called "sustaining donations," these are gifts that a donor agrees to give on an ongoing basis. Recurring donations provide donors with an easy, hassle-free way to support causes they love. Recurring giving programs are the bread and butter of nonprofit fundraising, as they provide nonprofits with a consistent, steady, and predictable source of income.

The Donorbox Recurring Donations feature is easy to add to your campaign. While creating your donation form on Donorbox, simply check the recurring intervals you'd like to have on the form and you're done. You can choose four of the following intervals: one-time, daily, weekly, biweekly, monthly, quarterly, and annually. Then, embed your form on your website or host it on Donorbox.

Plus, recurring donors can log in to their own Donorbox account at any time to change their donation – saving you time on the backend.

Here's an example of a nonprofit using a Donorbox recurring donation form on their website. With Donorbox, you also have the option to highlight your preferred recurring interval on your donation form (like in the example below – a tiny heart icon next to the interval).

Best practices for recurring giving:

Promote this giving option in your organization's newsletter, social media posts, and other communications.

Thank your recurring donors! It can be easy to overlook these loyal donors since their giving happens automatically. Make it a habit to connect with them in a personal way now and say thank you.

13. Seek out corporate sponsorships and partnerships

Corporations with corporate social responsibility programs have agreed to devote resources to making the communities they operate in better. Often, this leads to opportunities for nonprofits to seek out sponsorships or partnerships with these companies.

Consider whether you have an upcoming event, program, or initiative that might be appealing to a corporate funder. This is the perfect time to solicit event sponsorships. Partnerships can include ongoing programming and support in a variety of ways.

In exchange for supporting your organization, these companies receive free advertising and reputation boosting through recognition on digital and print materials, signage, invitations, and more. There are also sometimes tax incentives associated with in-kind gifts.

Best practices for corporate sponsorships and partnerships:

Be mindful of tax implications related to sponsorships. The IRS has rules about what counts as an advertising purchase versus a sponsorship.

Ask prospective partners which recognition benefits are most important to them. Within reason, you can create a model or package that suits their goals.

Get it in writing! To prevent any confusion, be sure a representative from each organization signs an agreement detailing the arrangement.

14. Launch a phone-a-thon

This effective fundraising strategy involves connecting with donors the old-school way – by picking up the phone!

During a phone-a-thon, you place calls to donors and ask them to support your cause. You may ask for a specific amount, or ask them to match or increase their gift from the previous year.

Organize a phone-a-thon in-house using your existing staff members to save money. Or engage a company to handle the heavy lifting (and the calls) for you.

While the goal of the call might be to secure a donation, you can learn a lot in the process. During a phone-a-thon, you might ask donors why they choose to support your work. You might also ask them what other causes they support.

One favorite question is: “What is the most meaningful gift you’ve ever given, and what was so special about it?” You’ll learn a lot about your donor’s philanthropic values from this question! And you’ll form a genuine connection that can lead to greater long-term support.

Pro-tip: Record this information in your Donorbox donor management database. You can add communication records so you know exactly what you talked about and when. This helps you build donor relationships – and keeps you from reaching out too much and becoming a nuisance.

Best practices for a phone-a-thon:

Don’t be afraid to pick up the phone! You might be surprised how many donors are craving connection.

Create targeted fundraising scripts to ensure success.

A solicitation call is also an opportunity to steward the donor for their past giving. Be sure to share your gratitude for their past support!

Build trust and connection by sharing who you are and what your role is within your nonprofit. You can also share what motivates you to stay involved with the cause.

15. Start a membership program

Membership programs have many benefits. They ensure a predictable revenue for your nonprofit organization, help you create a loyal supporters base, and ensure you’re able to offer benefits to your members. These benefits may include exclusive access to your updates and newsletters, member-only events to help raise more money and acknowledge their support, and special programs to make them feel a part of your mission.

Donorbox Memberships is our easy-to-use membership tool that helps you build more connections with your donors. Add unlimited membership tiers to the form to fully customize your program for monthly or annually recurring memberships. Plus, you can create a form that aligns with your brand and even embed it right on your website.

Your members can also log in to their accounts on Donorbox and manage their membership plans. And you can easily manage member data and membership payments on the backend!

Conclusion

In condition of scare resources, raising funds is difficult, so different methods for fund raising are needed to obtain an effective fund raising by non-profit organizations.

References

Yanev, S. (2024) Our country is on the verge of entering a debt spiral. Quick and adequate measures are needed. Fakti.bg. https://fakti.bg/en/bulgaria/920066-stefan-yanev-our-country-is-on-the-verge-of-entering-a-debt-spiral-quick-and-adequate-measures-are-needed

BNR (2024) https://bnr.bg/en/post/101812859/bulgaria-without-bulgarians-is-the-country-s-demographic-collapse-irreversible

Hill (1990)
https://www.independent.org/article/1990/10/01/the-environment-in-bulgaria/

Implementation of mastery-based testing in discrete mathematics

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Abstract.
A mastery-based approach is a teaching strategy adopted by many instructors. Achieving complete solutions to problems derived from course concepts can be challenging for students. Mastery is demonstrated through multiple attempts, which helps create a classroom environment in which persistence is valued and supported through understanding. This research paper provides an in-depth analysis of the implementation, outcomes, and advantages of mastery-based testing in discrete mathematics. It reports the results of applying mastery-based testing in this subject and discusses the core idea underlying the approach. The paper also describes the design and implementation of two mastery tests focused on construction. Student feedback and classroom observations were collected, indicating improved learning effectiveness when mastery-based testing was implemented in discrete mathematics.

Keywords: discrete mathematics, learning, mastery-based testing, implementation etc.

Introduction

Traditional assessment systems typically rely on pencil-and-paper tests that use formats such as true/false, multiple-choice, or matching questions. Although these methods are easy to grade, they often assess only lower-level thinking skills and the recall of memorized information or facts. As a result, traditional testing tends to measure only basic and general student skills, which has led to the adoption of more advanced assessment approaches in education (Abd Algani, Hibi, Abo Al-Hija, 2021).

Instructors commonly share broader goals for students, including developing deep understanding of course content, building confidence, and strengthening rigorous problem-solving skills to persist with challenging tasks until a solution is achieved (Amanda Harry & Alyssa Hoofnagle, 2020; Abd Algani & Gross, 2024). These goals are developmental in nature. To motivate mathematics students to invest substantial time in building thorough understanding of course material, advanced approaches such as mastery-based techniques have been introduced. Mastery-based testing can help reduce test anxiety and encourage students to revisit earlier concepts that were not fully understood until they can demonstrate mastery with confidence. Although mastery-based techniques have been discussed by many authors, their impacts are not always clearly explained. Introducing any new teaching method is associated with multiple changes, and mastery-based testing is intended to support specific pedagogical goals.

The present study focuses on implementing a mastery-based technique in discrete mathematics. Discrete mathematics is a branch of mathematics that deals with quantities that take separate and distinct values. The research was conducted with a group of students, and the findings suggest that homework and exam credit policies, as well as instructor support, had a stronger influence on course passing rates than students' demonstrated understanding, problem-solving strategies, and mastery of the core skill types emphasized in the course. Students often struggled to obtain a grade of C without truly mastering the underlying ideas, which may partly explain the learning challenges observed in the classroom (Jean Marie Linhart, 2019; Abd Algani & GROSS, 2024).

Mastery-based testing. Mastery-based testing refers to a testing system, where the students are assessed and tested depending on the course learning objectives and are primarily graded with the learning objectives number, which are mastered by these students in one term. Students are motivated to seek knowledge from the mistakes they commit as there are many success opportunities. Mastery-based grading system encompasses slack community group, which gives advices and references for the teachers, who implements mastery-based testing in their mathematics courses. Mastery-based testing is already implemented in fields such as pilots or doctors and is ranked on a fail or pass basis. A pass mark is given to the students, when all of the course material is correctly demonstrated by the students. The opportunities to seek knowledge from mistakes and sorting out the misconceptions are eminent in a mastery-based testing technique. The other objective of mastery-based testing is to motivate the students for engaging in full repetition for understanding clearly the course material. This is the major reason for the implementation of mastery-based technique in the field of discrete mathematics. This paper

reflects about the experiences on varying a discrete mathematics course on mastery-based testing with the results observed during the research.

Related Works. (Kulik and Kulik 1987, Abd Algani, 2024) carried out a meta-analysis on the mastery-testing and student learning. The meta-analysis results indicated that generally the mastery-testing has optimistic effects on the learning of the students but the single study size is contemplated on the mastery criterion stringency utilized within the experimental control and mastery group, which are implemented in the study. Mastery effects were highly reflected from the less able students. The instruction time was also increased by the mastery-based testing. (Beguin and Straat 2019) introduced some techniques for determining the number of items and the corresponding scores, which are essential for deciding on the mastery. These techniques were employed in situations of varying characteristics and offer the results for different testing situations, which are highlighted with a practical archetype. The study recommended for future research on alternate ways for translating the outcomes of LCA into the consideration of the Bayesian hypotheses. (Collins et al. 2019) conducted a mastery-based on undergraduate mathematics. They described the advantages and execution of mastery-based testing in the mathematics courses of college students. They also summarized the response data of the students, which indicated optimistic reactions to the mastery-based testing technique. The results of their study indicated that the mastery-based testing motivates students with learning through understanding. The study recommends for mastery-based testing implementation in other mathematical courses. (Raimon Effendi 2021) carried out the design and execution of computer based testing in the field of vocational education. The study was mainly carried out by the traditional examination systems. Their study results were gathered through online test kits for evaluating the learning outcomes of students. The study recommends for adjustments and socialization of computer based testing for gaining maximum features and results. (Harsy et.al 2021; Abd Algani, 2022) carried out an analysis on the effect of mastery-based testing in the mathematical courses. They explored the attitudes of the students in the field of mathematics with the mastery-based testing. The results of the study indicated that the mastery-based testing provided optimistic results on the learning and attitudes of learning in mathematical courses with the mastery-based testing.

Methodology

The proposed mastery-based testing is implemented in the field of discrete mathematics learning of students. The research is carried out in a university, which has about 1200 students. The course of discrete mathematics is an eminent mathematical course, which is usually learned by computer science students of the junior year. The students who are involved in the research are 87% male students and 13% female students. The research involves the topics in discrete mathematics such as basic proofs, quantifiers, truth tables, logic and sets of calculus 1. The course material encompasses counting and combination units, networks, graph theory, number theory, recurrences and induction proofs. This course material is converted into many mastery units and is sorted according to the units. These details are mentioned in the appendix. The grading procedure for the mastery-based testing is calculated primarily on the basis of number of mastery tests, when all the needed mastery tests are passed. In the proposed research, five mastery tests are required to be passed and seven mastery tests are given as optional tests. The grades for these mastery tests are given as A or B, contemplated on the performance on these tests by the students. On the passed tests, the number of earned A's are counted. The third part of the grading involves assigning scores contemplated on the homework assignments and their associated difficulty and length. The final grading is done contemplated on the completion of these mastery tests. Thus, the grading is done on 4 levels on these mastery tests.

Criteria for grading. A grade is sure for the students, who complete the entire requirements. When all of the mastery tests are passed by the students, then it indicates that the student will be assigned a C grade. When a student passes less than five required mastery tests, then they will be given a C- grade. Post the achievement of the requirements by a student, when the student passed extra test after attaining a C grade, then they are graded as 1/3(C to C^{+}). When a requirement is missed or an optional test is missed or homework assignment is not done or an A grade is missed then a letter grade of 1/3 is reduced for a student. The required mastery tests to be passed, the required optional tests to be passed, the number of A grade gained on tests and homework percent is given in the below table.

Table 1. Grading Criteria for the Mastery-based testing

Grade	**No. of tests required to be passed**	**No. of optional test to be passed**	**Homework Assignment**
C	All (5)	2	70 and above
B	All (5)	3	75 and above
A	All (5)	7	85 and above

The student must score a grade of C for joining any course in the subject of discrete mathematics. For scoring this grade, the student must pass the entire five required mastery tests and two optional tests. They must also gain a minimum mark of 70% and above in the homework assignments. Here the research makes an analysis on how the discrete mathematics course material is effectively utilized by the students. Recurrence relations, induction proofs and combinations would be utilized in the class of algorithm analysis, where the eminent requirement is discrete mathematics. Many applications and encryption algorithms are encapsulated within the number theory. The required tests of the research are covered up in the above topics. The optional tests are encapsulated with additional topics such as identification of patterns involving recurrence relations resolution or networks and graph theory tests. The learning objectives and the associated mastery tests are indicated in the appendix. When the requirement tests and optional tests are passed by the students and the homework assignments are not fulfilled, then the instructors must decide on the grading of the students in such case. A student passes all the required tests and if 7 of the optional tests are passed and when they score 85 and above percent in the homework assignment would receive A grade and those failing to fulfill that would receive an A-. When all the required tests are passed and 3 of the optional tests are passed and the homework assignments are completed by the students, they would receive B+ or B and those failing to fulfill this condition would receive B-. Home works assists the students to pass the mastery tests. The solutions for the home works would be published on a platform called the learning management system.

Mastery-testing Implementation. Writing tests is a linear process. A problem may be written with 5 versions for solving linear recurrences of second order having easy and quick constant coefficients but the written tests are time consuming and hard. Some of the problems in the mastery tests are difficult to implement. The instructor should be aware about the struggles faced by the students during the tests and must be able to resolve it. A student who score grade B can retake the mastery test to score a grade A. There are about 5 needed mastery tests; 4 of them must be provided in the class, which could be retaken by the students at least 3 times. The home tests should be correctly completed by the students before the due date. Feedbacks are given to the students before this date. The needed or required tests are conducted to the entire class at a single instant and are graded instantly based on the solutions given by the students and depending on the grading criteria. The mastery-based testing involves two solution types; correct solutions and incorrect solutions. When a mastery test is not passed by a student, they could verify their mistakes by taking a look on the answer key. The time duration allotted for completing a test is about 15-25 minutes. The learning management system provides details about the available time, location and solution for the test problems. In the learning management system, each mastery test is considered as an assignment. In addition, the learning management system also encompasses the homework assignments and their associated solutions.

Counting Material. The counting material is a tough task for the students, which has to be taught initially to the students for retest and mastery counting is a last topic in the discrete mathematics course. The mastery test also encompassed two counting tests, where one test is a required test and one test is an optional test.

The counting test 1 covers the following learning objectives:

- Students will have knowledge on the application of functions definition, bijective function, injective function and partial function within the context of counting.
- Students utilize the binary operations for counting functions, encompassing the functions having certain inputs with restrictions.
- Students make use of combinations, bijections and permutations for solving counting problems.
- Students will predict the appropriate methods for resolving the counting problems.

The counting test 2 encompasses objectives of counting test 1 and the students make use of the pigeonhole principle for writing a logical proof.

Results and Discussion

It was found that the result of mastery-based testing resulted in deep learning. It is evident from the research that the responsibility to learn or master the course material goes to the students, where they would learn and fulfill the learning objectives. The drawbacks, which were observed from the students was that they do not have an effective time management. For the failure of the students, the reasons such as improper time management, failing to take the retests till the last minute and not completing the homework. When the counting unit is successfully completed by a student, and if they do not complete the course of discrete mathematics, they easily and quickly learn the discrete mathematics course, when compared with the first time, they pursue the course. It was also found that the mastery-based testing successfully influenced the teaching.

Table 2: The discrete mathematics grades of students before implementation of the mastery-testing and after implementation of the mastery-based testing.

Students' Grades	**Before Mastery-testing**		**First three attempts of mastery-testing**		**Next two attempts of mastery-testing**	
Students' Number	59		72		104	
A, A-	8	13.56%	24	33.33%	37	35.57%
B, B-, C	34	57.62%	25	34.72%	56	53.84%
C- and below	11	18.64%	18	25%	7	6.73%
Withdrawn tests	5	8.47%	5	6.94%	4	3.84%

The questions associated with bijections and functions were complex for the students. Many of the students agreed that the mastery-based testing helped them in learning discrete mathematics effectively. Most of the students preferred the mastery-based testing as an effective one for their learning. Results proved that the students undertaking the discrete mathematics course learned persistently and productively with the implementation of mastery-based testing. The following table indicates the discrete mathematics grades of students before implementation of the mastery-testing and after implementation of the mastery-based testing.

The results of the grades obtained by the students in the mastery-based testing implementation is represented in the below figure.

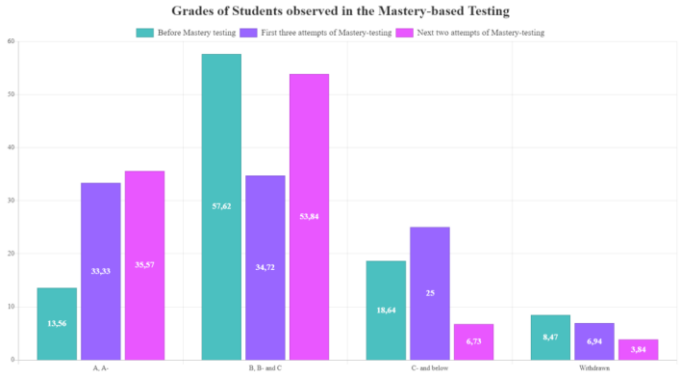


Figure 1: Grades of the students observed in the Mastery-based Testing in Discrete Mathematics

A mixed effect was observed with the grades in the mastery-based testing of the students in discrete mathematics course. In the first three tests, students were not able to successfully complete the course, which indicated that students scored C grades or less than that in the course. The successive mastery-tests improved the grades of the students with the students successfully completing the course. The alterations in the grading structure and these changes are informed in a way, which had an optimistic impact on the success of students. Encouraging retest on a complex or source material could encourage the students for rectifying their mistakes and in effective thinking. This eases the close alignment of the grades with the mastery of learning of the course as an alternative to the scores earned by the students, which could or could not help in their learning process. It eases the strict condition for scoring in mathematical problems especially problems in discrete mathematics (Abd Algani, Abu Alhaija, Awad, 2021).

Appendix

Learning Objectives and Mastery Tests of the Course Material. The discrete mathematics learning objectives can be portioned into mastery tests and units. The required tests are indicated as counting "1R" and counting "2R". The required test can be taken up to five times; the optional tests can be taken by the students three times. The homework assignments must be completed by the students before the due date. The tests conducted for the required research are given below. Two tests are indicated in this section, which are required tests to be completed by the students.

Counting 1R Test:

1. How many ways could a stationery store employee could make an arrangement of 16 books within a row, when 6 similar copies of *Rocket Gills,* 4 similar copies of the *Tempest,* 3 similar copies of the *Curse of Chalion* and 3 similar copies of *Anatham* are there?
2. Provide a bijection among bit sequences and options for selecting 5 chocolate bars from 6 types such as Musketeers, Butter finger, Almond Joy, Kitkat, Hershey's and Dairy Milk. Indicate the zeroes, the ones,

bit sequence representation and bit sequences time. In what ways could we choose 5 chocolate bars from the six types?

3. When f is a partial function $f:T \rightarrow T$ indicating $t \in T$, $f(t) \in T$ or $f(t)$ do not exist. Let T indicate the *set {M,A,T,H,E,M,A,T,I,C,S}*. Write the number of partial functions when no restrictions are there.

Counting 2R Test.

1. A pouch encompasses 3 tiger marbles, 9 yellow marbles, 8 blue marbles and 5 red marbles. You should choose a set of 4 marbles from the pouch. All 4 types of marbles are unique.
   In what ways would you choose 4 marbles from the 8 blue marbles?
   In what ways would you choose 4 marbles from the 5 red marbles?
2. Let f be a function $f: P \rightarrow Q$, which is a injective total function. f indicates $p \in P$ as the output, $f(p) \in Q$. When f is an injective function, $f(s) = f(t)$ then $s = t$. Let the set $P = \{1, 2, 3, 4, 5, 6\}$; $Q = \{a, e, i, o, u\}$.

How many functions here are injective functions, where f (4) is among the vowels?
How many functions here are injective functions, which are f (2) or f (3) is among the vowels.
Similarly other tests are conducted in discrete mathematics course during the research.

References

Abd Algani, Y.M. (2024). Solving mathematics anxiety, lack of confidence and negative attitude with artificial intelligence models: insights from stakeholders. Journal for the Mathematics Education and Teaching Practices, 5(2), 89-100

Abd Algani, Y., & Gross, Z. (2024). Effectiveness of Digital Versus Printed Arabic Text on the Literacy mathematics tasks of Seventh- and Eighth-Grade Students. Research Journal in Advanced Humanities, 5(1).

Abd Algani, Y. & GROSS, Z. (2023). Lecturers-based evaluation on the role of technological advancements in teaching. Texto Livre, 16, e46036.

Abd Algani, Y. M. (2022). Role, Need and Benefits of Mathematics in the Development of Society. Journal for the Mathematics Education and Teaching Practices, 3(1), 23-29.

Abd Algani, Y., Hibi, W., Abo Al-Hija, Y. (2021). The Impact of Using the Mathematical Modeling in Communication and Mathematical Achievement in Preparatory School Students. Psychology and Education Journal, 58(2), 5482-5492.

Abd Algani, Y., Abu Alhaija, Y., Awad, N., (2021). The Impact of Using Digital Books on The Level of Motivation of Teachers and Students to Teach and Learn Mathematics in Elementary Schools in Palestinian Arab Society in Israel, Turkish Journal of Computer and Mathematics Education, 12 (14), 3025-3043.

Abd Algani Y. (2019). The Effect of Mathematics Events on The Adjustment of Students' Error in Fractions. International Journal of Development Research, 09, (11), 35-39

Kulik, Chen-Lin C., and James A. Kulik. "Mastery Testing and Student Learning: A Meta-Analysis." Journal of Educational Technology Systems, vol. 15, no. 3, Mar. 1987, pp. 325–45. DOI.org (Crossref), https://doi.org/10.2190/FG7X-7Q9V-JX8M-RDJP.

Béguin, Anton A., and J. Hendrik Straat. "On the Number of Items in Testing Mastery of Learning Objectives." Theoretical and Practical Advances in Computer-Based Educational Measurement, edited by Bernard P. Veldkamp and Cor Sluijter, Springer International Publishing, 2019, pp. 121–34. Springer Link, https://doi.org/10.1007/978-3-030-18480-3_6.

Collins, J. B., et al. "Mastery-Based Testing in Undergraduate Mathematics Courses." PRIMUS, 2019. Semantic Scholar, https://doi.org/10.1080/10511970.2018.1488317.

Harsy, Amanda, et al. "An Analysis of the Impact of Mastery-Based Testing in Mathematics Courses." PRIMUS, vol. 31, no. 10, Nov. 2021, pp. 1071–88. Taylor and Francis+NEJM, https://doi.org/10.1080/10511970.2020.1809041.

Raimon Effendi. Design and Implementation of Computer Based Test (CBT) in Vocational Education. 2021, pp. 1–13, https://doi.org/10.1088/1742-6596/1764/1/012068.

Li, Tun, et al. "Towards Connecting Discrete Mathematics and Software Engineering." Tsinghua Science and Technology, vol. 25, no. 3, June 2020, pp. 325–35. IEEE Xplore, https://doi.org/10.26599/TST.2019.9010012.

Yankovskaya, A. E., et al. "Development of Hybrid Intelligent System of Express-Diagnostics for Detection Potential Attacker." 2015 9th International Conference on Application of Information and Communication Technologies (AICT), 2015, pp. 183–87. IEEE Xplore, https://doi.org/10.1109/ICAICT.2015.7338542.

Kostoglotov, Andrey, et al. "Adaptation of Discrete Estimation Algorithms According State Model and Shaping Noise Parameters Based on the Combined Maximum Principle." 2016 IEEE East-West Design Test Symposium (EWDTS), 2016, pp. 1–5. IEEE Xplore, https://doi.org/10.1109/EWDTS.2016.7807734.

Orlowski, Przemyslaw. “Hybrid, Discrete-Time Distributed Parameter Mathematical Model for Road Traffic with Control.” 2020 16th International Conference on Control, Automation, Robotics and Vision (ICARCV), 2020, pp. 255–59. IEEE Xplore, https://doi.org/10.1109/ICARCV50220.2020.9305389.

Labusch, A., et al. “Computational Thinking Processes and Their Congruence with Problem-Solving and Information Processing.” Computational Thinking Education, edited by Siu-Cheung Kong and Harold Abelson, Springer, 2019, pp. 65–78. Springer Link, https://doi.org/10.1007/978-981-13-6528-7_5.

Halperin , Alexander. Mastery-Based Testing in Calculus with a Final Exam Component. no. 1, Dec. 2019, pp. 1–28, https://doi.org/10.1080/10511970.2019.1700575.

“Mastery-Based Evaluations: Teaching to the Test vs. Testing What You Teach.” Chalk, 13 Oct. 2019, https://www.chalk.com/resources/teaching-to-the-test-vs-testing-what-you-teach-mastery-based-evaluations/.

“How to Set Up Mastery-Based Grading in Your Classroom.” Cult of Pedagogy, 7 Mar. 2021, https://www.cultofpedagogy.com/mastery-based-grading/.

Lenarz, Jessie. “Pairing Mastery-Based Testing and Active Based Learning to Improve Student Performance and Persistance in the Calculus Sequence.” Mathematics, Data Science, and Statistics Faculty Research, Jan. 2020, https://sophia.stkate.edu/math_fac/7.

Harsy1 , Amanda, and and Alyssa Hoofnagle2. Comparing Mastery-Based Testing with Traditional Testing in Calculus II. no. 2, Nov. 2019, pp. 1–13, https://files.eric.ed.gov/fulltext/EJ1278234.pdf.

Creating travel operator for Balkan countries starting from a travel and dating club

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Abstract.

In this article, we consider a strategy for creating an international travel operator which should start operating first in Balkan countries. Also, branches in some other European countries is planned to be created: France, Germany, Russia, Spain, Hungary, Portugal, Italy, UK.

The first markets where the travel operator will start its activity are Bulgaria, Macedonia, Serbia and Germany.

The strategy of establishement of the travel operator is specific. It is based on creating first branches of a travel and dating club operating in Bulgaria. Then, when local sections of the club are created and developed in the selected countries, each section creates a local branch of the travel operator using a holding structure.

Keywords: tourism, travel operator, new markets, travel and dating club

Introduction

In this article, we consider a strategy for creating an international travel operator which should start operating first in Balkan countries – Albania, Bulgaria, Bosnia and Herzegovina, Croatia, Greece, Macedonia, Montenegro, Romania, Serbia, Slovenia, Turkey. Also, branches in some other European countries is planned to be created: France, Germany, Russia, Spain, Hungary, Portugal, Italy, UK...

The first markets where the travel operator will start its activity are Bulgaria, Macedoni, Serbia and Germany.

The strategy of establishement of the travel operator is specific. It is based on creating first branches of a travel and dating club operating in Bulgaria. Then, when local sections of the club are created and developed in the selected countries, each section creates a local branch of the travel operator.

The strategy is based on already functioning travel and dating club named SOFIA-TOP DATING in Sofia, Bulgaria. This club is operated by the Bulgarian travel operator PERUN-HOLIDAYS Ltd.

The club SOFIA-TOP DATING has started its activity in 2012, together with the start of PERUN-HOLIDAYS Ltd. Since then it has around 50 members in Bulgaria.

Organization and activities of SOFIA-TOP DATING

The club SOFIA-TOP DATING has a small coordination team in Sofia and members who are served by the coordination team. It maintains multi-lingual site (SOFIA-TOP DATING, 2026) which apart from English version has versios in: Bulgarian, Macedonian, Serbian, Russian, German, French, Spanish, Portugese, Italian, Turkish, Romanian, Albanian, Hungarian.

The Bulgarian version of the club is presented at Figure 1.

The English version of the club web-site is presented at Figure 2.

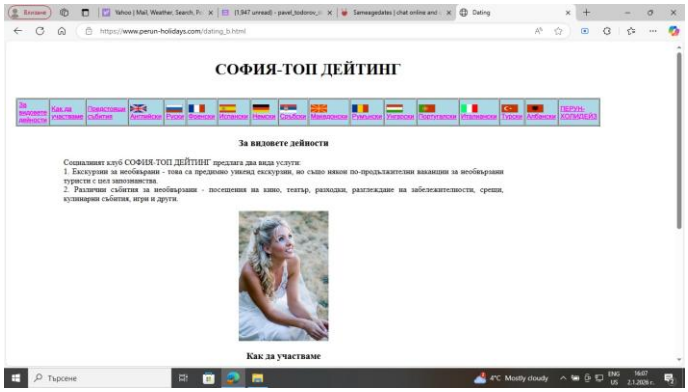


Figure 1. The Bulgarian version of the club web-site.

The main activity of the club is organizing cultural and entertainment events for its members. Among the events of SOFIA-TOP DATING are also organized excursions and tours which are realized in cooperation with the company-mother – PERUN-HOLIDAYS Ltd. The English version of the club site is presented at Figure 2.

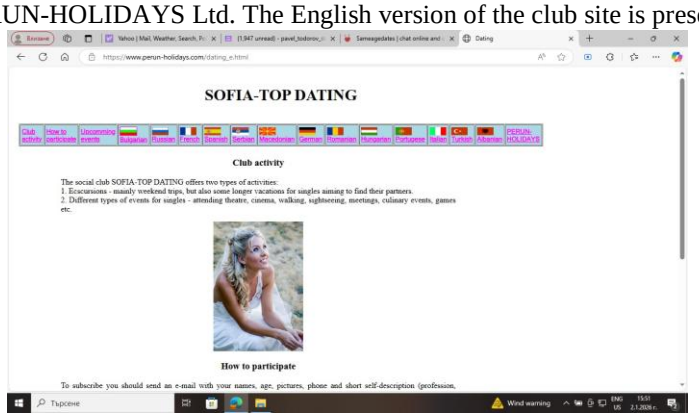


Figure 2. The English version of the club web-site.

The club also maintans database of single men and women who actively look for a partner for marriage and creating family. For members of this database, dating events (like personal meetings, speed dating etc.) are organized. This activity is supported by TOMORROW-BG foundation in the frames of foundation's program to stop the negative population dynamics in Bulgaria (since the Large collapse in Bulgarian economy in 1990s, Bulgarian population decreased drastically by more than 2 million people and also there are some negative qualitative trends in population dynamics).

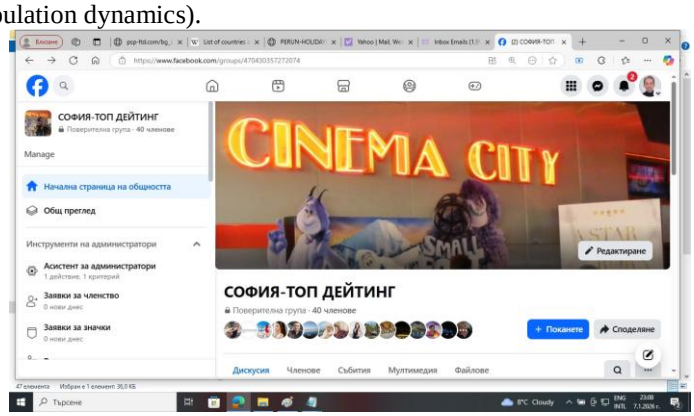


Figure 3. The Facebook page of SOFIA-TOP DATING Favebook page.

The club also has a Facebook group in Bulgarian (Facebook SOFIA-TOP DATING, 2026) and it has plans to create Facebook group in other European languages. A view to the Facebook page is presented at Figure 3.

Since its beginning in 2012, SOFIA-TOP DATING has organized around 500 events in Bulgaria.

The travel and dating club in Serbia –
BELGRADE GUIDE TO DATING

Since 2025, there exists a branch of the club in Belgrade, Serbia. Its name is BELGRADE GUIDE TO DATING. The Serbian version of the site (BELGRADE GUIDE TO DATING, 2026) is presented at Figure 4.

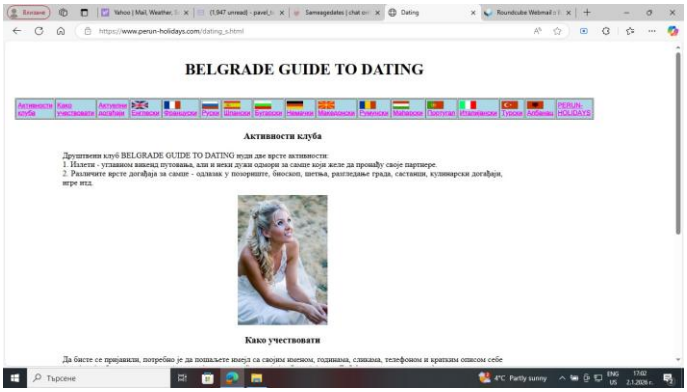


Figure 4. The web-site of the Serbian branch of the dating club.

The plan is in 2026 Belgrade club to attract at least 10 members and to start organizing regular social events in Serboa on monthly basis.

The travel and dating club in Macedonia – MK-TOP DATING

In 2026, it is expected to have a branch of the club in Macedonia. Its working name is MK-TOP DATING. The Macedonian version of the site (MK-TOP DATING, 2026) is presented at Figure 5.

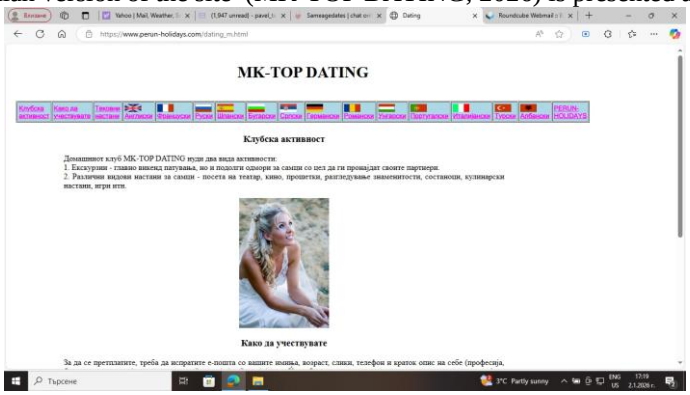


Figure 5. The web-site of the Macedonian branch of the dating club.

The plan is in 2026 the Macedonian club to attract at least 10 members and to start organizing regular social events in Macedonia on monthly basis.

The travel and dating club in other countries

In parallel with Bulgaria, Serbia and Macedonia, we try to develop branches of the club in other countries of Europe. An example is the branch in Germany.

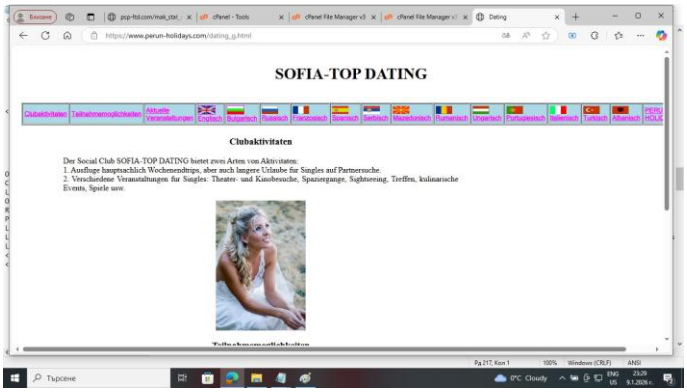


Figure 6. The web-site of the German branch of the dating club.

The German version of the site (SOFIA-TOP DATING IN GERMANY, 2026) is presented at Figure 6.

Conclusions

Creating international travel operator is a challenge related to large capital, hiring staff and expertise for different markets. The approach considered in the article helps to make the transition to the new markets more gradual and easy.

Refferences

BELGRADE GUIDE TO DATING (2026) https://www.perun-holidays.com/dating_s.html

Facebook SOFIA-TOP DATING (2026) https://www.facebook.com/groups/470430357272074.

MK-TOP DATING (2026) https://www.perun-holidays.com/dating_m.html

SOFIA-TOP DATING (2026) https://www.perun-holidays.com/dating_e.html.

SOFIA-TOP DATING IN GERMANY (2026) https://www.perun-holidays.com/dating_g.html

SOFIA-TOP DATING IN ROMANIA (2026) https://www.perun-holidays.com/dating_rom.html

Corruption from the persepective of the European Commission

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Abstract. The fight against corruption is a significant topic for the European Commission. The development, democracy and efficiency of each member state, as well as the prospects for the union as a whole depends on Commissions policies, measures, assessments, recommendations and control mechanisms The article analyzes the specifics, current state and prospects of the fight against corruption as presented in the latest report of the European Commission, published on July 8, 2025.

Keywords: corruption, 2025 report, European Commission

"Corruption is not merely a crime - it is a disease of trust, which can only be cured through personal responsibility, because the true strength of a society is not measured by its wealth, but by the integrity of its citizens."

After 19 years of Bulgaria's membership in the European Union, the European Commission continues to perceive corruption as a violation of the rule of law. Under this definition, the instruments for counteracting the essential forms of corruption - bribery, fraud, conflict of interest, abuse of office, etc- are blurred. Public interest is sacrificed in favor of private interests. It is widely acknowledged that corruption leads to inequality, injustice and poverty and that success often depends not on knowledge, work, skills and talent, but on connections, bribes and a repressive judicial system.

There is no doubt that corruption destroys trust in institutions, undermines economic growth and creates a sense of impunity, depriving civil society of real mechanisms for resistance. The causes of corruption are multilayered: low wages and pensions, high prices, inequality, injustice, irresponsibility, widespread poverty, the absence of a middle class, extensive theft of public resources, and not least, a divided civil society which sees that success depending not on work, skills and talent, but on connections, bribes and theft.

Corruption is not a natural disaster, although its consequences are devastating for the state, the economy and citizens. It is the result of human choices, lack of control and moral deadlock.

Rule of law – a culture of integrity: yesterday, today and tomorrow?

In line with its tradition, every year the European Commission submits a Rule of Law Report to the European Parliament, the Council, the European Economic and Social Committee and the Committee of the Regions. This year 2025 is no exception. On 8 July 2025, Member States were informed about the state of the rule of law in the European Union as a whole and in each Member State.

This is the sixth annual Rule of Law Report and the first under the current European Commission, once again applying a preventive dialogue-based approach. The rule of law continues to rely on democracy, security and the economy, as cornerstones guaranteeing the stability of European values. Its strength lies in the implementation of policies that enable citizens to participate actively both in the economy and in governance. For this purpose, the EU must be placed on a firm and stable foundation, to achieve future enlargement, trust in public institutions and guarantees for the free and honest exercise of civil rights.

In 2025, the President of the European Commission, Ursula von der Leyen, stated that her aims is to build a developing European Union, with a new generation of spending instruments, strict adherence to the principles of the rule of law and protection of financial interests. This can only be achieved through broader and more effective efforts to monitor the implementation of recommendations, strengthened contacts and cooperation with Member States.

The current conditions of geopolitical instability and local wars increasingly require more effective measures to protect the rule of law both within and outside the Union, especially with regards to human rights in the context of the EU enlargement to candidate countries such as Albania, Montenegro, North Macedonia and Serbia.

Anti-corruption measures, both preventive and repressive, help promote a level playing field for business and reduce the risk of organised crime infiltrating the economy and governance. European Commission policies must ensure that key decisions- such as public procurement- are made fairly and on an objective basis, protecting national public budgets. Another important benchmark is the media environment, which is essential for achieving transparency and safeguarding the integrity of the democratic space by ensuring equal conditions for media service providers.

The rule of law – a global challenge for the EU

The rule of law is fundamental to the development of the European Union's single market. It is a key prerequisite for a stable and predictable economic environment and a competitive advantage in its functioning, ensuring the protection of all rights and effective mechanisms for detecting and punishing corruption.

The rule of law inseparable linked to the effectiveness, quality and independence of the judicial system. Through judicial independence and accountability, effective results in the fight against corruption and organized crime can be achieved. As an example in the report, the EC points to: "awarding public contracts to the best offer on an objective basis, thereby protecting the public budget".

The budget is another essential element in supporting the rule of law. EU spending is a crucial guarantee for protecting the Union`s financial interests and an effective tool for promoting reforms and rules that enhance Europe's long-term competitiveness and ensure a level playing field in the single market. These include the handling of commercial disputes, the stability of the regulatory environment, the effective functioning and independence of regulatory bodies and judicial review of administrative decisions. The EC plans to adapt its methodology to engage Member States and business associations, enhancing effectiveness through digitalization, the fight against corruption and compliance with the Charter of Fundamental Rights in the use of EU funds.

Encouraging reforms in the area of the rule of law in connection with the budget can be used to invest in national or regional reforms that ensure high standards. Since 2019, the European Union has directed its work toward strengthening of the anti-fraud and anti-corruption architecture as a whole, ensuring effective instruments to protect the rule of law.

Cross-border initiatives can also ensure high standards in the use of EU budget funds. Since 2022, the Commission`s Rule of Law Report has included recommendations to Member States for reforms and for seeking assistance from the Venice Commission of the Council of Europe. These recommendations should be seen as a key element for continuing dialogue between Member States as a mechanism for resolving problems.

According to the report: "Meetings of the Network of Contact Points on the rule of law have yielded good results, serving as an effective forum for sharing experiences of common interest and as an established mechanism for political exchange among Member States." Despite these positive outcomes, the Commission plans to improve monitoring, reporting and control over the implementation of recommendations.

The European Commission and the European Parliament jointly promote the practice of holding annual debates on the Rule of Law Report, including country specific debates and public hearings on the application of democratic principles, the rule of law and fundamental human rights. The renewed mandate of the (DRFMG) [1]places additional focus on monitoring by the European Parliament.

The rule of law is a topic also discussed by the Advisory Committees, as well as brought to the attention of the European Economic and Social Committee (EESC), at the fifth annual conference on fundamental human rights.

Over the past year, the exchange of good practices has also included topics such as initiatives to promote a culture of the rule of law, the single market dimension of the rule of law, and measures to strengthen the resilience of national justice systems.

In October 2024, the Justice Council discussed how to promote access to justice in the context of the rule of law and competitiveness, and in March 2025, it discussed the independence of the judiciary and how the EU toolbox could most effectively promote it.

In connection with the European Parliament Resolution of 18 June 2025 on the 2024 Report of the Commission on the Rule of Law, the General Affairs Council held a horizontal discussion on general developments in the area of the rule of law in September 2024. One month later, in November, the Council broadened the discussion to include country-specific issues and practices, which continued in January and May 2025.

The exchange of good practices covers initiatives to promote a culture of the rule of law, the single market dimension of the rule of law, as well as effective measures to strengthen the resilience of national justice systems.[2]

On October 9, 2024, the European Parliament held special plenary debates in its plenary sessions on the rule of law report for Malta on October 23, 2024, Slovakia on February 12, 2025, Hungary on April 2, May 21 and June 18, 2025 and Spain on June 18, 2025. There is no information for Bulgaria on whether plenary sessions on the rule of law were held in 2024 and 2025, although the EU reports contain a number of problems, criticisms and recommendations.

The assessment of the European Commission's annual reports on the rule of law in the European Union, adopted on 22 January 2025, and the "Economic Measurement of the Rule of Law", adopted on 30 April 2025, create an opportunity to shed light on the real factual situation in each member state and the Union as a whole in the individual areas of observation.

[1]Democracy, Rule of Law and Fundamental Rights Monitoring Group (DRFMG)

[2](https://commission.europa.eu/strategy-and-policy/policies/justice-and-fundamental-rights/upholding-rule-law/rule-law/annual-rule-law-cycle/network-national-contact-points-rule-law_en). (2024/2078(INI)),

Spain is highlighted as a good practice for its Democracy Action Plan, which includes a proposal for an annual parliamentary debate to assess government compliance with the rule of law and fundamental rights.

Ireland is cited for initiatives, promoting a culture of the rule of law in higher education. To date, no Bulgarian practice has been identified as positive or innovative and recommended by the European Commission for application by other Member States.

Independence and cost of the judicial system

The European Commission gives special emphasis on ***the "Independence of the judiciary",*** as a cornerstone of the rule of law and fair access to justice. Access to justice is essential for citizens to exercise their rights, combat discrimination and hold decision-makers accountable. Achieving these democratic principles requires an independent judiciary system- something that, in Bulgaria, remains difficult to convincingly guarantee.

Concerns are raised that although some judicial systems may appear stable in theory, they do not always correspond to reality. Appointments and promotions of judges, based on criteria related to qualification and influence over internal convictions are central to real assessment. A relevant indicator is the number of cases in which Bulgaria has been convicted by the European Court of Human Rights (ECHR), resulting in hundreds of thousands of euros paid annually from the state budget.

The prosecution service is an essential key element in combating crime and corruption and in resisting political influence and interference. The European Commission condemns the misuse of the judicial system for political purposes, including the persecution of political opponents and interference in corruption investigations- facts that undermines public trust in constitutional principles and EU standards.

To achieve independent judicial systems, the EC proposes the inclusion of and access to free legal aid, a guarantee of equal access to justice, for vulnerable groups and legal aid systems, and especially in the case of language barriers.

The European Commission calls for disciplinary procedures for judges and prosecutors to be reviewed by independent bodies free from political influence- bodies that are currently lacking in Bulgaria, due to the lack of an effective mechanism for real civil society participation in referendums, a mechanism to challenge the adoption of draft laws, regulatory acts, legal norms that have not been subject to public discussion and the provisions of the Law on Regulatory Acts have not been complied with.

Over the past decade or so, every parliament has increasingly openly demonstrated unprincipled coalitions and votes, which lead to a breakdown of trust and a feeling among citizens that nothing depends on them. Unpardonable publicity of legislative power, imposed decisions for which they are not responsible, for the harmful damage caused to the image of the state, the economy, the law, morality, democracy and the rule of law.

The judicial system has been increasingly the focus of the European Commission's annual reports in recent years. In a decision of 25 February 2025 in two joined cases under Article 19(1) of the Treaty on European Union, concerning the rules for determining the remuneration of judges, it was stated that in Bulgaria too they must be objective, predictable, stable, transparent and fair in law.

In a US report on Bulgaria in 2025, the European Court of Human Rights issued 20 condemnatory decisions against Bulgaria for lack of a fair trial, excessively slow judicial procedures, poor prison conditions, ill-treatment and others, amounting to over 200 thousand euros, paid by the Bulgarian budget, i.e. by every Bulgarian living in the country and pretending to work. This result does not involve Bulgarian citizens who do not work in Bulgaria, do not create benefits for Bulgaria, but have equal rights to vote in elections, thereby determining and empowering those who enter parliament.

Despite the scarce public sources and systematized data, such as the budget law, decisions of the Supreme Judicial Council, annual reports and media publications, the goal is not to provide a statistical analysis, but to outline the factual situation that the state budget allocates to the judicial system and the prosecutor's office over the last few years:

- for 2024, the total budget of the judicial system is about 1.2 billion leva for salaries, administrative expenses and other expenses;
- on April 3, 2025, the SJC decided to increase the basic salaries, retroactively from March 1, 2025, of Supreme Judges, Prosecutors, and Investigators of the SJC from BGN 7,813 to BGN 9,079, or an increase of BGN 1,266 per month or an increase of 16%;

The salaries of the remaining structures of the system have also been increased by 16%, retroactively from March 1, 2025, as follows:

- at the Appellate level from 6464 BGN, to 7511 BGN;
- at the district level – Sofia from 5,780 BGN to 6,716 BGN;
- at the district level in the country from 5344 BGN to 6210 BGN;
- at the district level in Sofia from 4,694 BGN to 5,454 BGN;
- at the regional level in the country from 4216 BGN to 4899 BGN.

For junior magistrates, the increase in monthly salaries will come into effect from the beginning of the calendar year - January 1, 2025, and will increase from BGN 3,928 to BGN 4,564. The specialized

administration will also receive an increase in salaries, about 20%, and the annual amount for clothing will increase to about BGN 5,000 for magistrates for the current calendar year. According to the Ministry of Justice's reporting data, a budget for the judicial system for 2024 has been approved based on two indicators:

-for salaries **(§ 01-00)** – **793,284,850 BGN;**

- other remuneration and payments to personnel **(§02-00) -104,577,188 BGN.**

Additional payments have also been distributed, such as:

- bonuses;
- bonuses beyond the basic monthly salaries;
- cash grants, incentive funds – for specific courts and administrations.
- In addition to them: - Christmas and annual bonuses; remuneration for specific projects; reimbursement; distribution of unspent funds and other bonuses.

Even from the limited data, it is clear that the judicial system awards itself excessively high salaries, bonuses, and additional funds, despite the fact that Bulgaria pays over 200,000 euros annually for their unlawful decisions, awarded by the European Court of Human Rights (ECHR).

The European Commission relies on the key role of the Court of Justice of the EU in upholding the rule of law principles to effectively address ongoing challenges to the rule of law. It acknowledges the alarming trend that Member States selectively implement, or fail to implement and integrate, judgments of the Court of Justice of the EU, as well as to implement and integrate the latest case-law of the Court. This also applies to judgments of the International Court of Justice and the International Criminal Court (ICC), as independent and impartial judicial institutions.

The implementation of the judgments of the Court of Justice of the EU and the ECHR does not always contain clear deadlines for implementation, which is considered a weakness, a dilution of effectiveness and responsibility. It is envisaged to introduce a practice for monitoring each decision and for the Member States involved, for the Commission to initiate proceedings to establish non-fulfilment of these obligations. To this end, the EC, instead of sanctions for these findings, calls on the Member States to promptly implement the pending judgments of the Court of Justice of the EU and the ECHR.

The EC envisages the creation of **a monitoring unit** on matters related to democracy, the rule of law and the fundamental rights of citizens of the European Union. No information is available on this measure, including the timeframe for its implementation and the corresponding measures and mechanisms for control and sanctions in case of non-compliance.

In cases of non-compliance with the judgments of the Court of Justice of the EU, the Commission should urgently take action under Article 260(2) TFEU and apply the Regulation on the conditionality of compliance with the rule of law in the event of non-compliance with the judgments of the Court of Justice of the EU and the ECtHR. In cases where non-compliance with a judgment seriously affects the budget or the financial interests of the Union, it must necessarily lead to financial sanctions in order to ensure deterrence or to tangible financial sanctions.

The rule of law and the protection of fundamental rights are linked to the protection of fundamental rights, which requires appropriate funding, training and resources for police and law enforcement agencies.

The Council of Europe Code of Police Ethics and Situations in Which Force Is Used, defines it as a strictly necessary form with clear limits. It requires member states to introduce guidelines for transparent, independent and consistent selection of the use of force and weapons, in accordance with the standards of international law, UN recommendations and guiding principles, while preserving human rights in their application. The Council of Europe calls for thorough investigations into all cases of excessive use of force and discriminatory treatment by law enforcement authorities.

The European Commission also envisages the revision of the Victims' Rights Directive in order to eliminate the accumulated gaps and inconsistencies and achieve protected access to justice and support for victims with the principles of the rule of law. The conditions in prisons in recent years, with their overcrowding, inadequate living conditions and suicide statistics, are a serious problem for any state governed by the rule of law, and the EU as a whole. The European Commission declares that it is a tangible need to implement all the principles of the rule of law, to achieve fair treatment, within the framework of administrative justice.

Let us recall that, under Articles 19 and 267 of the Treaty on the Functioning of the European Union (TFEU), the courts of the Member States cannot be prevented from making use of the possibility of referring questions of law to the Court of Justice of the EU and the ECHR for a preliminary ruling on the rule of law. An anti-corruption mechanism that the Commission can carry out systematically, as part of its annual report on the rule of law, and bring infringement proceedings against a Member State when national judges encounter obstacles in this regard.

The EC's 2024 Rule of Law Report notes that there continue to be serious concerns that in Hungary about the independence of the judiciary from political influence on the prosecution, [3]which raises the question, isn't

[3]https://www.europarl.europa.eu/doceo/document/A-10-2025-0100_BG.html

Bulgaria in the same situation. Is it possible that this contagion will spread throughout the European Union??? What signal is it for the future of the union, the eurozone, freedom, finances, peace and the fear of war?

Anti- corruption principles

The basic principle of the rule of law is the fight against corruption in various spheres of state governance. The abuse of power for personal gain is an indicator of abuse, of the lack of effective laws in the interest of the entire public.

According to the 2024 Eurobarometer survey:

- 68% of EU citizens consider corruption a serious concern;
- 65% believe corruption is widespread,
- 41% believe that the corruption levels have increased.

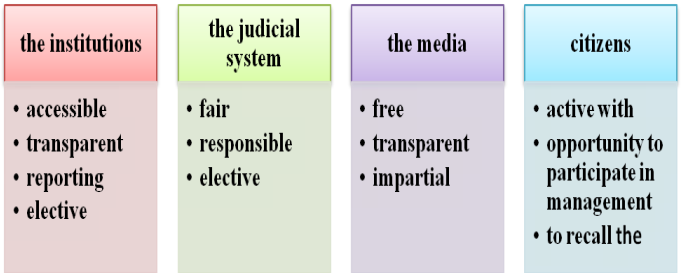
The European Commission emphasizes the need for joint action with the Group of States against Corruption (GRECO) to achieve effectiveness, accountability and transparency in the management of EU funds. It supports strengthening the powers of the European Public Prosecutor`s Office an enhancing cooperation among Europol, Eurojust, The European Court of Auditors, OLAF and other institutions.

The European Commission supports the strengthening of the European Public Prosecutor's Office's monitoring and coordination powers to strengthen its ability to fight corruption and cross-border crimes against the environment and the financial interests of the Union by EU officials.

The findings and recommendations can be defined as a signal with sufficient need for:

- drafting and adopting a new anti- corruption directive;
- unified definitions of corruption offences in the public and private sectors;
- clear rules on penalties;
- preventive measures against illegal political financing;
- conflict of interest rules for disclosure and management;
- free access to information;
- rules for interaction between the private and public sectors;
- a Code of Conduct for public officials;
- implementation of the European Media Freedom Act (EMFA) to achieve media pluralism and guarantee media freedom throughout the Union;
- active participation of civil society in the development of national anti-corruption strategic measures by each member state of the European Union and their reflections in the European Union Anti-Corruption Strategy.

The fight against corruption requires not only laws and strategies, but also culture, honesty and integrity in every citizen of the European Union, which should lead to:



Is it democratic for citizens to have the right to recall those they elected if they do not fulfill their election promises? According to Art. 67, para. 1 of the current Constitution of the Republic of Bulgaria, "*the representatives of the people represent not only their voters, but also the entire people.*" In addition, the constitution does not bind their election as representatives to a mandate, which in practice will mean that some will retire as deputies, and not what contribution they have made to the state, the people, the economy, etc. Hasn't the time come for the entire Bulgarian people to decide with a referendum?

However, there are countries that we do not perceive and define as democratic, but their voters can recall deputies, such as: Venezuela, Ecuador, Bolivia, Taiwan [4].

Even in the US, *Recall elections have been introduced*, which is applied partially, only at the state and local level. For example, in California, Wisconsin, and Michigan, state legislators can be recalled, and in Ukraine, local council deputies can be recalled.

[4] Republic of China

Conclusion

Corruption is the shadow side of society. It is not merely a crime, but a disease of trust and the most serious threat to the development of any modern democratic state and the European Union as a whole. Corruption is not a natural disaster, but it has the same destructive power, leaving devastation in its wake. For this, all of us bear historical responsibility- for yesterday, today and tomorrow.

The role of ethical leadership in preventing and countering corruption

Alexander Tsvetkov

Abstract. This article synthesizes theoretical frameworks, empirical evidence, historical lessons, and contemporary practice to argue that ethical leadership is a central - indeed causal - factor in preventing and countering corruption at both organizational and state levels. Drawing on leadership theory, meta-analytic findings, international policy reports, historical case studies, and national examples (including EU practice), I identify concrete causal pathways through which ethical leadership reduces opportunities for corrupt behaviour, bolsters institutional resilience, and increases social trust. The paper contrasts these beneficial causal mechanisms with the pernicious, predictable consequences of unethical leadership - ranging from organizational collapse to systemic political capture. Practical implications and recommendations for international organizations, EU institutions, national governments, and civic actors conclude the article. Bibliography list primary sources, meta-analyses, and official reports on corruption and ethics.

Keywords: ethical leadership, corruption prevention, institutional trust, governance, European Union, international organizations, organizational ethics

Introduction

Corruption undermines governance, economic development, and social cohesion. Preventing and countering corruption therefore requires more than rules and detection technologies: it requires leaders who commit to ethical norms, embody them in decisions, design anti-corruption institutions, and foster cultures in which misconduct is unlikely to flourish. This article asks: *How and why does ethical leadership reduce corruption?* It answers by synthesizing leadership theory, empirical research, policy practice, historical lessons, and documented cases of failure and success.

Key claims are: (1) ethical leadership causally reduces corrupt practices by shaping incentives, norms, and monitoring; (2) the absence of ethical leadership increases systemic vulnerability to capture, fraud, and institutional erosion; and (3) durable anti-corruption results require coupling rules with morally credible leadership that models integrity and enforces accountability.

Conceptual and theoretical foundations

Defining ethical leadership. Ethical leadership is a specific leadership construct defined by scholars as the demonstration of normatively appropriate conduct through personal actions and interpersonal relationships, combined with promotion of such conduct to followers through two-way communication, reinforcement, and decision-making. The social-learning perspective conceptualizes ethical leaders as salient models whose behaviour is imitated and internalized by subordinates; leaders also shape formal incentives and informal norms that together determine organizational behaviour.

Mechanisms: how ethical leadership reduces corruption. Based on social learning and institutional theory, ethical leadership reduces corruption through multiple, mutually reinforcing causal pathways:

1. **Modeling and norms transmission.** Leaders' visible ethical conduct sets behavioral reference points; employees imitate ethical cues and internalize norms of honesty and fairness.
2. **Rule design and enforcement.** Ethical leaders adopt clear policies, close loopholes, and ensure consistent sanctioning for misconduct, reducing opportunities and increasing expected costs of corruption.
3. **Institutional capacity building.** Ethical leaders recruit and promote on merit, strengthen internal audit and compliance functions, and create channels for protected whistleblowing - raising detection probability.
4. **Trust and social capital.** Ethical leadership fosters organizational and public trust, which increases voluntary compliance and civic cooperation in anti-corruption efforts.
5. **Signal to external stakeholders.** Ethical leadership signals credibility to partners and regulators, attracting investment and cooperation that constrain corrupt rent-seeking.

These mechanisms operate at micro (team), meso (organizational), and macro (state) levels and interact: for example, higher trust leads to greater civic support for robust oversight institutions, which in turn increase leaders' incentives to remain ethical.

Empirical evidence: leadership, outcomes, and stability

Meta-analytic evidence. Large-scale meta-analyses show consistent, positive relationships between ethical leadership and desirable follower and organizational outcomes - ethical conduct among employees, perceptions of fair treatment, job satisfaction, organizational citizenship behaviour, and reduced counterproductive work behaviour. These studies support the claim that ethical leadership is *not merely correlated* with better outcomes but, via plausible mediating variables (norms, monitoring, fairness perceptions), exerts causal influence on individual behaviour inside organizations.

Governance indicators, corruption and stability. Cross-national governance metrics - such as the World Bank's Worldwide Governance Indicators - show that countries with stronger governance (rule of law, regulatory quality, control of corruption) enjoy higher political stability and better development outcomes. Ethical political leadership that strengthens institutions and accountability mechanisms is one upstream causal factor contributing to these better governance indicators; conversely, sustained unethical leadership correlates with degraded governance and lower stability.

International and policy reports. Recent OECD and EU documents emphasize that anti-corruption success depends on both institutional design and the integrity of leadership at all levels (public enterprises, ministries, regulatory bodies). The OECD's integrity outlook and the European Commission's anti-corruption agenda explicitly link leadership, board professionalism, and public-sector culture to effective prevention. These policy statements reflect and synthesize the empirical consensus that leadership matters for systemic integrity.

Historical lessons: morality, legitimacy, and state survival

History offers repeated examples in which erosion of elite integrity contributed to state weakness or collapse. Several causal pathways recur:

- **Legitimacy erosion:** When rulers routinely flout rules and enrich narrow networks, public legitimacy declines and state capacity to tax, mobilize, and govern falls.
- **Institutional atrophy:** Persistent clientelism and patronage hollow out bureaucratic competence, reducing the state's capacity to respond to crises.
- **Elite myopia:** Immoral leadership prioritizing short-term rent extraction over long-term investment weakens economic foundations and resilience.

Classic and contemporary historical studies (institutional collapse, state failure literature) show that moral norms among elites matter for institutional continuity. While not the only factor - economic shocks, external invasions, and resource shocks matter greatly - corrupt leadership often multiplies fragilities and accelerates decline. Notable recent analyses of systemic collapse emphasize the interaction between elite incentives and institutional robustness. (For theoretical synthesis, see comparative institutional works on state capacity and failure.)

Known cases of unethical leadership and cascading failures

This section catalogs prominent, well-documented instances where unethical leadership - alone or combined with weak institutions - led to major organizational or societal catastrophes. Each case illustrates one or more causal links described above.

Enron, WorldCom and corporate collapse (2000–2003). Enron's top leadership cultivated a culture that tolerated accounting manipulation and concealed risk. Leadership actions - including deceptive financial reporting, reward structures tied to short-term profit, and suppression of whistleblowers - created permissive conditions for large-scale fraud. The causal chain is clear: leadership incentives → unethical accounting and concealment → market failure and of stakeholder trust → bankruptcy and systemic costs. Regulatory and audit failures interacted with leadership immorality. Official investigations and academic analyses document these mechanisms.

The 2007–2009 financial crisis. Investigations into the global financial crisis found that leadership failures - risk normalization, incentive misalignment (huge bonuses tied to short-term revenue), inadequate risk governance, and managerial hubris - were central causal contributors. Leadership choices enlarged systemic risk, while weak regulatory oversight and complex incentives prevented timely correction. The Financial Crisis Inquiry Commission's final report highlights leadership failure and institutional erosion as major causal factors.

State-level corruption and political capture. Where political leaders tolerate or engage in capture - awarding public contracts to cronies, politicizing procurement, and undermining independent oversight - corruption becomes systemic, draining public resources and undermining legitimacy. Consequences include fiscal stress, underinvestment in public goods, and declines in human development indicators. Transparency

International's global assessments show persistent harms where governance and leadership fail to prioritize integrity.

Positive examples: ethical leadership in practice

Ethical leadership can and has produced significant, measurable anti-corruption wins. Below are representative examples - at organizational, national, and international levels - illustrating causal mechanisms and effects.

International organizations and the EU. The European Commission and several EU bodies have introduced integrity frameworks, transparency measures, and leadership-driven compliance initiatives to reduce corruption risks in EU institutions and member states. The EU's Rule of Law reporting and anti-corruption legislative proposals seek to align legal frameworks with leadership accountability and enforcement, reflecting the understanding that leadership signals and behaviors shape national compliance and institutional reform.

Organizational examples: governance reforms and culture change. In private organizations, interventions led by committed senior leaders - resetting reward structures, mandating transparency, empowering compliance functions, and protecting whistleblowers - have correlated with lower misconduct and higher employee morale. Meta-analytic evidence indicates that ethical leadership improves employee ethical behaviour and perceptions of fairness, mechanisms that in turn reduce petty corruption and misconduct at scale.

National-level reformers. Countries that combine strong public-sector leadership commitment with institutional reforms (merit-based civil service, procurement transparency, independent anti-corruption agencies) often show measurable improvements in governance indicators and investor confidence. OECD evaluations and country case-studies emphasize the catalytic role of credible political commitment and leadership in making structural reforms stick.

Empirical studies on public trust, values, and leadership

Trust research shows that perceptions of leader integrity are among the strongest predictors of public trust in institutions. In turn, public trust facilitates compliance with regulation and enables collective action against corruption (e.g., citizen reporting, civic oversight). Conversely, perceived leader hypocrisy - public avowal of reform coupled with private rent-seeking - deeply erodes trust and civic cooperation, making anti-corruption measures politically costly to sustain. Cross-national surveys and governance indices consistently show these relationships: higher perceived integrity correlates with stronger institutional trust and better development outcomes.

Causal inferences and chains: enumerated propositions

Based on the preceding literature synthesis and case evidence, I propose the following causal propositions (each intended as an empirically testable claim):

P1 (Modeling-channel): When leaders consistently demonstrate ethical conduct, employees' unethical behaviours decline through social learning; this reduces internal corruption incidence. (Mechanism: norm internalization → behaviour change.)

P2 (Incentive-channel): Leaders who align material incentives (compensation, promotion) with long-term, integrity-based goals reduce rent-seeking and short-term opportunism. (Mechanism: altered expected utility calculations of potential offenders.)

P3 (Institutional-channel): Ethical leadership that strengthens independent oversight (audits, ombuds, judiciary) raises the probability of detection and sanction, thereby deterring corruption. (Mechanism: increased expected cost of misconduct.)

P4 (Trust-channel): Ethical political leadership increases public trust, which increases civic cooperation with anti-corruption policies and reduces tolerance of patronage networks. (Mechanism: collective enforcement through civic norms.)

P5 (Negative counterpart): Persistent unethical leadership produces institutional capture, lowers public trust, and, via feedback loops, increases the scope and depth of corruption-leading to systemic risks and possible state weakness. (Mechanism: legitimization of rent extraction; degradation of administrative capacity.)

Each proposition identifies mechanisms that are observable and measurable (norm perception surveys, audit reports, governance indicators), enabling empirical testing and policy design.

Policy and managerial recommendations

To translate theory into practice, the following interventions draw directly on the causal pathways identified above:

Visible ethical modeling by senior leaders. Leadership appointments should be accompanied by clear, public ethical commitments and demonstrated through transparent decision-making and consistent sanctioning of misconduct.

Align rewards with integrity. Compensation and promotion policies should include integrity metrics and long-term performance indicators to avoid short-termist incentives.

Institutionalize independent oversight. Boards, internal audit, and independent anti-corruption bodies must report to non-partisan authorities with protection against political interference.

Protect whistleblowers and encourage reporting. Effective confidentiality and anti-retaliation safeguards increase detection probability and signal leadership seriousness.

Strengthen civic engagement and transparency. Open contracting, accessible information on public budgets, and civically accessible complaint mechanisms convert public trust into active surveillance and pressure for accountability.

Leadership development and training. Invest in ethics education for current and future leaders, emphasizing moral reasoning, conflict of interest management, and institutional stewardship.

For EU and international organizations, recommendations include conditionality that rewards demonstrated leadership-driven anti-corruption reforms (not only formal law changes), peer review mechanisms emphasizing leadership integrity, and technical assistance targeted at leadership capacity-building.

Limitations and directions for research

This article is a synthesis and policy-oriented argument; it does not present new primary quantitative analysis. Important limitations include:

Causal inference complexity. While multiple mechanisms are plausible and supported by studies and cases, isolating leader-driven causality in observational data requires careful designs (natural experiments, instrumental variables, longitudinal studies).

Contextual heterogeneity. Leadership effects interact with cultural, legal, and economic contexts; interventions effective in one polity may require adaptation in another.

Measurement issues. Ethical leadership and corruption are partly latent constructs measured by perceptions and proxies (e.g., indices), which entails measurement error and response bias.

Future research should pursue longitudinal studies linking leadership changes to variation in corruption metrics, randomized field interventions (e.g., leadership training + institutional reforms), and comparative case studies that unpack causal sequences.

Conclusions - summative causal claims

This review leads to several robust conclusions:

Ethical leadership matters. Extensive theoretical and empirical work supports the conclusion that ethical leadership causally reduces corruption within organizations and can catalyze systemic anti-corruption effects at national levels.

Multiple causal pathways. The main mechanisms - modeling of norms, incentive alignment, institutional strengthening, and trust-building - operate together to reduce opportunities and motivations for corruption.

Absence of ethics has predictable harms. Cases ranging from corporate scandals (Enron, WorldCom) to systemic financial crises and political capture show consistent causal chains from unethical leadership to catastrophic outcomes.

Policy follows practice. Effective anti-corruption policy must combine rules and enforcement with credible ethical leadership; legal frameworks alone are insufficient if elite incentives and organizational culture remain misaligned.

In short: ethical leadership is not merely an attractive complement to anti-corruption tools - it is a central causal driver of durable integrity.

Closing remark. Ethical leadership is both a moral imperative and a pragmatic policy lever. The cumulative evidence - from micro-level organizational studies to macro-level governance indices and high-profile case investigations - points to leadership as a central causal actor in the fight against corruption. To build resilient, trustworthy institutions we must invest in leaders who not only endorse integrity on paper but embody it in decisions, incentives, and the everyday signals that shape organizational life.

References

Brown, M. E., & Treviño, L. K. (2006). Ethical Leadership: A Review and Future Directions. (Foundational conceptual article on ethical leadership and social learning).

Bedi, A., Alpaslan, C. M., & Green, S. G. (2016). A Meta-analytic Review of Ethical Leadership Outcomes and Moderators. Journal of Business Ethics.

Financial Crisis Inquiry Commission. (2011). The Financial Crisis Inquiry Report: Final Report of the National Commission on the Causes of the Financial and Economic Crisis in the United States.

OECD. (2024). Anti-corruption and integrity outlook 2024. OECD Publishing.

European Commission. (2023–2025). EU anti-corruption policy and legislative proposals. (Commission webpages and reports).

Transparency International. (2024). Corruption Perceptions Index 2024. Transparency International.

World Bank. Worldwide Governance Indicators (WGI). (Data and methodological documentation).

SEC; Congressional reports and investigative reports on Enron and WorldCom (2002–2004). See SEC Report of Investigation (WorldCom) and congressional materials.

Creating helicopter emergency medical service

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European Commission has adopted and imposed specific amendments and supplements to the legislative regulation governing the conduct of helicopter emergency medical service (HEMS) operations. This is a fundamental and key normative and regulatory act, which introduces changes and additions to national rules, requirements and standards for safety and certification.

In Bulgaria, a National Program for the Introduction of HEMS was launched in 2024-2025. A number of legislative and organizational actions have been undertaken for a national program for the delivery of helicopters, the designation of a national operator in the person of Bulgaria Heli Med Service, and the commitments of the Ministry of Health and the Ministry of Transport and Communications.

Our southern neighbor, Greece, has a well- established and sustainable national system, based on public-private partnerships and supported by Stavros Niarchos Foundation (SNF). The Greek aviation regulator, the Hellenic Aviation Authority (HCAA), carries out its activities through national helicopter guidelines. A long-standing, functioning operational system (SMURD) is applied, with a legal framework of ordinances and orders, regulating the activities of medial flight crews.

Systematically, the government of Greece, conducts research, studies, analyses and prepares official reports on the performance and criteria for the overall activities of bases and helicopter teams.

Our northern neighboring country, Romania, has a functioning, long-standing operational system (SMURD) with a legal framework – consisting of ordinances/orders regulating the activities of medical flight crews. Scientific articles and analyses are used to evaluate the system and the effectiveness of regulatory documents (ordinances) and scientific research on the activities of the teams.

In 2023, the European Parliament voted an amendment to Regulation (EU) 965/2012 regarding HEMS operations, introducing mandatory technical and operational requirements for Member States and operators.

Table 1. Comparative analysis of the level of development of helicopter emergency medical service

Indicator	**Bulgaria**	**Greece**	**Romania**
Existence of national HEMS regulation	Draft/national framework in progress; existing provisions for civil aviation plus a draft decree for HEMS; finacing/ procurement underRecovery /ESIF.	There are national guidelines/instructions (HCAA SIAN) and operational procedures through EKAV; regulatory control by HCAA.	Regulated and established (SMURD/DSU) through ordinances and operational manuals for many years.
Key reference regulations (links)	Civil Aviation Act, draft HEMS decree; decisions of the General Directorate of Civil Aviation Authority (AOC for operators) – Ministry of Transport and Communications	Regional/national regulations + HCAA SIAN 02-2022; EKAV operational instructions.	Ordinances and operational documents for SMURD; national legal framework for emergency medicine and aviation.
Responsible institutions	Ministry of Health (medical component), MTC / Civil Aviation Authority (regulation/AOC), regional health inspectorates and hospitals.	EKAV (national emergency center), HCAA (regulator), Ministry of Health	DSU/ Ministry of Health/ Civil Aviation Authority
Operational model (state/private/mixed)	Mixed: national program/state funding plus contracted operators with AOC (e.g. Bulgaria Heli Med Service). EU funding	Mixed/public-private: EKAV coordinates, private operators and contractual solutions are used; PPP models for island operations.	Predominantly state/hybrid: SMURD (publicly organized) with significant state/local resources, donations and international support. scoolmedia.com

	for part of the fleet.		
Number of operational helicopters (public estimate)	Program for 6 helicopters (project stage; phased delivery — first in 2024; fourth arrived October. 2025.	No single state fleet - several AW139 and other helicopters operated by different operators, especially for islands an tourist seasons (operators conclude contracts).	SMURD: public estimates of 9–10 helicopters (in various publications and scientific articles — values vary over time).
Number of bases/geographic coverage	Planned national bases (project foresees 6+ local hangars/bases; 8 hospital heliports registered plus others still in process). MTS	Distributed bases/temporary locations with, strong focus on islands and tourist regions; reactive scaling during the season.	SMURD aeromedical operational bases forming an extensive network across regions.
Annual number of missions (latest public figure)	Official national annual HEMS figures still limited (new service, data partially published in press releases).	2,863 medical evacuations in 2024 (reported increase due to tourism - publications/media).	Aggregated SMURD interventions are very high (hundreds of thousands across all operation types), but individual air missions are not always clearly aggregated in public summary (e.g. scientific articles and reports provide implicit estimates).
Average response time	There are no unified national public statistics at the moment (the service is new - measurements are expected after stabilization).	EKAV/operators publish local operational times, but there is no easily accessible national aggregate figure (seasonal variations).	SMURD: Local assessments exist for specific bases; no single centralize national figure.
Financing (annual budget/mechanism)	EU Recovery /ESIF + national budget + possible operator contracts; detailed figures partially public in project documents (European Commission)	Mixed financing- national funding and specific contracts/subsidies; private operators under contract, sometimes with sponsorship/banks. Avincis	Mainly state and local funding plus donations/international aid; allocated through DSU/MoH budgets. scoolmedia.com
Crew qualifications (medical staff, pilots)	Project foresees pilot + co-pilot + paramedic; certification under CAA and medical rules; training in progress.	EKAV and HCAA require pilot qualifications and medical teams; national protocols and training.	SMURD has established long standing training procedures for medical and flight crews.
Implementation of EU 2023/1020	Implementation is expected through national legislation and ordinances (adaptation process ongoing). EUR-Lex	Operational compliance through HCAA frameworks referencing Reg 965/2012; amendment implementation in progress.	Applies EU regulations through CAA/DSU; SMURD operations meet many of the requirements, though formal incorporation of amendments should be verified. EUR- Lex
Public annual reports (links)	Partial press releases and project PDFs (Ministry of Transport and Communications, Ministry of Health. Centralized annual HEMS reports are not yet consistently published. MTC	EKAV/HCAA press releases and media reports; some annual data published .	SMURD/DSU publish reports and scientific articles; including analyses of air operations and impact.
Notes / specific risks	Need for monitoring safety culture and data collection.	Strong seasonal demand (tourism/islands) – risk of capacity constraints and	SMURD is an established model, but fleet maintenance, financing, and

		dependence on private operators requiring strict contract and quality control.	monitoring/quality methods during expansion require attention.

The data and information presented in Table 1 are extracted from official reporting documents of the three countries, with the aim of providing a brief comparative analysis of the level of development of this activity. The information makes it possible to outline strengths and weaknesses in this relatively new field, especially for Bulgaria, which has a significant cost and life-saving potential.

Despite the short period of time for the implementation of this noble activity by Bulgaria, both strengths and certain shortcomings can be identified.

A positive aspect for Bulgaria is undoubtedly the state support through EU funding, which enabled the rapid delivery of the first helicopters and the issuance of AOCs to operators – an important initial capital. The project for building several bases creates opportunities for coverage planning. Alongside these good initial decisions, it is unavoidable to note the difficulty in assessing effectiveness in terms of number of missions per region, development of safety culture, SOP integration with ground teams, and others aspects under the Ministry of Transport and Communications.

A positive aspect for Greece is the established HCAA procedures during tourist seasons, solid experience with public-private contracts and flexibility for seasonal needs. A potential weakness is the possible risk of dependence on private operators and short-term contractual arrangements.

Romania has long-standing experience with an established fleets, bases, procedures, and personnel, as well as good practices in integrated operations and strong local expertise in aeromedical emergency operations. Despite these achievements, Romania lacks compact public indicators on the effectiveness of air operations and fleet renewal costs and logistics.

The European Commission draws the attention of all EU Member States to several common recommendations, foremost among them the introduction of standardized public annual operational reports, containing information on:

- Number of missions by type (HEMS , interfacility, SAR);
- Average response time and outcome indicators;
- Minimum required number of missions and flight hours;
- Full implementation and verification of compliance with EU 2023/1020;
- Quality & safety monitoring and introduction of national KPIs (HIT — HEMS;
- Contractual transparency in public- private models;
- Cross-border coordination and shared procedures;
- Investing in data and impact assessment.

References

EU 965/2012 (2026) https://eur-lex.europa.eu/eli/reg/2012/96/oj/eng
EU 2023/1020 (2026) https://eur-lex.europa.eu/eli/reg/2023/1020/oj/eng