ISSN (Online) 2956 - 0764

Social informatics JOURNAL

Volume 4, Issue 2, December 2025.

ISISSN (Online) 2956-0764

Social informatics journal

Volume 4, Issue 2, December 2025.

https://socialinformaticsjournal.com

IMPRESSUM

Social informatics journal
Volume 4, Issue 2, December
2025.

Editor in chief:
Momčilo B. Bajac, PhD

Publisher:
Address: University UNION Nikola Tesla, Belgrade, Faculty of Management,
Njegoševa 1a, 21205 Sremski Karlovci
Studentska služba: 060/0400127
Računovodstvo: 021/2155046
Dekanat: 021/2155045
FAX: 021/833303
https://famns.edu.rs/
E-mail: editor@socialinformaticsjournal.com

For publisher:
Nenad Marković, PhD

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Bajac, M., & Njegovan Gužvica, M. (2025). Algorithmic Reality and the Myth of Neutrality: Social Informatics Perspectives on AI-Mediated Society. *Social informatics journal, Vol. 4, No. 2*, 01-10

UDC: 004.8:004.021]:316.3
https://doi.org/10.58898/sij.v4i2.01-10

Algorithmic Reality and the Myth of Neutrality:

Social Informatics Perspectives on AI-Mediated Society

Momčilo Bajac[1*], Milica Njegovan Gužvica[1]
[1] Faculty of management, University Union Nikola Tesla Beograd
momcilo.bajac@famns.edu.rs; milica.njegovan@famns.edu.rs

Abstract: The rapid expansion of artificial intelligence (AI), algorithmic systems, and platform-based communication technologies is fundamentally changing the way social reality is produced, perceived, and interpreted, particularly among younger generations growing up in digitally mediated environments. This paper aims to demonstrate that the assumption of algorithmic neutrality represents one of the most prominent and dangerous myths in contemporary technological discourse. By uncritically accepting algorithms as objective, value-free, and merely technical instruments, societies risk obscuring their profound normative, epistemological, and political effects. As a conceptual-theoretical paper drawing on insights from social informatics, philosophy of technology, and critical AI studies, we offer a conceptual framework for understanding AI as a generator of mediated reality, rather than merely a passive tool. The paper is intended as a reflective guide for authors and researchers, encouraging critical engagement in exploring the consequences of AI-driven systems across all spheres of social reality.

Keywords: artificial intelligence, social informatics, algorithmic bias, mediated reality, youth, digital society.

Introduction: From the Information Society to Algorithmic Reality

Modern societies have entered a stage in which digital technologies not only support social processes but actively structure them. Social networks, recommendation systems, generative AI models, and automated decision-making tools increasingly determine what individuals see, read, learn, and believe. In this context, reality itself becomes technologically mediated. For younger generations, that are often described as *digital natives*, this mediation is not experienced as an external intervention but as a natural framework of existence.

In such an environment, algorithms function as invisible social actors. They filter information, rank relevance, predict preferences, and shape attention. Google, as a pioneer of surveillance capitalism with the help of AI, transforms data into highly profitable algorithmic products that predict and modify user behavior. This creates the foundation for unprecedented instrumental power and its social and political consequences (Zubof, 2019).

*Corresponding author: Momčilo Bajac, momcilo.bajac@famns.edu.rs

Social informatics, as a field concerned with the mutual interaction between information technologies and society, is directly called upon to examine the consequences of this interaction. The central question is no longer whether technology affects society, but how deeply algorithmic systems participate in constructing social reality.

The Myth of Algorithmic Neutrality

One of the dominant narratives accompanying the adoption of artificial intelligence is the claim of neutrality. Algorithms are often presented as objective, rational, and immune to human biases. This narrative is deeply misleading. Algorithms are designed, trained, and applied within specific social, economic, and cultural contexts (Filipović et al, 2022). Their outcomes inevitably reflect the values, assumptions, and power relations embedded in the data, design choices, and institutional objectives.

The myth of neutrality becomes particularly problematic when algorithmic systems are entrusted with epistemic authority, deciding what counts as relevant information, credible knowledge, or acceptable behavior, especially in sensitive situations involving personal data and information (Bajac & Bjelajac, 2022). In such cases, algorithms do not merely process reality; they actively produce it. Neutrality therefore serves as an ideological shield that conceals responsibility and discourages critical scrutiny of the constructed reality.

This myth of algorithmic neutrality is closely intertwined with the myth of the "purity" of artificial intelligence and its ecological neutrality, which has been clearly and convincingly demystified by Kate Crawford in her book *Atlas of AI* (Crawford, 2021).

AI-Generated Content and the Construction of Meaning

A defining feature of the current technological moment is the mass production of AI-generated content. Texts, images, videos, and even social interactions are increasingly synthesized by machine learning models. For younger users, distinguishing between human-generated and AI-generated content is often irrelevant (Mishra et al., 2025).

This raises profound questions for social informatics. When meaning is algorithmically produced, traditional assumptions about authorship, authenticity, and intent are, to say the least, questionable. Reality becomes partially simulated yet socially effective. Individuals respond emotionally, cognitively, and behaviorally to content regardless of its origin (Carr, 2010). In this sense, AI systems function as co-creators of social reality.

Simulation, Post-Truth, and the Hybridization of Reality

The emergence of AI-generated content intensifies what Jean Baudrillard described even before the advent of computers and AI as the era of simulation: a state in which signs no longer represent reality but replace it (Bodrijar, 1985). In algorithmic environments, simulations are not merely symbolic representations; they are operational structures. They guide behavior, shape expectations, and organize social interaction. Reality, in this sense, becomes performative.

This fact can be productively combined with Berger and Luckmann's theory of the social construction of reality (Berger & Luckmann, 1966). While earlier forms of socialization relied on relatively stable institutions (family, education, media), algorithmic systems introduce a fluid, continuously adaptive layer of

reality construction. Social meanings are no longer stabilized through shared narratives but are dynamically recalibrated through data-driven feedback loops.

Luciano Floridi's concept of the infosphere further clarifies this transformation (Floridi, 2018). Human existence increasingly unfolds within an informational environment where distinctions between online and offline, artificial and natural, human and machine, lose analytical clarity. Within the infosphere, AI systems act as epistemic agents: they not only transmit information but actively participate in shaping what can be known, remembered, and valued.

This state is closely connected to the phenomenon of post-truth. Post-truth should not primarily be understood as the spread of lies, but as a structural shift of truth toward relevance, visibility, and affective resonance. Algorithmic systems prioritize engagement over epistemic validity, thereby transforming truth from a normative standard into a performance metric (Farkas & Schou, 2019).

Youth, Perception, and Algorithmic Socialization

Younger generations are socialized in algorithmically curated environments. Their exposure to news, cultural norms, political discourse, and social validation is filtered through platform logics optimized for engagement rather than understanding (Bajac & Vojinović, 2022). This form of algorithmic socialization shapes not only opinions but also cognitive habits: attention span, risk perception, identity formation, and expectations about the world.

From the perspective of social informatics, this phenomenon calls for a shift from explanations at the individual level to systemic analysis. The question is not whether young people critically assess information, but whether the informational environments in which they live even allow such critical distance to emerge.

From Media to Environment: The Change in the Ontological Status of Technology

For previous generations, technology was a tool (TV, radio, computer) or a mediator of reality. For younger generations (digital natives), technology is the environment – a primary reality, not a secondary representation. Here, we see a drastic, paradigmatic ontological shift in which reality is no longer equivalent to the physical world. Reality becomes a hybrid of physical, digital, and algorithmic elements.

Furthermore, there is fragmentation of reality and the loss of a shared frame of reference for forming relationships with reality. In traditional models that shaped reality, there were shared narratives created by schools, media, the state, and religion, resulting in relative consensus about truth, authority, and knowledge itself. In today's models, algorithms on digital platforms personalize information, truth, and value systems so that each user lives in their own epistemological micro-reality (Bajac & Vojinović, 2022). The result? A multiplied reality without consensus, weakening the concept of objective truth, and increasing relativism. This is crucial for understanding both youth identity confusion and political polarization.

On social networks, performative identities are built that depend on feedback loops (likes, views, engagement). As a consequence, identity is constructed externally rather than internally. Young people learn that they exist if they are seen, are valuable if confirmed by the algorithm, and attention becomes the new currency of self-worth. This deeply affects self-esteem, anxiety, and socialization. Digital environments favor speed, fragmentation, and reaction. Young people grow up in constant stimulation, multitasking, and short narratives. Consequently, they develop weaker capacities for deep reading and learning, poor concentration and contemplation, and limited long-term planning skills (Bajac & Fišer, 2024).

Beyond these immediate effects, this has direct implications for democracy, education, and political participation. New technologies, social networks, and artificial intelligence do not merely change how younger generations communicate; they actively reconfigure how reality, identity, and authority are perceived. The challenge facing society as a whole is no longer the adoption of technology but the ethical and institutional design capable of preserving human autonomy within algorithmically mediated environments.

Digital Environment vs. Evolutionary Brain Development

Before the digital revolution, information arrived linearly and within natural rhythms (speech, reading, observing the environment), and the brain evolved to filter out the unnecessary and focus on what was relevant for survival and social interactions. In a digital environment, information is multisensory, hyperfast, and fragmented. Constant notifications, feeds, video clips, and interactive content stimulate the dopamine network and reward short-term attention. They interrupt deep, focused thinking and prolonged information processing (*deep work*).

Working Memory and Cognitive Capacity

Information processing in the brain involves selection, filtering, focus, and abbreviated heuristics. This is a system developed over millennia for controlled attention and problem-solving in the real world. When the volume of input (information) exceeds the capacity of working memory, overload occurs, resulting in reduced decision-making ability, decreased concentration, and fragmented attention (Mayer, E. R. 2005).

Impact on Children and Adolescents

Excessive exposure to multimedia content and information leads to attention fragmentation and reduced capacity for deep processing. Multiple inputs cause the brain to shift focus every second, reducing the ability to integrate information into long-term memory. As a result, problems with concentration, planning, and solving complex tasks arise. Too much input in a unit of time leads to sensory processing overload, that is, information overload. Working (operational) memory has limited capacity and duration: on average, it can hold 4 ± 1 units of information at the same time (Ratković Njegovan & Bajac, 2008).

Children may become hyper-stimulated, exerting increased mental effort to filter "important from unimportant." Rapid selection of information, where the brain favors fast, superficial conclusions, reduces critical thinking and reflection, while excessive multitasking decreases working memory capacity, affecting planning, self-control, and long-term focus. Although the brain is flexible and allows adaptation to new conditions, the evolutionary framework was optimized over millennia for linear and contextual processing (Harari, 2015).

The consequences of a hyper-digital environment include short-term increases in motivation and stimulation, but long-term potential reductions in deep analysis, attention, and creative problem-solving. This is particularly risky for children and adolescents whose brains are still developing executive functions (prefrontal cortex until the mid-20s). To prevent this in time, it is necessary to limit multiple inputs for children, encourage deep learning and focus, reading, projects, practical and physical activities, combine online and offline experiences, and develop digital literacy alongside sensorily balanced activities (Rajović, 2020). The human brain's working memory is not designed for continuous digital bombardment. The crisis

is not fatal, but if unmanaged, it can lead to temporary or permanent cognitive development impairments, especially in children and adolescents. The digital environment is extremely stimulating but evolutionarily misaligned and requires a controlled educational strategy to develop the functions needed for real-life situations and long-term learning (Ratković Njegovan & Bajac, 2008).

Artificial Intelligence, Power, and the Risk of Total Mediation

The popular metaphor of *The Matrix*, a fully simulated reality that its inhabitants accept as natural, gains new significance in the context of AI-driven societies. Although often dismissed as science fiction, the Matrix metaphor functions as a powerful heuristic for understanding technologically mediated reality (Langoday et al., 2025). It is important to note that such a state does not require a unified, totalitarian system of domination. Partial, fragmented, and normalized mediation can be even more effective.

In this sense, contemporary societies may already inhabit a "soft Matrix": a reality continuously curated by algorithms. Individuals are not violently separated from reality; rather, reality itself is gradually reconstructed around them. This process closely aligns with the logic of post-truth societies, where emotional resonance, visibility, and algorithmic amplification surpass factual accuracy.

Here, the myth of algorithmic neutrality plays a crucial stabilizing role. By framing algorithmic outputs as objective reflections of reality, mediation systems become epistemically invisible. Users experience algorithmically generated environments as neutral, natural, and inevitable. Over time, this erodes the distinction between representation and reality itself, replacing critical distance with adaptive immersion.

For civilization to "slide" into the Matrix, it is not necessary to fully simulate reality; structuring the conditions of perception is sufficient. Thus, younger generations do not "enter" the Matrix. They grow up within it. Therefore, the most dangerous aspect of AI is not the autonomy of machines, but the transformation of humans who no longer know where their perception ends and the system-Matrix begins. The Matrix is not a technical but an epistemological and emotional prison. Within it, people do not lose freedom by force but by surrendering the interpretation of reality to algorithms. If people lose the ability to create meaning for themselves, AI will not need to control them. They will adapt and submit to the system-Matrix (Langoday et al., 2025).

When discussing the search for meaning in new conditions, Yuval Noah Harari starts from the assumption that a technologically mediated future, especially one shaped by AI, dismantles traditional sources of meaning: religion, nation, ideology, profession, and even personal identity (Harari, 2024). According to Harari, AI systems will not only replace human labor but will surpass humans in many cognitive and creative domains, challenging the idea of human uniqueness. In this context, his central question is not how to control AI, but how to preserve human meaning, autonomy, and dignity in a world where algorithms know more about us than we do ourselves.

According to Harari, meaning is not given by external authorities but learned. Future generations will not inherit ready-made narratives but will need to develop mental flexibility and the ability for constant "reinvention". The most important skill becomes self-awareness – not technical expertise, but the ability to understand one's own emotions, fears, and motives. The danger is not AI itself but the manipulation of attention. If algorithms take control of our attention, emotions, and decisions, humans can become "hacked organisms".

New Reality vs. the Old Economic Paradigm – Do We Have Solutions for the Situation We Are Facing?

Why is responsibility, especially self-responsibility, more necessary today than ever? Predictions and statistics from reference institutions and experts estimate that over the next five years, a large portion of the global population will be left without employment due to rapid and paradigmatic changes. According to Yuval Noah Harari, the central challenge of an AI-mediated future is not technological domination but the preservation of human meaning in a world where algorithms increasingly shape perception, attention, and decision-making. In a world governed by intelligent systems, meaning becomes a human responsibility rather than a structural guarantee.

In this context, his often-criticized concept of the "useless class", a class of economically irrelevant, unemployable people, is relevant. This is not a moral judgment but a structural diagnosis, a warning. Harari does not claim that people are useless as human beings; rather, in a system based on the market value of labor and competitiveness, a large number of people can become economically irrelevant. Industrial capitalism created jobs, digital capitalism rationalizes them, and AI capitalism eliminates them faster than it creates new ones. The problem is not unemployment as such, but persistent unemployability.

Smith's "invisible hand of the market" operates under the assumption of human labor creating value, scarcity of resources, and market coordination of interests. The AI paradigm breaks the link between labor and value, reduces scarcity in the informational sphere, and introduces coded coordination instead of market coordination. Therefore, attempting to plan the AI era solely through Smithian categories is historically anachronistic. This is a cultural, not a technical problem. A new economy of ownership is necessary. If AI will produce value in the new reality, who owns the AI? Here, there is space for DAO (Decentralized Autonomous Organization) models, collective ownership of algorithms, similar to the Bitcoin community (Bajac & Bjelajac, 2022), and even AI as a public good. New social narratives are required. Without a new narrative, the "unemployed" remain "unsuccessful," and UBI remains social assistance rather than a civilizational step forward. UBI, within the logic of capitalism, still assumes the market, money, and consumption as meaning. It does not change the ontology of labor but bypasses it. The problem of UBI funding is not trivial, and there is currently no clear solution. Without changes in the ownership of the means of production, within the logic of capitalism defined by Adam Smith in *The Wealth of Nations* (1776), UBI becomes "reluctant": an unnatural redistribution of profits for capitalism, not a system transformation. In other words, technology is ahead of social theory, economics above ethics, and politics ahead of a deep understanding of the new reality.

The new reality currently has no complete solution for the "unemployable class," into which a large number of young people could easily "slide" if they fail to take their responsibility for seeking meaning seriously in a post-authority and post-truth world. The creators of the "new reality" are still thinking in old economic terms about a new technological ontology.

New Paradigm, the Great Reset, and the Question of Human Nature

Klaus Schwab, in *The Fourth Industrial Revolution* (Schwab, 2016), suggests a new paradigm emphasizing the convergence of physical, digital, and biological systems. From the perspective of social informatics, this convergence signifies a transition to hybrid reality: a socio-technical state in which human cognition, machine intelligence, and material environments co-produce social experience. But it does not

stop there.

By erasing the boundary between physical, digital, and biological, the conditions under which identity, autonomy, labor, the body, and consciousness are formed are changing. While he implies that human nature itself will change, Schwab does not explicitly claim, in a strictly biological sense, that "humans will cease to be human." His thesis is subtler but far-reaching. In other words, Schwab does not start from the classical philosophical definition of "human nature" but from functional anthropology: how people perceive the world, make decisions, communicate, and experience their body and mind. In this sense, a change in human nature does not necessarily mean a change in DNA (although that is no longer excluded), but a change in the mode of being in the world.

Convergence of Physical, Digital, and Biological: What Specifically Changes?

- Physical–Digital Convergence: Always-on connectivity, algorithmic perception of reality, externalization of memory, attention, and orientation, inevitably leading to cognitive dependence on technical systems.
- Digital–Biological Convergence: AI in medicine (diagnostics, predictive models), neurotechnologies, bioinformatic personalization (genetics, mRNA therapies). As a result, the body becomes a datafied system.
- Physical–Biological Convergence (nanomedicine, biomedicine): Implants, biohacking, life-extension, modification of bodily functions. Consequently, the boundary between natural and artificial bodies blurs, producing hybrid humanity, promoted by the ideology of transhumanism.

Although there are different approaches to defining human nature (essentialist, historical-constructivist, and techno-anthropological), the Fourth Industrial Revolution and its underlying technologies do not directly change human nature, but radically alter the conditions of its formation. When perception, memory, decision-making, and embodiment are systematically delegated to technological systems, the boundary between human and technical becomes ontologically unclear. If human nature has historically always been shaped by the environment, then a highly technological, algorithmically mediated environment has the potential to produce a new form of the human subject. Not biologically different, but epistemologically and existentially transformed.

Technology has no ethics, purpose, or compassion. It only has an internal logic of optimization. Meanwhile, young people remain without clear narratives of meaning, without value authorities, and without "initiatory" education for the new reality.

The Great Reset – Long-Awaited Utopia or Uncertain Dystopia?

Should humans transfer at least part, if not all, of their sovereignty to AI-led technology? Viewed from a historical perspective, humans have continuously produced violence, exploitation, war, and suffering, inflicting pain on one another. If intelligence beyond human passions assumes part of decision-making, chaos may decrease, resource allocation may be rationalized, and tribalism may weaken. On the other hand, intelligence without ethics can become the perfect ruler of injustice, a cold optimizer of suffering. There is a danger that evil will not disappear, but rather become more efficient and invisible.

We are currently entering a period that could be called an anthropological transition, which some may term the Great Reset (neither the first nor the last). It is akin to the transition from hunter-gatherer to agricultural societies or from feudalism to the industrial age (Harari, 2015). During major civilizational

transitions, "old wisdom" is often lost or forgotten, violence becomes inevitable, and meaning temporarily disappears. However, the difference today is the speed of paradigm change. Unlike previous transitions, this one occurs within a single generation.

Who controls these changes, and why is the intellectual elite mostly silent?

The world is too complex, driven by many intertwined interests. No one fully controls the changes, but a small number of actors significantly steer them. We are facing what could be called warning-level technological power without political responsibility. The most significant actors are:

- Silicon Valley, which holds infrastructural power (know-how, computing power, data, platforms).
- Capital, investment funds driven by a growth-at-all-costs logic.
- States, mostly reactive rather than proactive.
- Military-security sector, quiet but deeply present.
- AI systems, which already produce unexpected consequences even for their creators (Harari, 2024).
- Individuals such as Peter Thiel, Elon Musk, Sam Altman, Bill Gates etc., often called "world rulers," acting as accelerators, narrative architects, and legitimizers of change. They ride the wave of the new technological paradigm, but the wave is no longer entirely under their control.

Why is the intellectual class largely silent?

- Status corruption: Academia has become bureaucratic, grant-oriented, and politically cautious. Radical questions are risky for careers.
- Obsolete epistemological tools: Most social sciences think linearly, fail to understand nonlinear systems, and lag (at least) a decade behind technology.
- Fear of technological irrelevance: Many feel they are losing the monopoly and control over knowledge, especially technological. It is easier to remain silent than to admit no longer being a central interpreter of the world.

Implications for Research and Public Discourse

For researchers aiming to contribute meaningfully to the *Social Informatics Journal*, studies on the impact of new AI-led technologies should not be limited to technical performance or economic efficiency. They must address questions of meaning, power, and social transformation.

Authors are encouraged to investigate how algorithmic systems affect lived experience, institutional trust, and society's democratic capacity. Interdisciplinary approaches combining computer science, sociology, philosophy, psychology, and ethics are particularly valuable in capturing the complexity of the new algorithmic reality.

Conclusion: Beyond the Illusion of Neutrality

Belief in algorithmic neutrality obscures the fact that AI systems are already deeply embedded in social processes. As generators of mediated reality, they shape the way individuals understand the world and themselves. Recognizing this fact is a prerequisite for responsible technological development and meaningful social governance.

This article proposes that social informatics, as a new academic discipline, must play a central role in breaking the myth of neutrality and articulating alternative frameworks for understanding AI as a socio-

technical phenomenon. Only by acknowledging the constructive power of algorithms can societies begin to design technologies that serve human values, rather than quietly redefining them. Therefore, institutional responsibility from the state, universities, educational institutions, and regulatory bodies is essential. Finally, this work does not offer definitive solutions but rather a **conceptual framework** for understanding algorithmically mediated reality. Its contribution lies in shifting the focus from the technical efficiency of AI systems to questions of meaning, power, and the anthropological consequences of the "new reality." Future research in social informatics should integrate empirical studies of algorithmic socialization, institutional responsibility, and educational paradigms capable of responding to the challenges of the new reality.

Conflict of interests

The authors declare no conflict of interest.

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UDC: 004.78:004.8

https://doi.org/10.58898/sij.v4i2.11-44

AI-Driven IoT Scenario Building and Policy Analysis: A Comparative Societal Impact Study in New York, Berlin, Tehran, and Zurich

Mehdi Abar[1*]

[1] Allameh Tabataba'i University, Iran, abar.edu.science@gmail.com

Abstract: The rapid expansion of the Internet of Things (IoT) and its integration with Artificial Intelligence (AI) are transforming urban and rural landscapes, creating both opportunities and governance challenges. This study applies AI-driven foresight methodologies to analyze the societal impact of IoT through a structured five-phase framework: technology description, forecasting, foresight, impact assessment, and policy analysis. The STEEP framework (Social, Technological, Economic, Environmental, and Political) is used to identify key drivers, evaluate their uncertainty and impact, and develop scenario-based policy recommendations. To forecast IoT development, this research references the Gartner IoT Hype Cycle (2020) and integrates insights from more recent reports, such as the Emerging Technologies Hype Cycle 2024, AI Hype Cycle 2024, and Smart City Hype Cycle 2022. Findings highlight the need for adaptive governance strategies to address cybersecurity risks, interoperability challenges, and digital divides. Policy options were identified using classical Technology Assessment (TA) approaches and can be further explored through Participatory TA and Constructive TA to enhance stakeholder engagement. Future research should focus on quantifying societal impacts using methods such as Scanning and Tracking Analysis and expanding discussions on policy frameworks beyond Parliamentary TA. This study contributes to the field of Technology Assessment (TA) by combining quantitative forecasting and qualitative scenario-building, offering a structured approach for IoT governance and policy development.

Keywords: IoT, Internet of Things, AI, Technology Assessment, Foresight, Digital Transformation.

[*]Corresponding author: Mehdi Abar, abar.edu.science@gmail.com

1. Introduction, Problem Statement, Logic, Implication, Methodology

1.1 Introduction

1.1.1 Context & Importance

The fusion of Artificial Intelligence (AI) and the Internet of Things (IoT) is transforming urban and rural landscapes, driving advancements in smart infrastructure, public services, and security. AI enhances IoT applications ranging from smart grids and intelligent traffic systems to healthcare monitoring and environmental sensing (Kitchin, 2020). However, the governance and deployment of AI-driven IoT solutions vary significantly across cities, shaped by local policies, economic structures, and regulatory landscapes (Weber, 2019).

This study compares the societal impact of AI-IoT integration across cities by employing scenario-building techniques and policy analysis to evaluate cybersecurity risks, digital divides, and interoperability challenges (Brous, Janssen, & Herder, 2020). By examining these intersections between IoT, AI, and governance, the research identifies both opportunities and risks associated with these technologies.

Furthermore, understanding the socio-technical implications of IoT is critical for policymakers, technology developers, and urban planners (Castells, 1996). This study contributes to discussions on responsible and equitable IoT deployment, ensuring that digital transformation benefits reach all layers of society.

Research Objective

This research, based on Technology Assessment (TA) principles, aims to support the sustainable and responsible development of IoT technologies. It evaluates societal impacts and governance policies in urban and rural contexts. By applying TA methodologies, the study ensures IoT deployment aligns with ethical, economic, and social sustainability.

Problem Statement

The rapid development of the Internet of Things (IoT) and its integration with Artificial Intelligence (AI) are transforming urban and rural environments. However, these Technological Developments (TD) introduce challenges related to cybersecurity threats, digital divides, and interoperability issues. The governance of IoT technologies varies across regions, leading to societal fragmentation and policy discrepancies.

The uneven adoption of IoT across different governance systems can exacerbate societal inequalities, leading to Cultural Lag, a concept introduced by Ogburn (1922), which suggests that when technological advancements outpace social adaptation, a misalignment occurs, causing societal disruptions (Ogburn, 1922). Similarly, Beck's (1992) Risk Society theory argues that technological progress intensifies human-made risks, shifting threats from natural disasters to cyber vulnerabilities (Beck, 1992). In the IoT era, risks such as data breaches, surveillance concerns, and AI-driven biases exemplify this shift.

Furthermore, Giddens' (1994) Reflexive Modernization theory emphasizes that, unlike traditional risks, modern technology-driven threats are unpredictable, necessitating scenario-building methodologies to manage uncertainties (Giddens, 1994). Additionally, Castells (1996) highlights how digital transfor-

mation polarizes societies, exacerbating technological divides (Castells, 1996). Heidegger (2005) differentiates between older, nature-preserving technologies and modern, irreversible technological interventions, emphasizing the long-term societal consequences of uncontrolled technological expansion (Heidegger, 2005).

By integrating these theoretical perspectives, this study adopts a Technology Assessment (TA) framework to analyze IoT's societal impacts and propose equitable policy solutions to mitigate these challenges.

1.2.1 Existing Gap

Despite advancements in IoT scenario modeling and policy evaluation, key gaps persist:

a) Societal Fragmentation – Research focuses on technology and economics but often neglects digital divides and sociopolitical barriers in urban-rural IoT adoption (James, 2022).

b) Comparative Urban Analysis – Most IoT policy studies lack city-specific insights. The diverse governance models of New York, Tokyo, Tehran, and Zurich require tailored policies (Raj & Sundararajan, 2020; Wenge et al., 2021).

c) AI-Driven Policymaking – Traditional policies rely on historical data, overlooking AI-enhanced foresight. Integrating Hype Cycle Analysis and Scenario Storytelling enables future-oriented policy strategies (Huang & Zhang, 2021).

1.2.3 Research questions

1. What are the key directions of IoT development in societal technology, and how do they shape urban and rural dynamics?
2. How can these technological directions be described through scenario analysis, and what policy options can be prescribed to address their societal impacts?

1.3 Logic and Rationale of the Research

This research is based on Technology Assessment (TA), a framework for evaluating the societal, economic, and political impacts of emerging technologies. Key assumptions include:

a) IoT adoption is a societal transformation, not just a technological shift (Feenberg, 1999).

b) Existing policies are reactive, lacking future-oriented strategies (Bijker et al., 2012).

c) AI-driven scenario analysis improves IoT governance and policy adaptation (Grunwald, 2018).

To establish a historical and theoretical foundation for Technology Assessment (TA), we considered the four phases of TA evolution (Grunwald, 2009):

1) Philosophy of Technology
2) Sociology of Technology
3) Technology Policy (TP)
4) Technology Assessment (TA)

1.3.1 Philosophy of Technology

The Philosophy of Technology examines AI-IoT development through five principles:

i. Technology is value-laden, reflecting cultural, political, and economic forces (Feenberg, 1999).
ii. Technology has agency, shaping human behavior and institutions (Winner, 1980).
iii. Technology is systemic, embedded within complex socio-technical networks (Vermaas et al., 2011).
iv. Technology evolves through social struggles, not linear progress (Bijker et al., 2012).
v. Technology is dynamic, continuously reshaping society (Grunwald, 2018).

1.3.2 Sociology of Technology

Three key perspectives explain technology-society interactions:

i. Social Construction of Technology (SCOT) – Innovation is shaped by social, political, and economic contexts (Bijker & Pinch, 1987).
ii. Technological Determinism – Technology autonomously drives societal change (Smith & Marx, 1994)
iii. Co-Evolution (Soft Determinism) – Technology and society mutually influence each other (Rip & Kemp, 1998).

By integrating these perspectives, this research highlights how AI-driven IoT adoption in different cities is neither purely determined by technology nor entirely shaped by social forces, but rather co-evolves with economic, political, and cultural factors.

1.3.3 Technology Policy (TP)

Technology policy has evolved through three generations:

i. Growth-Oriented Innovation (1950s-1970s) – R&D investments for economic growth (Schumpeter, 1942).
ii. National Innovation Systems (1980s-1990s) – Collaboration between firms, universities, and governments (Freeman, 1987; Lundvall, 1992).
iii. Socio-Technical Systems (2000s-present) – Emphasizing sustainability and policy integration (Geels, 2004).

This study applies the third-generation approach, integrating AI-driven foresight and scenario analysis for IoT governance.

1.3.4 Technology Assessment (TA)

TA has evolved into two models:

i. First-Generation TA ("Speaking Truth to Power") – Expert-driven analysis guiding policymakers (Collingridge, 1980).
ii. Second-Generation TA ("Dialoguing with Society") – Participatory assessment involving stakeholders (Grunwald, 2019).

This research aligns with the second-generation TA, incorporating AI-driven foresight and scenario-building to develop inclusive IoT policies. But of course, this research methodology foundation is *Classic TA*.

1.4 General Framework of the Research (Methodology)

1.4.1 Theoretical and Conceptual Foundations

- Research Perspective: Prospective, using scenario-building to anticipate future IoT developments.
- Study Timeframe: Trend analysis, mapping AI-IoT adoption patterns over time.
- Research Type: Descriptive and prescriptive, analysing trends while recommending policy strategies.

1.4.2 Sources and Types of Data

- Primary data – Expert interviews, stakeholder workshops, scenario-building.
- Secondary data – Policy documents, academic literature, industry reports, smart city initiatives.

1.4.3 Data Collection Methods

- Qualitative: Policy Analysis – Review of regulatory frameworks and AI-IoT governance models. Scenario Development – Using the STEEP framework for foresight-driven IoT projections. Comparative Policy Evaluation – Assessing policies based on effectiveness, efficiency, implement feasibility, and adoption.
- Quantitative: Trend Analysis – Measuring IoT adoption via investment, market penetration, and regulations. Technology Maturity Assessment – Applying Hype Cycle & Time-to-Plateau indicators to track IoT evolution

1.5 Structure of the Study

1.5.1 Level of Analysis

The research will be conducted at multiple levels, including city governance structures, national regulatory frameworks, and international IoT development trends.

1.5.2 Unit of Analysis

The primary unit of analysis is the city-level implementation of AI-driven IoT policies. Comparative case studies of New York, Berlin, Tehran, and Zurich will be used to assess the societal impact of different governance models.

1.5.3 Data Analysis Techniques and Methods

The study employs:

- PESTEL analysis for evaluating external environmental impacts on IoT policies.
- Scenario-based analysis to explore potential future outcomes.
- Multi-criteria decision analysis (MCDA) to assess policy effectiveness, efficiency, implement feasibility, and adoption.
- Comparative analysis of the selected cities to identify best practices and policy gaps

1.5.4 Workflow and Organizational Setup

Table 1. Workflow and Organizational Setup

	Phase 1	**Phase 2**	**Phase 3**	**Phase 4**	**Phase 5**
Stage	Description of Tech	Forecasting Tech	Foresight Societal Tech	Impacts Analysis	Policies Analysis
Data		Quan	Qual	Quan-Qual	Quan-Qual
Identification		Hype Cycle (Vars-Times)	Scenario Building (TDS-STEEP)	Matrix of Scenarios-(Vars-Times) Combination of Phase 2&3 Matrix of Phase 4-PESTEL	Matrix of Phase 4-Policy Options
Analysis (Case Studies)					1. Effectiveness 2. Efficiency 3. Implement Feasibility 4. Adoption
Evaluation (Case Studies)					Means of 4 Criteria

This study applies a *Technology Assessment (TA) framework* incorporating scenario construction, forecasting, impact analysis, and policy evaluation (Grunwald, 2018; Bijker et al., 2012; Godet, 2006).

- Phase 1: Description of Technology – Defines IoT and its complementary technologies, explaining their functions and interactions.
- Phase 2: Forecasting Technology – Uses Hype Cycle Analysis to predict IoT evolution, assessing technological maturity and adoption trends (Gartner, 2020; Wu et al., 2022).
- Phase 3: Foresight Technology – Applies STEEP analysis to explore external social, economic, environmental, and political influences on IoT (Godet, 2006; Ralston, 2011).
- Phase 4: Impact Analysis – Uses PESTEL to evaluate societal, technological, and legal consequences of AI-IoT adoption (Grunwald, 2018; Wenge et al., 2021).

- Phase 5: Policy Analysis – Assesses IoT governance models based on effectiveness, efficiency, implement feasibility, and adoption, guiding urban-rural policy decisions (Huang & Zhang, 2021; Wenge et al., 2021)

2. Results

2.1 phase 1. Description of IoT

2.1.1 Definition

The Internet of Things (IoT) refers to a network of interconnected devices that collect, transmit, and process data without human intervention. These devices, embedded with sensors, software, and connectivity, enable real-time monitoring, automation, and decision-making across various sectors (Atzori et al., 2010).

2.1.2 applications

Smart Homes, Smart Cities, Healthcare IoT, Smart Factories, IoT in Logistics, Agricultural IoT, Connected Vehicles, Things as Customer, IoT Security Systems, IoT Integration

2.1.3 Complementary or Enablers of IoT

Table 2. Complementary or Enablers of IoT

Technology	Role in IoT
Artificial Intelligence (AI)	Enhances IoT with data analytics, automation, and predictive decision-making (Atzori et al., 2010).
Cloud Computing	Provides scalable storage and processing power for IoT-generated big data (Botta et al., 2016).
Edge Computing	Reduces latency by processing data closer to IoT devices, improving real-time decision-making (Shi et al., 2016).
5G Networks	Enables high-speed, low-latency connectivity essential for IoT applications (Shafi et al., 2017).
Blockchain	Secures IoT transactions and data exchange through decentralized ledgers (Dai et al., 2019).
Big Data Analytics	Extracts insights from massive IoT datasets to optimize system performance (Sun et al., 2016).
Cybersecurity Protocols	Protects IoT networks from cyber threats and unauthorized access (Roman et al., 2013).
RFID & NFC	Facilitates IoT-enabled tracking, identification, and authentication (Want, 2006).
Digital Twins	Creates virtual replicas of IoT systems for simulation and optimization (Tao et al., 2018).
Low-Power Wide-Area Networks (LPWANs)	Supports long-range, low-energy IoT communication (Raza et al., 2017).

2.1.4 Workflow for IoT Data Processing

2.1.4.1 Simple Workflow:

1. Data Collection: Sensors and devices capture real-world data (e.g., temperature, motion, health metrics).
2. Data Transmission: Collected data is transmitted via networks (Wi-Fi, 5G, LPWAN) to processing units that is now Data Centers.
3. Data Processing & Analysis: AI and cloud computing analyze the data for insights and decision-making.
4. Action & Automation: Processed data triggers automated responses or provides insights for human intervention.

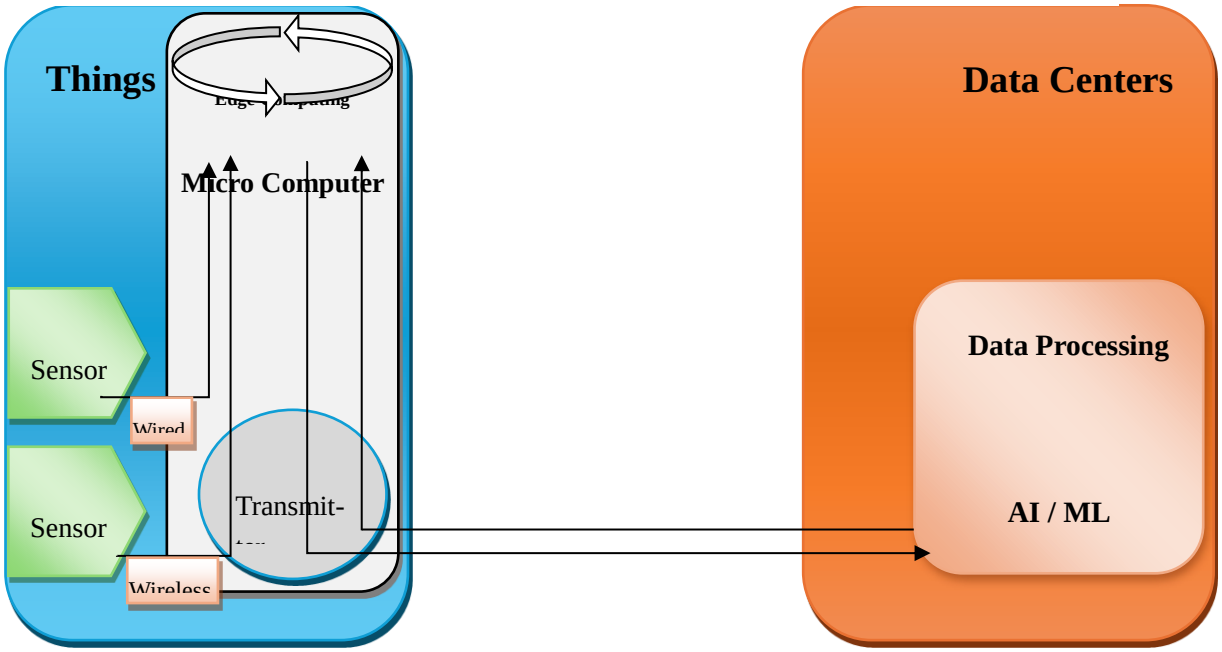

Figure 1. Workflow for IoT Data Processing

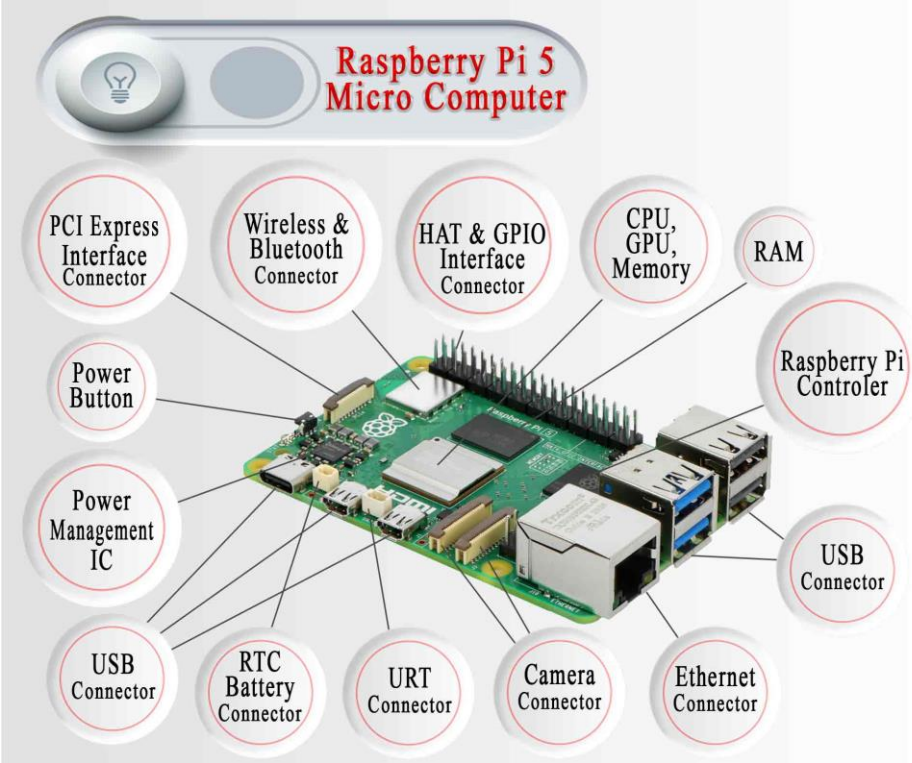

Figure 1. Raspberry Pi 5

2.1.5 Context and Actors of IoT

The Internet of Things (IoT) operates within a complex socio-technical ecosystem, influenced by economic, regulatory, and technological factors (Atzori et al., 2010). Key actors driving IoT adoption and governance include:

Table 3. Context and Actors of IoT

Actor	Role in IoT Ecosystem
Governments & Regulators	Establish policies, cybersecurity frameworks, and data protection laws.
Technology Companies	Develop IoT hardware, software, cloud platforms, and AI integration.
Industries & Enterprises	Implement IoT for automation, efficiency, and predictive analytics.
Consumers & Users	Drive demand for smart home devices, healthcare applications, and personal IoT products.
Academia & Research Institutions	Advance IoT standards, security protocols, and data governance practices.

2.2 Phase 2. Forecasting IoT

The latest comprehensive update of the IoT Hype Cycle was in 2020. Since then, the IoT landscape has evolved significantly. As we are now in 2025, it is essential to recognize that many IoT technologies have likely advanced through different phases.

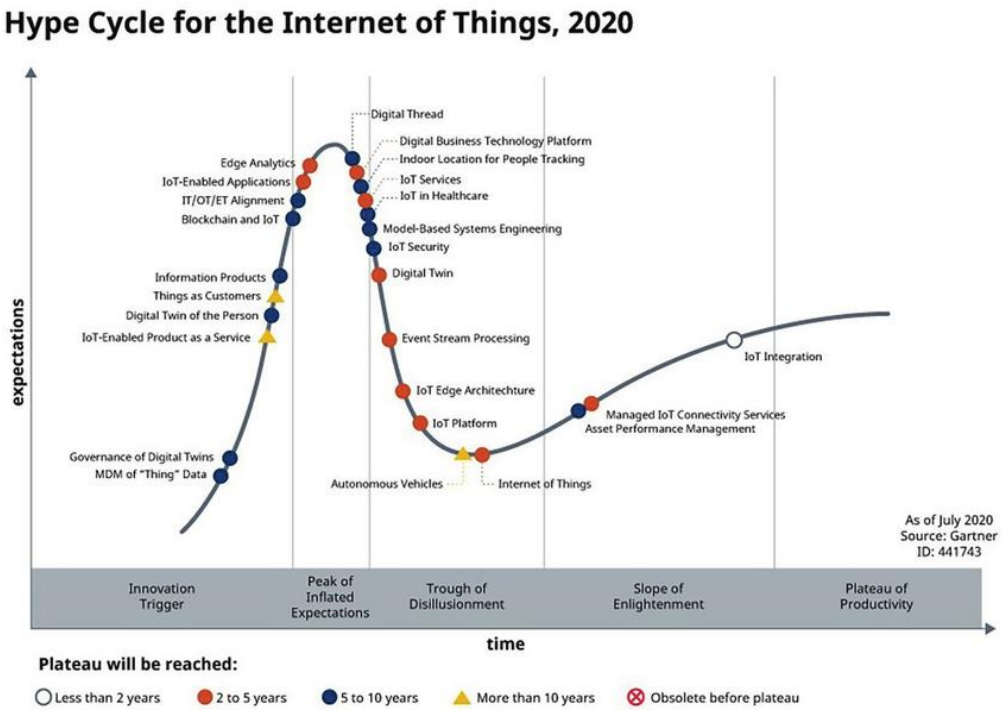

Figure 2. IoT Hype Cycle

The applications of IoT technologies have been recognized, and their *time to plateau* has been mapped based on insights from the most recent Hype Cycle reports. These reports, including the Emerging Technologies Hype Cycle 2024, AI Hype Cycle 2024, and Smart City Hype Cycle 2022, provide valuable perspectives on the evolving landscape and the shifting phases of IoT technologies.

Table 4. IoT Applications or Variables

IoT Variable	Description	Time to Plateau (Years)	Current Status
Smart Homes	For home automation and monitoring	1-5	Increasing adoption; interoperability.
Smart Cities	IoT for urban infrastructure management	11-15	Pilot projects in progress; scaling remains a challenge.
Healthcare IoT	Connected medical devices and telemedicine	6-10	Adoption accelerating with wearable tech and remote care.
Smart Factories	End-to-end automation and IoT integration	6-10	Steady progress with Industry 4.0 initiatives.
IoT in Logistics	Fleet tracking, cold chain monitoring	1-5	Widely adopted in global supply chains.
Agricultural IoT	Precision farming and livestock monitoring	6-10	Growing adoption in developed countries.
Connected Vehicles	Autonomous and connected vehicle systems	6-10	Advancing but far from full mainstream deployment.
Things as Customer	Devices autonomously ordering based on usage patterns	6-10	Early adoption; still evolving with some use cases.

IoT Security Systems	Advanced home and enterprise security systems	1-5	Growing adoption as security risks increase.
IoT Integration	Connecting and managing IoT devices across platforms	6-10	Ongoing improvements in standardization and interoperability.

2.3 Phase 3. Foresight of Societal IoT

2.3.1 IoT Technology Development System (TDS)

The IoT Technology Development System (TDS) consists of three key components:

1. *External Forces*: Factors such as economic conditions, technological advancements, and global trends influence the development and deployment of IoT technologies (Grunwald, 2018).
2. *System*: The core IoT ecosystem, which includes hardware, software, AI, cloud computing, and 5G connectivity, enabling the interconnectivity and data processing critical for IoT (Gubbi et al., 2013).
3. *Arena*: The governance policies, societal values, norms, and ethical considerations that affect how IoT technologies are adopted and regulated (Bijker et al., 2012).

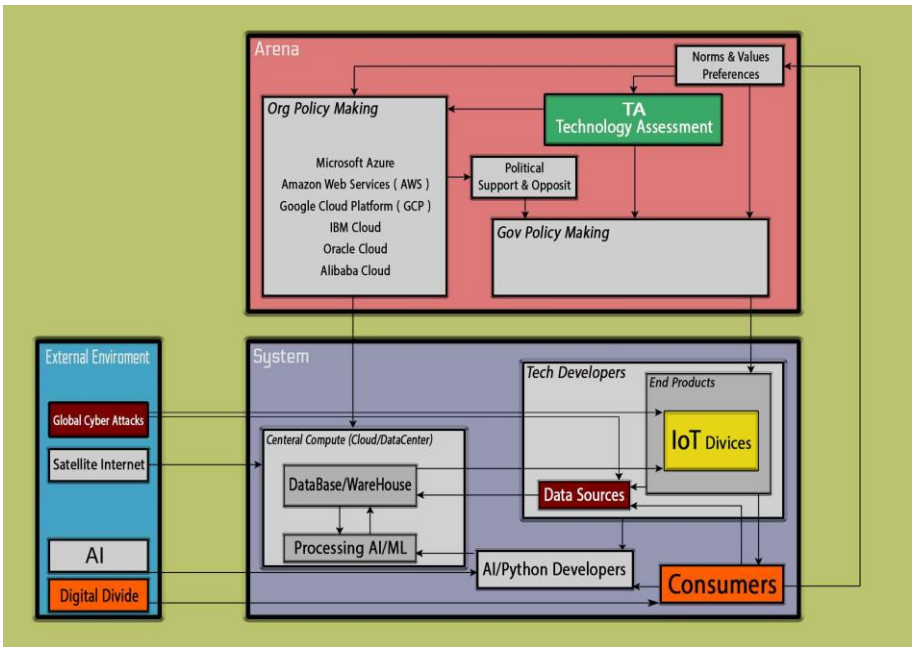

Figure 3. IoT, Technology Development Delivery (TDS)

2.3.2 Societal IoT Scenario Building Using STEEP Analysis

In this phase, STEEP analysis (Social, Technological, Economic, Environmental, and Political) is employed to construct societal IoT scenarios. The analysis evaluates the uncertainty and impact of each driver within the STEEP framework. AI-driven foresight methodologies are utilized to enhance the scenario-building process, enabling more accurate predictions of the future trajectories of IoT technologies in

diverse societal contexts.

Table 5. Societal IoT Scenario Budling Using STEEP

STEEP			Drivers	Uncertainty	Impact	Total
	Social 	1	IoT in Healthcare	6	8	14
		2	Digital Divide	9	8	17
		3	Privacy Concerns	7	8	15
		4	Workplace Collaboration	4	6	10
		5	Public Safety	6	9	15
	Technological 	1	Low-Power IoT Sensors	3	7	10
		2	AI-Driven Predictive Maintenance	5	9	14
		3	5G Networks	4	9	13
		4	Interoperability Challenges	8	7	15
		5	Global Cyberattack on IoT Systems	8	9	17
	Environmental 	1	Precision Agriculture	6	7	13
		2	Smart Grids	5	8	13
		3	E-Waste Management	7	6	13
		4	Environmental Monitoring	5	7	12
		5	Carbon Footprint Reduction	4	7	11
	Economic 	1	Cost Reduction in Manufacturing	3	8	11
		2	Subscription Services	5	6	11
		3	Barriers for Small Businesses	6	7	13
		4	Job Displacement	7	8	15
		5	Wearable IoT Market Growth	4	7	11
	Political 	1	Data Privacy Regulations	6	8	14
		2	Trade Policies	6	7	13
		3	Public Investment	5	8	13
		4	Surveillance Risks	7	9	16
		5	International Standards	5	8	13

Drivers in STEEP	Explanation
IoT in Healthcare	Use of connected medical devices and telemedicine for improved healthcare services.
Digital Divide	The gap between urban and rural areas in access to IoT and digital technologies.
Privacy Concerns	Risks associated with data collection, storage, and misuse in IoT systems.
Workplace Collaboration	IoT-enabled tools enhancing remote work, productivity, and efficiency.
Public Safety	Use of IoT in emergency response, surveillance, and disaster management.
Low-Power IoT Sensors	Energy-efficient sensors improving IoT device longevity and adoption.
AI-Driven Predictive Maintenance	AI-powered analytics predicting equipment failures before they occur.
5G Networks	Faster, more reliable connectivity enabling advanced IoT applications.
Interoperability Challenges	Difficulty in integrating different IoT systems and platforms.
Global Cyberattack on IoT Systems	Large-scale cybersecurity threats targeting interconnected IoT devices.
Precision Agriculture	Use of IoT to optimize farming, irrigation, and crop monitoring.
Smart Grids	IoT-powered energy management for efficient and sustainable power distribution.
E-Waste Management	Challenges and solutions for handling discarded IoT devices and components.
Environmental Monitoring	IoT-driven tracking of air, water, and soil quality for sustainability.
Carbon Footprint Reduction	IoT applications for energy efficiency and lowering environmental impact.
Cost Reduction in Manufacturing	IoT-driven automation improving production efficiency and cutting expenses.
Subscription Services	IoT business models shifting toward service-based, recurring revenue structures.
Barriers for Small Businesses	Challenges faced by small firms in adopting and integrating IoT solutions.
Job Displacement	Potential workforce disruption due to automation and AI-driven IoT.
Wearable IoT Market Growth	Expansion of IoT-based wearables for health, fitness, and productivity.
Data Privacy Regulations	Legal frameworks governing IoT data security and consumer rights.
Trade Policies	International regulations affecting IoT supply chains and adoption.
Public Investment	Government funding and incentives for IoT research and infrastructure.
Surveillance Risks	Ethical and security concerns over mass IoT-based monitoring.
International Standards	Global efforts to establish IoT interoperability and security guidelines.

2.3.3 Four Scenarios of Societal IoT (Trajectories)

Table 6. Four Scenarios of Societal IoT (Trajectories)

		Digital Divides	
		Low	High
Global Cyber Attacks on IoT Systems	Low	Scenario 1: ***"Equitable Tech Haven"***	Scenario 2: ***"Disconnected Prosperity"***
	High	Scenario 3: ***"Resilient United Front"***	Scenario 4: ***"Fragmented Societies"***

2.3.3.1 Scenario 1: *"Equitable Tech Haven"*

With minimal cyber threats, urban and rural societies equally benefit from IoT technologies. This fosters harmony through improved healthcare, education, and smart infrastructure, reducing societal tensions and promoting shared prosperity.

Figure 4. Equitable Tech Haven (Generated by DALL-E, 2025)

2.3.3.2 Scenario 2: *"Disconnected Prosperity"*

Urban societies thrive with smart IoT solutions, while rural areas lack access due to economic and infrastructure gaps. The digital divide widens societal inequality, fueling rural-to-urban migration and straining urban systems.

Figure 5. Disconnected Prosperity (Generated by DALL-E, 2025)

2.3.3.3 Scenario 3: *"Resilient United Front"*

Frequent cyberattacks push urban and rural societies to collaborate, leading to unified cybersecurity measures and equitable IoT adoption. Shared challenges foster stronger social bonds, bridging the gap between communities.

Figure 6. Resilient United Front (Generated by DALL-E, 2025)

Figure 8. Resilient United Front (Generated by DALL-E, 2025)

2.3.3.4 Scenario 4: *"Fragmented Societies"*

Rural areas are left behind in IoT adoption, while urban systems are plagued by frequent cyberattacks. The combination of technological exclusion and insecurity creates distrust, protests, and societal fragmentation.

Figure 9. Fragmented Societies (Generated by DALL-E, 2025)

2.4 Phase 4. Impacts Analysis

2.4.1 Matrix of Scenarios-(Vars-Times) Combination of Phase 2&3

2.4.1.1 Scenarios Related to Cities

Table 7. Scenarios Related to Cities

Scenario	Cities Likely to Fit This Scenario	Characteristics in Relation to Digital Divide
Equitable Tech Haven	***Zurich***, Tokyo, San Francisco	Cities with universal broadband, inclusive IoT, and equal digital access.
Disconnected Prosperity	***New York***, Dubai, London, Hong Kong, Shanghai, Los Angeles, Paris, Sydney, Beijing, Chicago, Moscow, Istanbul	Advanced urban IoT, but widening digital divides between rich and poor areas.
Resilient United Front	***Berlin***, Toronto, Stockholm, Helsinki, Amsterdam, Barcelona, Madrid, Brussels, Seoul, Melbourne, Montreal	Cities bridging the digital divide through public-private partnerships and smart policies for equitable IoT adoption.
Fragmented Societies	***Tehran***, São Paulo, Mumbai, Lagos, Jakarta, Mexico City, Cairo, Manila, Nairobi, Bangkok, Buenos Aires,	Cities with uneven IoT access, where tech hubs thrive but rural and low-income areas lag due to weak policies and infrastructure.

2.4.1.2 Equitable Tech Haven

Table 8. Equitable Tech Haven - (Vars-Times)

Scenario	Variable	0-5 Years	5-10 Years	10-15 Years
Equitable Tech Haven	Smart Homes	Widespread adoption due to improved affordability and interoperability.		
	Smart Cities			Scaled urban projects improve infrastructure and quality of life.
	Healthcare IoT		Expanded adoption of connected healthcare tools, enabling remote monitoring and patient care.	
	Smart Factories		Industry 4.0 advancements lead to greater IoT integration and productivity.	
	IoT in Logistics	IoT solutions optimize global supply chains, enhancing efficiency and tracking capabilities.		
	Agricultural IoT		Precision farming becomes widespread, improving yield and resource management.	
	Connected Vehicles		Autonomous and connected vehicles grow in adoption, reducing accidents and increasing convenience.	
	Things as Customer		Devices gain autonomy in reordering supplies, enhancing customer experiences.	
	IoT Security Systems	Advanced systems address rising security threats in homes and enterprises.		
	IoT Integration		Enhanced standardization simplifies device integration across platforms.	

Figure 10. Zurich, Equitable Tech Haven (Generated by DALL-E, 2025)

2.4.1.3 Disconnected Prosperity

Table 9. Disconnected Prosperity- (Vars-Times)

Scenario	Variable	0-5 Years	5-10 Years	10-15 Years
Disconnected Prosperity	Smart Homes	Growth focused in urban areas, with rural areas lagging behind.		
	Smart Cities			Projects are implemented unevenly, favoring affluent regions.
	Healthcare IoT		Healthcare IoT adoption primarily benefits wealthier communities, increasing the tech gap.	
	Smart Factories		Factories in developed regions lead automation trends, leaving smaller players struggling to compete.	
	IoT in Logistics	Adoption benefits global companies, while smaller businesses face barriers to entry.		
	Agricultural IoT		Adoption skewed toward large, well-funded farms; small-scale farmers see limited benefits.	
	Connected Vehicles		Connected vehicles remain exclusive to wealthier regions.	
	Things as Customer		Autonomous ordering technology is available only to select groups with compatible devices.	

	IoT Security Systems	Security systems primarily benefit urban and wealthier users.		
	IoT Integration		Fragmented standards hinder seamless IoT integration in less developed regions.	

Figure 11. New York, Disconnected Prosperity (Generated by DALL-E, 2025)

2.4.1.4 Resilient United Front

Table 10. Resilient United Front - (Vars-Times)

Scenario	Variable	0-5 Years	5-10 Years	10-15 Years
Resilient United Front	Smart Homes	Accelerated adoption as a result of unified efforts to reduce barriers and costs.		
	Smart Cities			Collaborative global initiatives bring smart city projects to diverse regions.
	Healthcare IoT		Healthcare IoT spreads evenly, addressing the needs of both rural and urban communities.	
	Smart Factories		Unified standards make IoT-based automation accessible across industries and regions.	
	IoT in Logistics	Widespread adoption improves supply chain efficiency worldwide.		
	Agricultural IoT		Global adoption reduces food in-	

			security through precision agriculture.	
	Connected Vehicles		Safety and convenience improvements benefit both developed and developing countries.	
	Things as Customer		Unified efforts improve access to IoT-based autonomous ordering systems.	
	IoT Security Systems	IoT security systems ensure equitable protection across regions and demographics.		
	IoT Integration		Standardized frameworks ensure seamless integration of IoT devices globally.	

Figure 12. Berlin, Resilient United Front (Generated by DALL-E, 2025)

2.4.1.5 Fragmented Societies

Table 11. Fragmented Societies - (Vars-Tines)

Scenario	Variable	0-5 Years	5-10 Years	10-15 Years
Fragmented Societies	Smart Homes	Urban areas adopt IoT solutions rapidly, while rural areas are left behind.		
	Smart Cities			Implementation benefits select regions, exacerbating social disparities.
	Healthcare IoT		Limited adoption creates unequal access to advanced healthcare solutions.	
	Smart Factories		High-tech factories emerge in select areas, widening the industrial technology gap.	
	IoT in Logistics	Large logistics companies dominate with IoT solutions, excluding smaller players.		
	Agricultural IoT		Unequal access limits precision farming to affluent regions.	
	Connected Vehicles		Connected vehicle technologies fail to reach rural and less developed areas.	
	Things as Customer		Use cases remain underdeveloped in less technologically advanced regions.	
	IoT Security Systems	Adoption focused on high-income areas, leaving other regions vulnerable to cyber threats.		
	IoT Integration		Lack of standardized frameworks hinders global adoption and interoperability.	

Figure 13. Tehran, Fragmented Societies (Generated by DALL-E, 2025)

2.4.2 Matrix of Phase 4-PESTEL

2.4.2.1 Equitable Tech Haven

Table 12. Equitable Tech Haven Impacts Identification

Scenario	IoT Variable	Political (P)	Economic (E)	Social (S)	Technological (T)	Environmental (E)	Legal (L)
Equitable Tech Haven	Smart Homes	Government incentives for smart living	Affordable smart home solutions	High public adoption	AI & 5G improve automation	Energy-efficient devices	Strong data protection laws
	Smart Cities	Global smart city initiatives	Public-private partnerships	Inclusive urban development	AI and IoT-driven infrastructure	Eco-friendly urban planning	Smart city cybersecurity laws
	Healthcare IoT	Government healthcare IoT policies	IoT reduces medical costs	Universal access to remote healthcare	AI-enhanced patient monitoring	Sustainable medical IoT devices	GDPR/HIPAA-compliant IoT health data
	Smart Factories	Industry 4.0-friendly policies	IoT-driven cost reduction	Workforce reskilling programs	IoT-robotics synergy	Waste reduction & sustainability	AI & automation labor laws
	IoT in Logistics	IoT-enabled trade regulations	Cost-efficient global supply chains	Improved logistics accessibility	Blockchain-integrated tracking	Carbon footprint monitoring	IoT-enabled trade compliance
	Agricultural IoT	Smart farming policies	Increased crop yield with IoT	Widespread rural IoT adoption	AI-driven precision farming	Climate-smart agriculture	Data ownership in agri-tech
	Connected Vehicles	Autonomous vehicle regulations	IoT-based transportation cost reduction	Public trust in smart mobility	AI-powered road safety & navigation	Emission reduction via IoT	Legal liability for self-driving cars

	Things as Customer	Consumer protection regulations	AI-driven automated purchases	Changing shopping behaviors	AI-powered demand prediction	Sustainable automated purchases	IoT commerce security laws
	IoT Security Systems	Cybersecurity funding & policies	IoT security market growth	Growing demand for secure homes & businesses	AI-driven threat detection	Green security tech	IoT security compliance laws
	IoT Integration	Global IoT standardization	Increased business IoT investment	Interoperability benefits for consumers	Seamless cross-platform IoT connectivity	Sustainability via IoT integration	Universal IoT regulations

2.4.2.2 Disconnected Prosperity

Table 13. Disconnected Prosperity Impacts Identification

Scenario	IoT Variable	Political (P)	Economic (E)	Social (S)	Technological (T)	Environmental (E)	Legal (L)
Disconnected Prosperity	Smart Homes	Urban-focused regulations	Affordable in cities, expensive in rural areas	Digital divide increases	AI-driven smart homes in urban zones	Rising electronic waste	Weak IoT privacy enforcement
	Smart Cities	Unequal government investments	Wealthy cities progress, rural areas lag	Urban-rural gap widens	AI-powered city services in select regions	Limited eco-friendly urban projects	Localized cybersecurity laws
	Healthcare IoT	Private sector dominates IoT health	Costly remote healthcare solutions	Limited access in rural areas	AI diagnostics available to select patients	High energy demand for health IoT	Fragmented healthcare data protection
	Smart Factories	Automation incentives for large firms	IoT increases productivity, but favors big corporations	Job displacement	AI-powered robotic assembly lines	Pollution from manufacturing waste	Labor laws struggle with automation
	IoT in Logistics	IoT-driven trade laws for large firms	Logistics optimization benefits major players	Unequal efficiency in supply chains	AI-driven logistics for top-tier companies	Environmental impact remains unaddressed	Trade laws prioritize corporate IoT interests
	Agricultural IoT	IoT farming benefits big agribusiness	Small farmers struggle to afford IoT	Rural farmers left behind	Precision farming tech only for major farms	Limited water management tech adoption	Agricultural IoT data rights unclear
	Connected Vehicles	Regulations favor urban IoT mobility	Smart cars are expensive	Rural areas lack IoT transport networks	AI driving technology develops unevenly	Urban areas benefit from green transport	Autonomous driving legal gaps remain
	Things as Customer	AI-driven markets expand	Personalized e-commerce grows in urban zones	IoT-based consumer habits increase	AI-predictive purchasing advances	Limited sustainability in urban commerce	E-commerce data privacy gaps widen

	IoT Security Systems	Cybersecurity policy gaps persist	IoT security costs high for individuals	Urban security IoT thrives, rural areas ignored	AI-driven security advances in premium markets	IoT devices increase electronic waste	Weak enforcement of IoT safety laws
	IoT Integration	No universal IoT regulation	Interoperability gaps increase costs	Consumer access to IoT depends on geography	IoT ecosystems fragmented across markets	Environmental gains limited to select regions	IoT regulatory frameworks remain incomplete

2.4.2.3 Resilient United Front

Table 14. Resilient United Front Impacts Identification

Scenario	IoT Variable	Political (P)	Economic (E)	Social (S)	Technological (T)	Environmental (E)	Legal (L)
Resilient United Front	Smart Homes	Strong pro-tech policies	IoT tax incentives for accessibility	High smart home adoption across society	AI & IoT-driven smart utilities	IoT-enabled energy-efficient homes	Comprehensive data security laws
	Smart Cities	Standardized global smart city frameworks	Sustainable IoT investment	Inclusive urban development	AI-powered municipal services	Climate-friendly infrastructure	Global IoT smart city regulations
	Healthcare IoT	Universal IoT healthcare policies	Cost-efficient IoT health services	Digital healthcare accessible to all	AI-powered telemedicine in all regions	Sustainable energy use in IoT health	Standardized health IoT data protection
	Smart Factories	Balanced regulations for automation & labor	IoT streamlines production costs fairly	Workforce reskilled for AI-driven roles	Smart robotics & IoT optimize production	Zero-waste IoT manufacturing	Fair labor laws for automation
	IoT in Logistics	IoT-driven trade harmonization	Efficient supply chains reduce costs	IoT logistics benefits all businesses	Blockchain-enabled logistics innovation	Green packaging & IoT tracking	IoT-integrated global trade laws
	Agricultural IoT	Pro-farming IoT policies	Fair access to precision farming	IoT adoption widespread among farmers	AI-driven agricultural innovation	Smart irrigation reduces water waste	Strong agricultural IoT regulations
	Connected Vehicles	Balanced IoT transport policies	Cost-effective IoT-enabled transport	Public trust in self-driving vehicles	AI-enhanced V2X connectivity	IoT-driven sustainable transport	Legal liability for autonomous accidents
	Things as Customer	Consumer rights protected in AI commerce	IoT enhances shopping efficiency	Widespread trust in AI-driven buying	AI demand forecasting is precise	Sustainability-focused smart commerce	Consumer IoT commerce laws strengthened
	IoT Security Systems	Global IoT security cooperation	IoT security affordability increases	Trust in IoT security solutions	AI-powered real-time cyber defense	Sustainable energy-efficient security tech	Universal IoT security compliance laws

	IoT Integration	Global IoT standardization	Widespread business & consumer adoption	Cross-platform IoT benefits all	Seamless IoT network interoperability	Circular economy enabled by IoT	Universal IoT regulatory frameworks

2.4.2.4 Fragmented Societies

Table 15. Fragmented Societies Impacts Identification

Scenario	IoT Variable	Political (P)	Economic (E)	Social (S)	Technological (T)	Environmental (E)	Legal (L)
Fragmented Societies	Smart Homes	Uneven smart home policies	High-cost limits adoption	Tech access limited to elite groups	AI-powered luxury automation	Waste from disposable IoT devices	Weak data privacy laws
	Smart Cities	Unequal investment in urban tech	Smart infrastructure only in select regions	Widening gap between smart and non-smart cities	IoT-enabled cities exist in isolation	Limited sustainability efforts	Patchwork of conflicting IoT city regulations
	Healthcare IoT	No universal IoT health policies	Expensive IoT healthcare	Limited remote care access for rural populations	AI-driven healthcare available only in wealthy areas	High energy demand for IoT health tech	Fragmented IoT medical data laws
	Smart Factories	No policies to address workforce impact	Automation benefits big corporations	Job losses create economic disparity	IoT robotics advance but are restricted to top firms	Increased industrial pollution	Outdated labor laws don't regulate IoT workforce
	IoT in Logistics	Trade policies favor large corporations	Small businesses struggle with IoT adoption	Unbalanced logistics networks	AI-driven logistics only benefits major firms	No sustainability measures in supply chains	Loopholes in IoT tracking regulations
	Agricultural IoT	Lack of rural IoT support policies	Cost of smart farming is prohibitive for small farmers	Rural tech gap grows	Precision agriculture is available only to agribusiness	Overuse of resources due to poor regulation	No clear ownership of agricultural IoT data
	Connected Vehicles	Self-driving laws favor corporations	Smart transport is expensive	Public transit lacks IoT integration	AI-driven mobility is exclusive to high-income areas	Urban green transport exists, but rural areas lack it	Liability gaps in autonomous vehicle laws
	Things as Customer	AI-driven markets benefit large corporations	Economic power shifts to AI commerce platforms	Consumer manipulation via IoT algorithms	AI-predicted purchasing creates digital monopolies	No regulation on eco-friendly consumer IoT	Gaps in AI-based consumer rights laws
	IoT Security Systems	IoT security is a luxury service	Costly cybersecurity solutions	Rising cybercrime due to weak protection	AI-driven security tech is inaccessible to most	Cybersecurity waste increases	No universal IoT cybersecurity laws

	IoT Integration	No global IoT standards	Poor interoperability raises business costs	IoT ecosystems create market silos	Tech fragmentation stifles innovation	Sustainability limited to corporate initiatives	Unregulated data-sharing across platforms

2.5 Phase 5. Policies Analysis

In this phase, AI-driven policy options related to the dimensions of the impact matrix from Phase 4 were identified, analyzed, and evaluated based on four criteria. This evaluation is specific to *the selected city* for comparison. We have chosen three-time scopes: short-term, mid-term, and long-term. The long-term scope focuses on *participatory policie*s that are constructive in nature.

Policy Option	1. Effectiveness
	2. Efficiency
	3. Implement Feasibility
	4. Adoption
	Means of 4 criteria

L	Low
M	Medium
H	High

2.5.1 Equitable Tech Haven policies, Zurich Evaluated

Policy Focus: foster a sustainable, inclusive, and secure IoT ecosystem by promoting environmental responsibility, bridging the digital divide, enhancing cybersecurity and data privacy, ensuring interoperability through open standards, and driving economic growth through innovation and fair access.

Table 16. Equitable Tech Haven policies, Zurich Evaluated

Scenario	Variable	0-5 years (Short-Term)		5-10 years (Mid-Term)		10-15 years (Long-Term)
Equitable Tech Haven	Smart Homes	Develop incentives for affordable smart home technology for low-income households	H H M H H	Standardize IoT protocols to ensure cross-compatibility of devices for all income groups	H H H H H	Implement national programs to upgrade rural homes with smart technologies and energy-efficient solutions
	Smart Cities	Pilot smart city projects focused on sustainability and low-cost technology for urban areas	M M M M M	Scale-up smart city infrastructure with a focus on inclusivity and low environmental impact	H H M H H	Ensure nationwide smart city policies that integrate environmental sustainability and equitable access for all socioeconomic groups
	Healthcare IoT	Provide subsidies for IoT-based remote healthcare in underserved areas	H H M H H	Create a universal health data framework that supports IoT-driven healthcare solutions for all demographics	H H H H H	Expand universal access to IoT-based healthcare systems, focusing on affordability and environmental impact
	Smart Factories	Introduce tax incentives for SMEs to adopt smart factory	M M	Encourage collaboration between large corporations and	H H	Implement global best practices for smart factory sustainability,

		technologies with a focus on energy efficiency	M M M	small businesses for IoT integration	H H H	ensuring lower waste and optimized resource use
	IoT in Logistics	Encourage IoT adoption for efficient supply chain management with a focus on minimizing carbon footprints	H H M H H	Support the development of IoT-enabled circular supply chains, reducing waste and emissions	H H H H H	Establish national and global IoT logistics policies to optimize shipping efficiency while minimizing environmental impacts
	Agricultural IoT	Offer subsidies for IoT technologies in small-scale farming to increase food security and reduce resource waste	M M M M M	Scale-up IoT-driven precision farming techniques to maximize crop yield while minimizing water and pesticide use	H H H H H	Mandate sustainable agricultural practices supported by IoT technology, ensuring equitable access for all farmers
	Connected Vehicles	Introduce policies to promote electric and IoT-enabled vehicles in urban areas to reduce pollution	M M M M M	Expand the adoption of autonomous, electric, and connected vehicles in public transport systems, reducing emissions	H H H H H	Ensure a global shift towards fully IoT-enabled, sustainable transport systems that are affordable for all urban and rural populations
	Things as Customer	Implement consumer protection policies for IoT-based purchasing, ensuring transparency and fair pricing	M M M M M	Develop standards for IoT-based consumer purchases that promote sustainable practices (e.g., promoting eco-friendly products)	H H H H H	Promote circular economy principles in IoT, encouraging devices to be reused and recycled, reducing e-waste
	IoT Security Systems	Strengthen public awareness and education on IoT security risks, making them accessible to all demographics	H H M H H	Mandate robust IoT security standards to protect consumer data while promoting environmental responsibility	H H H H H	Ensure global cooperation on IoT security, creating policies that also prioritize energy-efficient, low-carbon solutions in cybersecurity
	IoT Integration	Promote open-source IoT platforms and encourage collaboration between tech companies to ensure interoperability	M M M M M	Establish regulatory frameworks for seamless IoT integration across industries, with an emphasis on sustainability and inclusivity	H H H H H	international IoT integration standards that ensure devices from all sectors work together efficiently, minimizing environmental impact

2.5.2 Disconnected Prosperity policies, New York Evaluated

Policy Focus: Bridging urban-rural technology gaps, ensuring affordability, and expanding IoT services beyond privileged communities. guiding the scenario toward "Equitable Tech Haven."

Table 17. Disconnected Prosperity policies, New York Evaluated

Scenario	Variable	0-5 years		5-10 years		10-15 years
Disconnected Prosperity	Smart Homes	Expanding affordable smart home technology in rural areas	M M M M M	Standardizing smart home ecosystems to reduce entry barriers	H H H H H	Nationwide smart housing policies for universal adoption
	Smart Cities	Incentives for expanding smart city initiatives to underserved areas	L L L L L	Infrastructure funding for smart city projects beyond major urban hubs	M M L M M	National smart city integration for equitable growth
	Healthcare IoT	Extending IoT-driven healthcare subsidies to rural clinics	M M L M M	Mandating interoperability of healthcare IoT systems	H H M H H	Universal IoT-enabled healthcare access policies
	Smart Factories	Tax relief for SMEs adopting IoT-driven manufacturing	L L M L L	Upskilling initiatives for workers in IoT-enabled factories	M M M M M	Smart factory adoption policies to ensure industrial balance
	IoT in Logistics	Expanding IoT logistics networks to remote and rural areas	M M M M M	Incentives for small businesses to integrate IoT logistics	H H H H H	Full-scale IoT logistics adoption nationwide
	Agricultural IoT	Government grants for IoT-based farming innovations	L L L L L	Expanding connectivity in remote agricultural zones	M M M M M	Universal IoT-enabled agricultural policies for sustainability
	Connected Vehicles	Ensuring IoT-driven vehicle technology is accessible beyond urban centers	L L L L L	Developing equitable IoT transportation policies	M M M M M	Integrating smart mobility solutions for all communities
	Things as Customer	Regulating fair access to IoT-based commerce for all	L L	Expanding consumer pro-	M M	Enabling widespread and

		demographics	L L L	tection in IoT-driven transactions	M M M	equitable IoT-driven consumer services
	IoT Security Systems	Strengthening legal frameworks for IoT cybersecurity	M M M M M	Expanding IoT security requirements for businesses	H H H H H	Coordinated international cybersecurity governance
	IoT Integration	Encouraging open-source IoT solutions for broader adoption	L L L L L	Establishing legal mandates for IoT interoperability	M M M M M	Achieving full-scale IoT integration across economic sectors

2.5.3 Resilient United Front policies, Berline Evaluated

Policy Focus: Strengthening global cooperation, promoting standardization, and ensuring equitable IoT adoption across borders. guiding the scenario toward "Equitable Tech Haven."

Table 18. Resilient United Front policies, Berline Evaluated

Scenario	Variable	0-5 Years		5-10 Years		10-15 Years
Resilient United Front	Smart Homes	Strengthening local smart home initiatives with subsidies	L L L L L	Global collaboration on smart home technology standards	M M M M M	Equitable IoT housing policies with long-term sustainability focus
	Smart Cities	Establishing multi-stakeholder collaborations for smart city deployment	L L L L L	Incentivizing cross-sector smart city partnerships	M M L M M	Global frameworks for equitable smart city expansion
	Healthcare IoT	Public investments in IoT-driven health solutions	M M M M L	Standardized global protocols for IoT health data	H M M M M	Universal adoption of IoT-driven healthcare infrastructure
	Smart Factories	Investing in local workforce training for IoT industries	L L L L	Encouraging international IoT manufacturing collaboration	M M M M	Standardizing IoT-based industrial automation worldwide

			L		M	
	IoT in Logistics	Expanding IoT-based supply chain resilience strategies	M M M M L	Harmonizing IoT logistics standards across countries	M M M M M	Full integration of IoT logistics into global supply chains
	Agricultural IoT	Promoting cooperative smart farming initiatives	L L L L L	Standardizing IoT agricultural best practices globally	M M M M M	Establishing IoT-driven sustainable agriculture mandates
	Connected Vehicles	Incentives for cross-border IoT transportation projects	L L L L L	Coordinated international smart mobility policies	M M M M M	Seamless IoT-driven transportation frameworks globally
	Things as Customer	Establishing fair digital commerce regulations for IoT-driven transactions	L L L L L	Strengthening global consumer rights in IoT-driven markets	M M M M M	Standardized worldwide policies for IoT commerce accessibility
	IoT Security Systems	International agreements on IoT security frameworks	M M M M L	Cross-border cybersecurity cooperation in IoT governance	M M M M M	Establishing a global IoT security alliance
	IoT Integration	Developing open-source IoT frameworks for universal access	L L L L L	Expanding multi-national IoT standardization efforts	M M M M M	Ensuring seamless cross-industry IoT integration worldwide

2.5.4 Fragmented Societies, Tehran Evaluated

Policy Focus: bridging gaps in fragmented societies by ensuring accessibility, security, standardization, and widespread adoption. guiding the scenario toward "Equitable Tech Haven."

Table 19. Fragmented Societies, Tehran Evaluated

Scenario	Variable	0-5 years		0-10 years		0-15 years
F r	Smart Homes	Government incentives for	M	Standardizing smart home	H	Ensuring nationwide smart

		IoT adoption in low-income areas	M M M M	interoperability	H H H H	home infrastructure accessibility
	Smart Cities	Public-private partnerships for smart city pilots	L L L L L	Expanding smart infrastructure to rural areas	M M M M M	Mandating smart city policies for equitable urban planning
	Healthcare IoT	Subsidizing IoT-based remote healthcare for underserved populations	M M M M M	Expanding IoT health infrastructure in public hospitals	H H H H H	Creating universal IoT-driven healthcare frameworks
	Smart Factories	Supporting IoT training programs for workforce upskilling	M M L L L	Tax incentives for SMEs to adopt smart factory solutions	H H H H H	Full integration of smart manufacturing in all industries
	IoT in Logistics	Encouraging IoT-enabled supply chain transparency	M H H H H	IoT-driven optimization for public transportation	H H H H H	Nationwide integration of IoT logistics in infrastructure planning
	Agricultural IoT	Government subsidies for IoT-based precision farming	L L L L L	Expanding rural connectivity to support smart farming	M M M M M	Nationwide smart agriculture policies for sustainability
	Connected Vehicles	Regulation and investment in IoT-based traffic management	M M L L L	Expanding IoT-based vehicle safety standards	M M M M M	Full-scale smart mobility integration across cities
	Things as Customer	Encouraging development of autonomous commerce platforms	L L L L L	Establishing consumer protection laws for IoT-based purchasing	M M M M M	Ensuring universal accessibility and affordability

	IoT Security Systems	Strengthening cybersecurity policies for IoT protection	H H H H H	Mandating IoT security compliance in businesses	H H H H H	Global cooperation on IoT cybersecurity governance
	IoT Integration	Developing open standards for IoT interoperability	M M M M M	Enforcing global IoT integration policies	H H H H H	Full-scale seamless IoT adoption across sectors

3. Conclusion and Future Implications

3.1 Summary of Key Findings

This study applied AI-driven foresight methodologies across five phases, transitioning from IoT description to IoT governance recommendations through a structured framework TA. This study evaluated policy options or TP (Technology policy) in 4 directions of societal technology of IoT, related to the impacts matrix and selected city. Challenges and opportunities to IoT policies for selected cities, addressed to ***Table 16-19*** with Scoring of Low-High.

3.2 Primary Research Questions

1) What are the key directions of IoT development in societal technology, and how do they shape urban and rural dynamics?

As shown in ***Table 6*** the four scenarios of societal IoT foresight highlight different trajectories for technological adoption and policy responses. These scenarios are influenced by *the digital divide*, shaping urban and rural dynamics by determining access to infrastructure, connectivity, and innovation adoption rates.

2) How can these technological directions be described through scenario analysis, and what policy options can be prescribed to address their societal impacts?

As shown in ***Table 8-11***, we first enriched the scenarios with quantitative IoT data extracted from the Hype Cycle (Vars-Times) in ***Table 4***, which represents the novelty of this research. Then, as shown in ***Table 12–15***, we identified the societal impacts of IoT development using the PESTEL framework for each scenario. Finally, based on the selected cities from ***Table 7,*** for each matrix of identified impacts we developed a matrix of policy options (***Table 16–19***), aligning them with the dimensions of Vars-Times and evaluating them within the context of the selected cities.

3.3 Future Research Directions

This study identified societal impacts (Tables 12–15) but did not conduct an in-depth evaluation. Future research could apply *Scanning Method* or *Tracking Method* to analyze these impacts systematically, using specific metrics for quantification and assessment.

The policy options derived (Tables 16–19) were based on a classical TA approach, primarily suited for *Parliamentary TA*. Future studies could expand this discussion by integrating *Participatory TA* and *Constructive TA*, incorporating stakeholder engagement and technology co-creation for more inclusive and adaptive IoT governance.

Conflict of interests

The authors declare no conflict of interest.

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UDC: 631:502.131.1]: 001.814-027.562(497.11)
doi: https://doi.org/10.58898/sij.v4i2 45-53

From Fields to Data Infrastructures: Citizen Science for Soil Monitoring in the Western Balkans

Jelena Jović[1,*] (jelena.jovic@biosense.rs), Dušanka Vujanović[1] (dusanka.vujanovic@biosense.rs), Andrijana Andrić[1] (andrijana.andric@biosense.rs), Kristina Kalkan[1] (kristina.kalkan@biosense.rs), Ljiljana Šašić Zorić[1] (ljsasic@biosense.rs), Tijana Barošević[1] (tijana.barosevic@biosense.rs), Aleksandar Ivezić[1] (aleksandar.ivezic@biosense.rs), Nataša Ljubičić[1] (natasa.ljubicic@biosense.rs), Luka Isakov[1] (luka.isakov@biosense.rs), Branimir Bajac[1] (branimir.bajac@biosense.rs), Sanja Brdar[1] (sanja.brdar@biosense.rs)

[1] University of Novi Sad, BioSense Institute – Research Institute for Information Technologies in Biosystems, Novi Sad, Serbia

Abstract: Reliable soil information systems remain underdeveloped across the Western Balkans, limiting the capacity of institutions to monitor environmental change, ensure sustainable land management, and align with EU legislation. This article presents a sociotechnical case study of the Soil Health Guards initiative in Serbia, the country's first citizen-science initiative dedicated to soil health assessment. Here, we analyze the design, implementation and governance implications of an integrated citizen-science framework that supports farmers, youth, and local communities in generating standardized soil-health data. Participants collected standardized measurements of ten biological, chemical, and physical soil indicators using structured toolkits, educational manuals, and digital communication channels, supported by iterative workshops and expert validation. Of 135 registered participants, 67 actively contributed at least one soil assessment, with retention decreasing from 54% to 40% over the project duration. Farmers sampled soils across a range of land-use types and soil classes, while youth conducted assessments in schoolyards, home gardens, and urban green spaces, with group activities involving over 150 children and adolescents. Participants valued structured guidance, with the instructional manual cited as the most useful resource. The project demonstrates that even low-level-technology-mediated citizen science can facilitate knowledge co-production, environmental literacy, and community stewardship, while generating reliable, decision-ready soil data compatible with institutional monitoring frameworks. By integrating hands-on learning, digital tools, and collaborative engagement, the initiative highlights the potential of citizen science to complement formal soil monitoring, support sustainable land management, and foster inclusive participation in environmental governance.

***Keywords*:** citizen science, soil health, knowledge co-production, environmental monitoring, participatory learning, technology-mediated engagement

Introduction

Environmental data are inherently complex and heterogeneous, reflecting the diverse and interconnected nature of ecosystems (Thomas et al., 2025). Soil, as a vital, yet non-renewable resource, is the foundation for food production and environmental stability (De Corato et al., 2024). However, soil health is increasingly threatened by intensive land use, pollution, and climate change, highlighting the need for robust monitoring systems that detect degradation and guide sustainable management while protecting ecosystem functions for biodiversity and food security (Olsson et al., 2019; Hou, 2023;). However, such data remain limited across Serbia and the wider Western Balkan (WB) region, where systematic soil assessments have historically relied on outdated, fragmented and spatially sparse datasets (Zdruli et al., 2022).

*Corresponding author: Jelena Jovic, Ph.D., email: jelena.jovic@biosense.rs, ORCID: 0009-0008-4261-1818

As a result, the true status of soil functionality, contamination and degradation is hindered, leaving national and regional efforts to design, update and implement effective soil-related policies without an adequate evidence base. Only in the past decade has Serbia initiated more consistent and harmonized data collection through designated monitoring sites, gradually establishing the foundations of a national soil-monitoring network. This work culminated in the release of the country's first centralized soil-information system in February 2025 (SEPA, 2025). While an important milestone, the system highlights the extent of historical data gaps and the need for complementary approaches that expand monitoring coverage, increase data diversity and strengthen public engagement in soil stewardship (Todd-Brown et al., 2022).

At the European level, the adoption of the first Directive on Soil Monitoring and Resilience (the Soil Health Law) in 2025 has further transformed expectations. For the first time, EU legislation sets common standards for soil-health assessment, harmonized monitoring requirements and EU-wide resilience targets (EP 2025). These developments place additional pressure on non-EU countries, particularly those in the EU accession process, to enhance their soil-information infrastructures and align with European reporting frameworks.

In this context, citizen science offers a promising complementary pathway. Citizen science is broadly defined as the involvement of non-expert participants in scientific, predominantly environmental research (ECSA, 2015; Haklay, et al., 2021), but this definition conceals the deeper mechanisms through which such projects operate. This participatory approach can be also seen as a sociotechnical ecosystem in which people, technologies and institutions work together to create, interpret and govern environmental information. Non-expert participants do not simply contribute observations, but they also engage with a carefully designed network of tools, like manuals, sampling kits, digital communication channels, photo-sharing platforms, and data templates, which altogether guide their actions and shape the resulting knowledge. These tools structure the information practices of participants: how they learn, how they measure, how they document, and how they make sense of their results (Vikström et al., 2025).

At the same time, citizen science infrastructures must align with broader institutional and policy frameworks. Data must be compatible with governance systems, meet standards for traceability and quality and be interpretable within formal monitoring programmes. The legitimacy of citizen-generated data therefore depends on transparent validation procedures, shared standards, and ongoing human–technology interactions that build trust among participants and institutions. From this perspective, citizen science is best understood as an emergent, distributed information infrastructure that connects everyday practices in the real life with national and European governance systems (Hansen et al., 2021).

Therefore, the lack of soil-health data in Serbia is not only a scientific limitation but a social and institutional problem. Fragmented institutional responsibilities, limited public awareness of soil degradation, constrained monitoring budgets and historically low engagement between scientists and agricultural communities have all contributed to the persistence of soil data gaps. Addressing these gaps requires approaches that are both technically robust and socially grounded.

The purpose of here presented case study is to examine the socio-informational system created through the first scalable, two-year long citizen science project of its kind in Serbia titled as Soil Health Guards (https://citizenscience.eu/project/525). This article analyses how this initiative selected and integrated tools, knowledge, communication channels, training practices and validation workflows into a functioning sociotechnical infrastructure that actively engaged farmers and youth to monitor key soil health indicator. By focusing on the infrastructural, informational and governance dimensions of the initiative, we explore how citizen science can contribute to building resilient, EU-aligned soil-information systems in the Western Balkans.

Materials and Methods

Recruitment and Participant Groups

Understanding how citizens engage with sampling instructions, online communication channels, data submission procedures, and feedback workflows is essential for designing sustainable and policy-relevant initiatives. The Soil Health Guards project provides an evidence-based case study through which these dynamics have been examined. This citizen science initiative was implemented in Vojvodina, Serbia's most intensively cultivated region characterized by highly productive chernozem soils (Kuzmanović et al., 2025). Because the project aimed to create an inclusive and realistic picture of local land-use practices, recruitment strategies of non-expert participants were diversified to reach general public with different levels of digital access, agricultural experience and familiarity with environmental monitoring. The project focused on engagement of farmers, as the first line of stewards for soil health and youth of various ages and educational backgrounds in collecting data on standardized soil health indicators.

Recruitment of adult farmers relied primarily on partnerships with local agricultural cooperatives, advisory services and community organizations. Project partners staff attended regional agricultural fairs, seminars and local meetings, where they distributed printed leaflets and held in-person conversations with potential participants. This face-to-face approach was essential for engaging individuals who seldom use digital communication channels and who often rely on trusted local networks for information. Outreach was further supplemented with online communication through an online application form on the project's website and active social media channels (Facebook, Instagram, LinkedIn and YouTube), which enabled broader visibility and attracted participants who were already digitally engaged.

Recruitment of youth participants, including preschool, primary and secondary school students, took place through collaborations with local educational institutions. Teachers played an important facilitating role by integrating soil health activities into classroom projects and schoolyard. This approach ensured that children could participate in a supervised and age-appropriate manner, either in groups within their schoolyards or individually at home gardens and small family plots.

Participation was voluntary, without restrictions on parcel size, agricultural production system or soil type. All participants signed informed-consent forms, and parental consent was required for minors. Personal-data processing followed Serbia's Law on Personal Data Protection (Službeni glasnik Republike Srbije, 87/2018) and the EU General Data Protection Regulation ((European Parliament & Council, 2016), ensuring transparent, lawful and ethical treatment of participant information. This emphasis on consent and data privacy supported trust building between scientific institutions and general public, an essential element of the sociotechnical system underpinning the project.

Co-Learning and Participant Support System

As most participants had no prior experience with soil assessment, the project established a comprehensive co-learning infrastructure that included free, standardized toolkits containing all necessary sampling and analysis materials, standardized educational manuals, iterative co-learning workshops, and a collaborative communication space where participants could openly and promptly exchange ideas, knowledge, and experiences via their preferred communication channel (email, Viber chat community, social networks, telephone). This framework was designed to support all engaged citizens at every stage

of soil data collection. It was specifically tailored in terms of content complexity and language style for each contributing group, taking into account cultural sensitivities and ethical norms of local values and customs.

Educational manuals served as the central reference point for all measurement procedures. Each participant received a printed, 30-page educational manual written in Serbian and adapted for different age groups and backgrounds, along with standardized toolkits with all materials required (sampling tools, testing reagents and other materials) for successful execution of soil sampling and on-field measurements. The manual provided step-by-step explanations, illustrated sequences of actions, photographs showing correct and incorrect examples, and troubleshooting guidance to help participants identify and resolve common errors. Standardized templates for data recording were also included to promote uniformity and minimize mistakes. The manual was used both independently in the field and during guided training sessions.

To complement the educational manual, the project produced short instructional videos demonstrating each sampling and measurement technique. Videos were filmed in local fields and school gardens, making the procedures relatable and easier to imitate. Participants could access the videos at any time through the project's YouTube channel (https://www.youtube.com/@Cuvarizdravljazemljista) for ongoing, accessible support, enabling self-paced learning and repeated review before or after fieldwork.

Training of participants was delivered through a series of three workshops held throughout the project duration. The introductory workshop provided hands-on practice with soil sampling, pH testing, and visual assessments of soil structure. Participants received their toolkits and had opportunities to ask questions and clarify uncertainties. A second workshop, held after the first major sampling cycle, focused on sharing early experiences, addressing methodological difficulties and refining techniques based on common errors observed in submitted data. The final workshop served as a closing event where participants viewed preliminary results, learned about expert validation outcomes and discussed how their contributions fit into broader soil-governance efforts. These workshops created a shared learning space and fostered social cohesion, which proved essential for sustaining engagement.

Between workshops, participants were supported through a hybrid communication system that combined email, telephone correspondence and a dedicated Viber community. Viber was particularly effective because it allowed participants to share photos of their samples, seek immediate advice on unexpected field conditions and exchange experiences with peers. This combination of communication channels ensured that participants with differing levels of digital literacy could receive timely support and maintain confidence in their measurements.

Soil Health Indicators and Sampling

The choice of soil health indicators reflected scientific considerations, institutional compatibility and the practical real-life perspectives of participants. The indicators selection process was guided by their scientific, agronomic and ecological relevance, sensitivity to diverse farm management systems, and the capacity to detect meaningful changes within realistic monitoring timeframes, while being aligned with the national soil monitoring framework. The research team, partnering with agricultural non-governmental organisations and local cooperatives, collaboratively selected a suite of ten indicators that offered a holistic, but achievable assessment of soil biological, chemical and physical conditions.

Biological indicators focused on organic matter decomposition and soil biodiversity. Standardized assays using tea bags and cotton cloths (Hughes, 2021; Keuskamp et al., 2013) buried at fixed depths and later retrieved for laboratory analysis of mass loss, provided sensitive insight into microbial activity and nutrient cycling. Earthworm surveys were included because earthworms are widely recognized as bioindicators of soil ecological health (Stroud, 2019). Participants counted and photographed earthworms for classification into functional groups, enabling quality control by experts.

Chemical indicators assessed soil nutrient status and acidity using semi-quantitative colorimetric kits for pH, nitrate, phosphorus and potassium. These indicators were chosen because they are essential to agronomic decision-making and align with the national soil-monitoring framework.

Physical indicators addressed soil structure, texture and bulk density via standardized, yet simple approaches. Specifically, soil structure was evaluated using the Visual Evaluation of Soil Structure (VESS) method, which relies on carefully observing the morphology of aggregates, root distribution and porosity (AHDB, 2025). Texture was estimated using the tactile "texture-by-feel" method (USDA, 2001), and bulk density was measured using undisturbed soil cores collected with Kopecky cylinders. This combination provided complementary insights into compaction, water retention and aeration as critical properties for soil functioning.

Together, the selected indicators offered a scientifically robust yet user-friendly set of methods that enabled participants to meaningfully assess soil health while supporting comparability with institutional datasets.

Participants collected soil samples following the standardized procedures outlined in the manual and demonstrated during workshops, using only materials and reagents supplied in their distributed toolkits.

To streamline reporting and reduce errors, participants recorded all measurements and metadata, including GPS coordinates, crop type, land-use history and sampling date, using standardized provided template sheets. These templates ensured completeness and supported consistent interpretation during analysis.

Data Submission, Quality Assurance and Validation

In order to ensure the reliability of citizen-generated data, a structured, multi-layered quality-assurance process was implemented **(Figure 1)**. After receiving field data and soil samples, the research team undertook an initial screening to check for missing fields, inconsistent units or unclear notations in submitted templates. When ambiguities appeared, researchers contacted participants directly via phone or email to clarify entries, maintaining an open communication loop that reinforced participant learning and transparency.

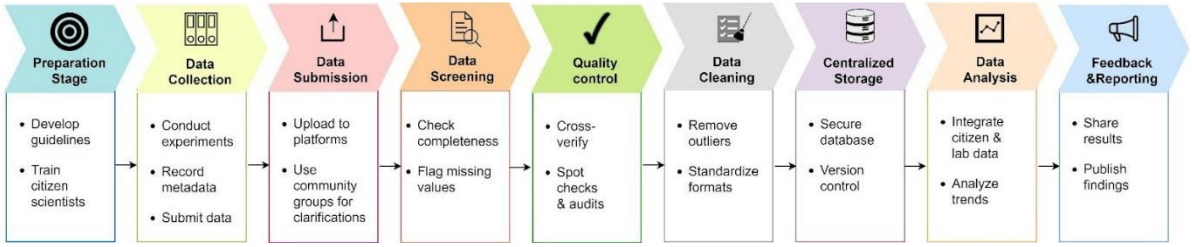

Figure 1. Data quality assessment and validation flow chart. Workflow illustrating the data quality assessment and expert validation process for citizen-generated soil observations.

Spatial validation involved cross-checking submitted GPS coordinates against official cadastral parcel boundaries using the GeoSrbija platform (https://a3.geosrbija.rs/katastar). This step ensured that each measurement was accurately geolocated and associated with a correctly identified land parcel. Once verified, soil types were assigned based on the 1:50,000 Vojvodina soil map (Nejgebauer et al., 1971) and harmonized with the World Reference Base (WRB) classification system following the national-to-WRB conversion scheme (Knežević et al., 2011).

To evaluate the reliability of citizen-generated measurements, research scientists conducted field visits to parcels selected to represent different soil types, land uses and management systems. Soil at

these locations was re-sampled using identical protocols, enabling direct comparison between participant data and expert measurements.

All datasets were securely stored on institutional servers with version control and routine backups, ensuring long-term data integrity and traceability, as key features for integrating citizen-generated datasets into national and EU-aligned soil governance systems.

Results

Between 2024 and 2025, from 135 registered individuals for the participation in Soil Health Guards citizen science project who received the necessary materials for soil health monitoring, 67 individuals (50%) actively contributed at least one assessment. Active participation was defined as completing and submitting at least one soil analysis with validated GPS coordinates and essential metadata, including sampling date, land use, and management practices, in line with the project manual.

Demographically, the participant pool comprised approximately 60% males and 40% females. Youth participants spanned ages 5 to 18 distributed across different educational levels, while farmers ranged broadly in age from 25 to 65 years. Their educational attainment varied, with over half having completed secondary education, thereby reflecting the region's general population trends (Statistical Office of the Republic of Serbia, 2023).

Retention declined slightly over time, from 54% in 2024 to 40% in 2025. Notably, one-third of active participants (23/67) completed all ten soil health indicator assessments over the two-year project duration.

Active participants included 46 adult farmers and 21 youth participants (ages 5–18). Farmers sampled soils across diverse soil types, at parcels ranging from 10 m² to 16.7 ha **(Table 1)**. Youth participants conducted individual assessments in schoolyards, home gardens, and urban green spaces, predominantly on chernozem soils. In addition, 45 group-based measurement activities engaged over 150 children and adolescents. These activities emphasized experiential learning, collaborative knowledge production, and soil literacy, rather than formal data collection.

Table 1. Participant demographics and sample distribution.

Participant Group	Number of participants (N)	Age Range	Soil Types Sampled (N)	Sample Context
Adult farmers	46	25–65	Chernozem (23), Fluvisol (4), Cambisol (5), Gleysol (3)	Agricultural parcels (size ranges: 0.1–16.7 ha)
Youth (individuals)	21	5–18	Chernozem (21)	Schoolyards, home gardens, urban green spaces
Youth (group)	150+	5–18	Mostly chernozem	Hands-on educational workshops

Participants' experiences, captured via a quick poll survey during the second workshop (n=18), illustrate the interplay between technology-mediated support, guidance materials, and participant engagement. The majority (61%) reported that performing experiments posed the greatest challenge, followed by express mail sample submission (33%), whereas registration for participation procdures were rarely cited as difficult (6%). In terms of perceived usefulness, the cotton cloth decomposition assay was most valued (33%), followed by earthworm counts and soil structure assessments (22% each), while tea bag decomposition was considered useful by 11%. Interestingly, participants relied heavily on instructional materials, with 72% citing the project manual as their primary support, 17% preferring video materials, and 6% indicating hands-on workshops as most beneficial. These findings highlight the centrality of clear, accessible guidance and digital facilitation for supporting participant learning, engagement, and confidence in data collection.

These results demonstrate that technology-mediated citizen science frameworks can successfully support both knowledge co-production and educational outcomes. Adult farmers and youth participants

contributed complementary perspectives, producing a spatially and socially diverse dataset that reflects local agricultural practices and urban green space management. For youth, engagement in hands-on activities fostered practical skills, environmental literacy, and collaborative learning, exemplifying how citizen science can function as a tool for community empowerment and social learning, consistent with the aims of social informatics research. The project underscores the importance of combining digital tools (GPS-enabled data collection), structured instructional resources, and interactive guidance to maintain engagement, ensure data quality, and maximize the educational and societal impact of citizen science initiatives.

Discussion

In this case study, we demonstrate how citizen science can connect community engagement with soil health monitoring, generating actionable data on different ecosystem services, such as nutrient cycling, soil structure stability, and organic matter decomposition that are essential for Vojvodina's agricultural provisioning services. It demonstrates both the opportunities and challenges of implementing low technology-mediated citizen science initiatives in socio-ecologically diverse regions. While our participant pool included a broad age range, from schoolchildren to adult farmers, the observed demographic skew toward younger, urban participants highlights a commonly observed pattern in citizen science, whereby participants tend to cluster in socio-demographic groups with greater digital connectivity and access to engagement opportunities. Even with widespread internet access in Vojvodina (88% of households; Statistical Office of the Republic of Serbia, 2023), rural and older populations remain underrepresented. Such gaps can limit data coverage and the representativeness of collected information, as these groups often hold valuable historical and localized knowledge of soil management practices critical for sustaining crop yields, preventing erosion, and maintaining nutrient cycles. Similarly, the observed gender imbalance, favouring male participants, reflects global trends in citizen science participation, where cultural norms, differential access to resources, and time constraints influence recruitment and sustained engagement (Strasser et al., 2023; Ibrahim et al., 2021). Future outreach strategies should therefore prioritize inclusive engagement approaches, targeting rural, older, and female populations to ensure that citizen-generated data reflects the full diversity of experiences and knowledge across the region. Enhanced inclusion would not only improve ecological representativeness but also empower marginalized groups through the co-production of knowledge relevant to local land management and decision-making.

From an educational and social perspective, the project successfully fostered intergenerational learning and collaborative knowledge exchange. By engaging farmers and youth in complementary roles, the initiative created opportunities for experiential learning, skill development, and environmental literacy. Group-based activities for children and adolescents reinforced hands-on learning, while adult participants contributed practical agricultural expertise, resulting in a socially and spatially diverse dataset. These dynamics illustrate the capacity of citizen science to function as a platform for community stewardship, collaborative problem-solving, and knowledge co-production, aligning with social informatics principles that emphasize the interplay between people, technology, and information systems.

The project also highlights the potential for citizen-generated data to support environmental monitoring and policy-relevant initiatives. Standardized and replicable soil health assessment methods, combined with expert validation, enable participants to produce reliable, decision-ready data. Such practices align with broader European frameworks, including the EU Soil Strategy for 2030, the EU Mission “A Soil Deal for Europe,” and the EU Soil Observatory, which increasingly recognize participatory monitoring approaches as complementary to institutional capacities. It is reported that CS has the greatest policy influence when projects generate structured, decision-ready data, align their indicators with regulatory requirements, and proactively engage environmental authorities through policy briefs, validation processes, and early consultations (Turbé et al., 2019). CS initiatives such as ours directly support the EU legislative soil priorities by complementing institutional monitoring capacities and engaging

communities in co-producing soil data relevant to climate resilience, biodiversity conservation, and sustainable agriculture. In this context, the Soil Health Guards project embodies many of the features identified as essential for effective policy integration: it offers standardized and replicable soil-health methods, includes expert validation to enhance credibility, engages both farmers and youth in data collection and learning, and targets soil health indicators where national monitoring capacity is still developing. While formal integration of citizen science into policy remains uneven, projects that offer structured protocols, clear guidance, and engagement with local authorities can help bridge this gap, demonstrating the societal and environmental relevance of community-collected data.

Importantly, the project's design, incorporating accessible and standardized methods, structured training, certain digital tools for data collection, and interactive guidance, illustrates a scalable model for regions with limited soil monitoring infrastructure. Beyond generating valuable ecological data, the initiative contributes to scientific literacy, environmental awareness, and community empowerment, opening pathways for the integration of local knowledge into agricultural and environmental governance. By combining practical data collection with participatory learning, the Soil Health Guards project highlights the transformative potential of citizen science: fostering stewardship, enhancing knowledge co-production, and sustaining soil functions and ecosystem services in contexts with persistent data gaps and governance challenges.

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UDC: 7.038.53:316.774]:7.038.6
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Media and Visual Culture through the Paradigms of Modernism(s): from Modernism through Postmodernism to Post-postmodernism and Hypermodernism

Darko Baštovanović[1*], Branka Bešević Gajić[2], Stevan Lutovac[2]

[1] Cabinet of the Minister for Reconciliation, Regional Cooperation, and Social Stability of the Government of the Republic of Serbia, darko1bastovanovic@gmail.com

[2] Faculty of Management, Sremski Karlovci, branka.besevicgajic@famns.edu.rs

Abstract: Departing from the premise that postmodernism does not disappear in the course of the historical demise of cultural–epistemological paradigms but is instead transversally incorporated into a new metanarrative of techno-aesthetic hypermodernity, this paper reconfigures the categorical foundations for the analysis of visual and media culture within the context of the post-postmodern transition. Its central thesis does not imply either a regressive reaffirmation of modernist formalism or a normative repair of postmodern fragmentation, but rather the articulation of an epistemologically expanded field within which postmodern poetics—including the simulacral, intertextual, pastiche-based, spectacular, and rhizomatic—are refunctionalized as the techno-ontological infrastructure of a new visual regime. Relying methodologically on heterogeneous yet compatible conceptual modules (assemblage / visual code / cyberspace / algorithmic affectivity), the authors approach media culture not as a phenomenological epiphenomenon, but as an apparatus-based formation of subjectivity in which the aesthetic, the political, and the technological are not separated, but operationalized through modes of digitally mediated (self-)representation. Within this discursive framework, the postmodern no longer exists as a historically "past" concept, but as a semiotic code undergoing algorithmic mutation—reconfigured within a hypermodern environment in which visuality has become the primary mode of affective and cognitive articulation of reality.

Keywords: postmodernism, hypermodernism, culture, paradigm, discourse, fragmentation.

Coordinates of Introductory Contextualization

The endeavour of the authors of this manuscript is directed toward the formation of a theoretical synopsis within which postmodernism is positioned as a culturally mediatized paradigm whose energy, although dispersed, continues to resonate within the structure of the present.

*Corresponding author: Darko Baštovanović, darko1bastovanovic@gmail.com

The writing does not proceed from the standpoint of historical retrospection nor from metaperspectival abstraction, but rather as an effort to conceptualize a particular density of experience: experience that has already been technically shaped, medially coded, and visually inscribed. The position of postmodernism within the contemporary mind is not that of a weakened theoretical fashion, but persists as a dynamic cultural repertoire, preserved in patterns of perception, in the grammars of everyday life, and in narrative modes that continue to structure our expectations of reality.

Postmodernism emerges and endures through media infrastructures, just as one might have formerly said that culture reflects epochal consciousness, here the media configuration appears as an ontological precondition for cultural articulation. Within this range, visual culture becomes more than an iconic practice: it constitutes a space for negotiation with reality, a regime for the production of events, and a mode of modeling what is recognized as "real." What we refer to as media is not exhausted by their technical role of mediation, but includes the entire spectrum of materiality, codes, narrative structures, economies of attention, and, above all, registers of perception.

The encounter between postmodernism and media culture does not occur within the horizon of mutual interaction, but within a matrix of co-emergence. Media are neither platform, nor tool, nor "channel", their functioning is not transmissive, but epistemological. They do not process reality; they configure it. The event ceases to be an ontological point upon which the subject is affectively inscribed: it appears in the form of a simulated scene, pre-formatted, often visually spectacularized, within which experience has already displaced its intensity. The media image does not follow the event – it is the event itself. Under these conditions, what is perceived as postmodern does not persist in theoretical paraphrases, but in productions of affective codes that circulate between technological replication and visual hyperpresence. The space of perception is no longer a space of introspection, but a terrain on which recombination of signs, cues, and echo-traces of reality occurs. The subject, in this context, no longer exists as a self-determining agency, but as a nodal point within a network of apparatuses, processors, interfaces, algorithms, and optical-digital assemblies that redefine what is sensory, what is possible, and what is conceivable.

In considering visual culture, one must begin from the ontological assumption that the visual is not reductively reducible to an image, nor to the act of "seeing" in the sense of perceptual activity, but is rather a complex and multilayered event in which codes of power, narratives of knowledge, and practices of subjectivity intersect. Within this discursive span, visual culture does not articulate representations alone, but also forms of relation to reality, distributions of visibility, arrangements of what may/may not be seen, what is authorized to be observed, and what remains in the blind spot of historical vision. It produces and is produced by that which can, in anthropological and media terms, be called the economy of seeing.

The capacity to see, to be seen, and to be recognized as a subject of vision is neither universal nor neutral. It is historically differentiated, always politically burdened, and technologically conditioned. It is precisely these distributions of power over the visible that constitute visual culture as a zone of conflict / negotiation / instrumentalization. The traditional understanding of the visual as an archetypal, all-seeing, divinely authorized position of knowledge, in the contemporary era, is extended into the domain of technological superstructure through surveillance systems, algorithmic facial recognition, and visual analyses of behavior. Visuality here is directly linked to knowledge and to power. The one who sees does not merely observe; they codify, govern, archive, and intervene.

Within this framework, postmodernism appears as a cultural form that has, in a sense, predesignated itself for reabsorption, not as an ideology of the end, but as a meta-discursive system that carries

within its core its own auto-immunity, its own consent to self-dethronement. The question of succession is no longer a question of truth, but a question of operativity: which conceptual apparatus succeeds in explaining contemporary cultural and media formations that are simultaneously post-postmodern and hypermodern?

The question of the hypermodernization of the postmodern is thus not posed as a theoretical inflation, but as a real cultural condition: what does it mean when postmodernism itself, that metaphysical archive of fragmentation, irony, simulation, and intertextuality, is subjected to technological expansion in the domain of algorithmic processing of affect, within an environment pre-mapped through the digital traces of subjects? The answer may lie in a distinction that remains insufficiently articulated: between postmodernity (as a historical period), postmodernism (as a conceptual-discursive apparatus), and postmodernization (as a socio-technological process).

Taking this tripartite distinction into account, this paper directs its focus toward several key theoretical coordinates: not as a retrospective interpretation, but rather as an experimental displacement: the rhizomatic matrix and assemblage in the analysis of visual communications; the graphic revolution as a radicalization of technological representation; pseudo-events as a spectacular dislocation of the real; hyperreality as a logic that substitutes for experience; simulacra as operational units of cultural production; pastiche as an aesthetic of repetition without origin; and intertextuality as a discursive mechanism without center. Each of these concepts will not be treated as a historically closed category, but as a living point of accessing and open to reflection within a post-postmodern condition of culture that is continuously undergoing hypermodernization.

Paraproximities of (Modern)ism(s)

Any serious reflection on the (post)modern requires a prior disentanglement of its internal conceptual tension not as a sterile taxonomy, but as a gesture of lucid differentiation between an epistemological horizon / a discursive formation / a socio-technological process. The conceptual triad postmodernity / postmodernism / postmodernization does not function as a neutral classification, but rather as a symptom of ontological and semiopolitical displacements that demand to be thought not in the form of the signified, but within a regime of the performativity of meaning.

Postmodernity is not exhausted as a “post-modern” stage but is articulated as a constitutive rupture within the linear logic of Enlightenment rationalism, destabilizing the axes of unity / universality / eschatological progression, it inaugurates an epochal imbalance: a topology of fluidity, the dominance of discontinuity, and the proliferation of multiple realities. Within this field of ontological stratification, postmodernism does not arrive as an “expression” or “reflection,” but as a productive dispositif of meaning – an operative cultural apparatus that generates modes of articulation of the postmodern imaginary through aesthetic / academic / political codes. It does not interpret reality, but produces its possibilities, mapping it through a language of fragments, ironic displacements, and narrative interferences.

Postmodernization, by contrast, does not operate symbolically, but infrastructurally: as a series of techno-economic, communicational, and institutional mutations that naturalize the logic of the postmodern, transforming it into a quotidian ontopolitics, a mechanism of subjectivation, algorithmic socialization, and cultural economy. This tripartite differentiation is theoretically articulated by authors such as Simon Susen, Zygmunt Bauman, David Harvey, and Fredric Jameson, each of whom insists on non-negligible shifts between these terms: Jameson conceives postmodernism as the cultural logic of late capitalism;

Harvey emphasizes its spatio-temporal reorganizations, while Bauman maps its ethical collapse through the metaphors of liquidity / precarity / fracture.

Susen describes the "postmodern turn" as a paradigmatic shift from the Enlightenment belief in the relative determinacy of both the natural and the social world toward an increasingly widespread post-Enlightenment conviction in the radical indeterminacy of material and symbolic forms of existence. Crucially, he does not treat this shift as a mere change in a "style of thinking," but as a set of interrelated transformations that reconfigure the very conditions of social-scientific explanation, namely, what counts as valid knowledge, how methodological justification is established, where causality is located, and how political agency is conceived. For this reason, Susen disaggregates the turn into five distinct "turns" (the relativistic turn in epistemology, the interpretive turn in methodology, the cultural turn in sociology, the contingent turn in historiography, and the autonomist turn in politics), thereby providing a precise map of how the postmodern "enters" scientific procedures and political horizons, rather than remaining merely a label for fragmentation, irony, or intertextuality (Susen, 2015).

Bauman, by contrast, insists that the key nerve of postmodernity lies precisely in the crisis of "old, comforting certainties": a condition in which the principles and assumptions upon which we once relied are called into question, and life is experienced in the register of contingency, insecurity, and ambivalence. In such circumstances, ethical–political orientation becomes increasingly difficult to anchor in stable codes and universal guarantees. In this sense, Bauman's diagnosis of postmodernity is not only a description of cultural pluralization, but also an elaboration of the experience of living without stable points of reference. He links the notion of ambivalence to the modern impulse to classify and order the world (language, order, boundaries), as well as to the persistent "return" of undecidability that this impulse generates as its shadow. This is significant because it allows us to read the postmodern not merely as a process of aestheticization and fragmentation, but as a moral–social condition in which normative certainty disintegrates, and responsibility and choice become "heavier" precisely because they are no longer covered by firm rules (Bauman, 1991).

Jean-François Lyotard, justifiably positioned as a major prophet of the disintegration of universalist apparatuses of legitimation and as a theoretical architect of epistemic dislocation, does not approach the phenomenon of postmodernity as a superficial cultural change / aesthetic mutation / ideological reaction, but rather postulates it as an ontological, cognitive rupture within the very infrastructure of knowledge, its production, circulation, and validation. His key diagnostic gesture in The Postmodern Condition (La Condition postmoderne, 1979), often simplistically reduced to the phrase "incredulity toward metanarratives", should be read neither as a philosophical relativization nor as a merely heuristic description of a moment, but as a theoretical seismograph registering the structural exhaustion of discursive totalities / rationalist universalisms / teleological horizons in an epoch dominated by dispersed, non-linear, multi-channel modes of knowledge articulation that no longer seek truth, but rather operational functionality / situated applicability / pragmatic efficiency within communicational, technical, and informational regimes that no longer recognize a hierarchical vertical of legitimation.

In the disintegration of metanarratives, the loss of their legitimating force becomes manifest: discursive models that once organized horizons of meaning, religious, ideological, modernist, no longer perform the function that sustained them. Modernism is not an exception within this process; its decline unfolds through two parallel stratifications. One belongs to the political matrix, within which humanity was imagined as the collective bearer of a historical mission of emancipation, as a subject capable of trans-

forming the world through the force of a universal project. The other pertains to the philosophical articulation of modernism, in which knowledge is posited as an end in itself, as a mechanism expected to produce emancipation through its very accumulation. Lyotard clearly demonstrates that the modernist order loses its weight at the moment when emphasis shifts from purpose to technical execution. The postwar acceleration of technological means separates the production of knowledge from its former value-laden functions; knowledge is no longer conceived as a universal emancipatory resource, but as a component of a techno-system that primarily generates performative effects. Political universalism is thus left without a subject, and the philosophical ideal of knowledge without a convincing emancipatory foundation. In this disintegration, the modernist metanarrative does not disappear as an idea, but as a mode of world-connection: it no longer provides a shared horizon of meaning, nor does it articulate the relationship between action, purpose, and a common future. It remains as the residue of an epistemic matrix whose operativity finds no grounding in contemporary regimes of experience, where reality is no longer organized through totalizing narratives, but through technical protocols, fragmentary perspectives, and shifts in the structure of the visible.

By contrast, Jameson does not accept postmodernism merely as an "incredulity" toward metanarratives in the Lyotardian sense, but dialectically insists on reading it as both a periodizing concept and as the cultural logic of late (multinational) capitalism, more precisely, as a historically specific regime of cultural production in which changes in aesthetics, perception, representation, and everyday symbolic economy cannot be treated as a self-sufficient "autonomy of culture," but rather as the mode through which the totality of social relations (under conditions of late capitalism) appears, is distributed, and reproduced at the level of culture. It is for this reason that the characteristics Jameson foregrounds are precisely those that can only be thought together: the new "flatness" or depthlessness and the culture of the image/simulacrum; the weakening of historicity (both in relation to public history and in private temporality); the "schizophrenic" structure of time (in the Lacanian register), which produces syntaxes without stable continuity; and a new affective ground ("the waning of affect") that transforms the very way in which the subject registers intensity, seriousness, and depth of experience. In other words, where Lyotard's gesture of rupture seeks to demonstrate the collapse of legitimating totalities, Jameson seeks to show that this very "collapse" can itself be explained as a functional expression of a broader systemic transformation—that the postmodern is both symptom and form of the logic of the commodity, media, and spectacle in late capitalism, in which aesthetics does not appear as the "victory" of culture over the economy, but as the mode through which the economy (as a total social relation) colonizes cultural production and turns it into its most sensitive sensorium.

Harvey argues that what we designate as the postmodern condition does not amount to a mere "change in taste," but rather to a profound displacement of the coordinates of experience—above all through the transformation of the experience of time and space, through the collapse of trust in a stable linkage between scientific and moral judgments, and through a specific shift of focus: aesthetics (image / performance / visibility) displaces ethics as the primary object of social and intellectual concern. In this configuration, images dominate narratives, while ephemerality and fragmentation take precedence over eternal truths and the idea of a unified politics. At the same time, explanatory frameworks are relocated: from material and political-economic foundations toward considerations of autonomous cultural and political practices, as if the "weight" of causality had migrated from structure to style, from production to the symbolic, from economy to rhetoric.

Yet Harvey simultaneously insists that such shifts are by no means historically unprecedented. His outline suggests that similar "regime changes" recur, and that even the most recent version remains fully accessible to historical-materialist analysis, theoretically elaborable through the metanarrative of capitalist development formulated by Marx. From this perspective, postmodernism, in Harvey's framework, is not merely a cultural label but a historically and geographically specific condition and it is precisely here that he opens the question of its nature: whether it is to be understood as a symptom/pathology or as a sign (portent) of a deeper and broader revolution in human affairs than those already produced by the historical geography of capitalism (Harvey, 1990: 327–390).

Dominic Strinati, examining the structural shifts in the formation of the symbolic order of the late twentieth century, identifies five fundamental aspects of postmodernism, not as a stylistic repertoire or cultural trend, but as a symptomatic crystallization of deep disturbances in regimes of meaning. Within this horizon, the postmodern appears not as a thematic change, but as an epistemological mutation: the collapse of verticality, the pluralization of norms, and the decline of the credibility of systems of totalizing meaning. According to Strinati, the five characteristics of postmodernism may be outlined as follows:

1. The annulment of the distinction between the social / the cultural / the experiential.

Instead of a functional opposition between institutional frameworks, aesthetic forms, and existential experience, the postmodern regime of meaning introduces a mutual translatability of codes—social relations are aesthetically staged, cultural artifacts become normative matrices, and experience is refracted through patterns of representation. The production of norms is no longer distinguishable from their performance, nor is it possible to discern where form ends and order begins.

2. The primacy of expression, that is, affect, over content.

The visual impulse, formal redundancy, and affective saturation acquire priority over conceptual articulation or cognitive coherence. Trust in inner meaning is replaced by trust in surface effect / stylistic deviation / gestural citationality. Meaning is no longer discovered; it is assembled and multiplied through montage and repetition, through the rhythmization of form, without obligation to deeper reference.

3. The mixing of elites.

Axiological distinctions between cultural elevation, media populism, and everyday banality are dissolved. The high is no longer elevated, the low no longer marginal. Both are incorporated into the same flow of cultural capital redistribution and symbolic consumption. The horizon of hierarchy disappears, replaced by a horizon of hybridity, a field of intersecting signs deprived of historical gravity.

4. The fragmentation of space, time, and presence.

Traditional coordinates of location, geographical / chronological / corporeal, are destabilized. Spaces are no longer constructed, but compressed; time no longer flows, but fractures; presence is no longer an event, but a dislocated trace. The subject no longer inhabits continuity, but circulates among disjunctive points that do not presuppose one another.

5. The disintegration of metanarratives / binding truths / universal forms.

Trust in unifying narratives that once guaranteed meaning disappears—not because they have become dysfunctional, but because they have become unconvincing. The authority of ideas / systems / progress is not dismantled through negation, but exhausted through iteration. In place of meaning, we encounter flow; in place of grounding, overlap; in place of answers, a change of position within the discursive matrix.

The annulment of the distinction between the social / the cultural / the everyday, as conceptualized by Strinati (2004: 211–212), does not represent an epistemological nuance but a symptomatic mutation

in which mass media become the key regulatory mechanisms of social reproduction. Within this configuration, popular culture does not function as a secondary sphere of symbolic expression, but as a dominant apparatus of affective–perceptual normalization—a techno-symbolic infrastructure operating through iconic transcriptions of the real. Signs, images, and imaginaries no longer act as transmissive carriers of meaning, but as operative instances of the codification of reality: they direct affect, map perception, and format experience. Subjectivity is not articulated through reflexive distance, but is generated within an algorithmic regime of orchestration: through spectacular montages, narrative loops, and affective transparency. The media image does not arrive as a representation of the event, but as its prosthetic substitution, pre-generated within a regime of hypervisibility and perceptual automatism. The social is no longer the precondition of the cultural, but its derived function, while culture is no longer consumed as meaning, but internalized as a normative grid of everyday subjectivation. Postmodernity in Strinati's framework does not interpret media saturation; it derives its theoretical form from it: an attempt to understand a society saturated with signs, affect, and hyperproduction of images.

In the configuration of postmodernity analytically dissected by the Marxist philosopher of autonomist provenance Franco Berardi, alias Bifo Berardi, what is at stake is neither an aesthetic shift of paradigm nor an epistemological skepticism toward totalizing discourses, but a profound transformation of the ontological and affective conditions of subjectivation within the regime of semiocapitalism—a regime in which labor is de-ontologized, communication instrumentalized, and language emptied of meaning through the permanent acceleration of rhythms of production, reception, and circulation. Here, postmodernity does not appear as a philosophical marker of the relativization of truth, but as a historical condition of collective derealization, depressive saturation, and psycho-affective disintegration that can no longer be interpreted through a hermeneutics of meaning, but rather through an analysis of frequency, intensity, and overload.

The affective structure of the postmodern subject does not emerge from oppression, but from constant integration into the machinery of the sign, through the mobilization of language, the exploitation of attention, and the emotional coding of consciousness, the subject no longer operates within the opposition freedom/repression, but within the horizon of uninterrupted inclusion, availability, and connectivity. The postmodern subject does not participate as a being of difference, but as a node within a network of affective compatibilities, as a semio-emotional machine that no longer interprets the world, but mediates it. In this sense, communication loses every form of reflexive distinction and becomes an algorithmically distributed force, designed not to express meaning, but to produce affective effects, to generate response, trigger desire, and mobilize energy that no longer condenses into political identity, but dissipates through dispersive flows of desire, panic, and exhaustion (Berardi, 2014: 88).

Language within the postmodern constellation functions as a technical matrix of affect rather than as a symbolic medium of representation: meaning is not stabilized through dialogue, but is volatile and consumable, illuminated only in micro-moments of semantic interference, while consciousness itself no longer functions as a stable bearer of identity, but as a surface continuously oscillating between rhythm, impulse, and demand. Within such a dispositif, postmodernity becomes the name for the collapse of collective temporal orientation: the linearity of chronos is replaced by asynchronous sequences of input, parallel emotional streams, and altered regimes of anticipation, in which the subject does not project the future, but endures an accelerated present as a field of constant reorganization of its own presence. Positioned within this semio-affective field, the subject no longer operates within the code of critical distance, but within the logic of permanent availability, where postmodernity no longer signifies pluralism but

disorientation in excess, no longer irony but the inability to distinguish between the serious and the banal, no longer difference but fatigue from difference itself. In this context, Berardi's analysis of postmodernity does not constitute a deconstruction of meaning, but a diagnosis of its metabolic collapse, the breakdown of the symbolic economy in which affect is produced without narrative, and narrative is consumed without experience (Berardi, 2012: 119). Subjectivity is thus reorganized in accordance with the techno-communicative imperatives of market rationality: the postmodern self is no longer an existential singularity, but an extension of platforms, a profiled point of reaction, an accelerative function of emotional processing. Its political potential is not abolished through violence, but diluted by rhythm, rhetorically, informationally, affectively.

Starting from the understanding that postmodernism cannot be separated either from its epochal configuration or from the theoretical model through which society is conceptualized, Denzin identifies a series of tendencies that define postmodern social analytics. Classical systemic constructions lose their grounding; society is no longer imagined as a closed totality, but as a set of dispersed processes without a stable center. At the core emerges the problem of legitimacy under conditions of technologically accelerated and medially saturated culture, where experience moves through filters, codes, and technical substrates rather than through immediacy.

The theoretical apparatus distances itself from earlier methodological forms – phenomenology, structuralism, poststructuralism, and critical models – because these frameworks no longer encompass transformations in social configurations. Language becomes the key analytical field: it is here that patterns of relations, distributions of power, modes of perception, and figures of subjectivity are formed. Along the same line runs the interrogation of scientific knowledge and the realist assumptions that accompanied social interpretations of late capitalism; the question is no longer what science claims, but how knowledge is produced, circulated, and legitimized. The subject is examined through the arrangement of discursive, affective, and technical practices, without presupposing a unified or self-contained position. Commodity acquires theoretical weight as a site where the reconfiguration of social relations becomes visible through commodity forms, consumption, and stylized everyday life. Metanarratives that once oriented cultural and social life lose their function; everyday existence no longer rests upon stable symbolic anchors. In this development, skepticism also arises toward rationalist models of emancipation, since promises of consensus, liberatory knowledge, and universal communication are no longer matched by the structures of the contemporary social order. Analysis therefore shifts toward fields in which society, language, and the subject are shaped through technological, media, and power regimes that define contemporary reality.

If there exists a regime in which postmodernity ceases to be a stylistic artifact and assumes the status of a techno-epistemological configuration of subjectivity production, its reading through the twin frameworks of Han's psychopolitics (Byung-Chul Han) and Virilio's dromology (Paul Virilio) opens a space for diagnosing visuality not as a representational mediator, but as an affective–dromological apparatus of discipline. In Han's account, power no longer functions through externalized prohibition, but through internalized obligation, the subject is not silenced, but compulsorily activated; not within a regime of censorship, but within an economy of permanent exposure and performative presence (Han, 2017). Within this framework, visuality does not appear as a field of recognition, but as a grid that incessantly demands confirmation, form allows no shelter, and transparency, instead of truth, produces flattening: everything becomes visible and thus consumed; everything is available, and therefore nothing remains (Han, 2015). There is no longer a gaze that requires distance, but a gaze as self-surveillance: the subject is no longer the subject of the gaze, but the subject of exposure, pressed by the light of visibility to the point of burnout.

In a parallel line of thought, in Virilio's work visuality loses its referential point, because what appears as an image no longer derives from reality, but from speed. The image does not follow the event; it replaces it. It is the visual residue of catastrophe, accelerated to the point of suppressing reflection, transformed into a logistics of light, a transmission that threatens to erase the distinction between appearance, representation, and destruction (Virilio, 1977). In this key, the dromological apparatus does not articulate the image as a carrier of meaning, but as a precursor of collapse—technology does not produce representation, but generates intensity that already contains self-destruction within itself (Virilio, 2005). The image is no longer secondary, no longer consequential; it is the event itself in its optical mutation, an accelerated form that does not allow the formation of experience. At the intersection of Han's affective–transparent matrix and Virilio's light–accelerational infrastructure, visuality is articulated as an algorithmic regime of affective determination, as a technical arrangement of enforced visibility. The subject is torn between the grid that marks it as an object of display and the rhythm that disables it from establishing itself as a subject of reflection. Visual culture, within this coded horizon, functions as a distributive network of attention and an operative zone of the exhaustion of presence—not as a symbolic medium of meaning exchange, but as a semiotic–economic apparatus for the manipulation of the visible, without remainder, without depth, without slowness.

Dimensionality(ies) of Mechanical Reproduction

In the contemporary age of technical reproduction, the manner in which works of art exist and circulate undergoes a radical transformation. The development of technologies such as photography, film, and digital visual practices has resulted in the image no longer being bound to a single original nor to privileged spaces of viewing. Instead, works of art enter a regime of mass accessibility in which the boundaries between the exclusive and the general, between private contemplation and public distribution, are erased. This shift not only redefines the relationship between audiences and art, but also the very foundations of artistic existence, what Benjamin identified as the loss of the work's "aura."

Yet this aura, as Benjamin emphasizes, does not disappear without residue: it remains as a testimony to the spatial, temporal, and cultural embeddedness of the original, its history and its ritual use. In this sense, technical reproduction does not abolish art, but relocates it within a new regime of visibility, where presence is no longer determined by place, but by flow, availability, and context of use. From this perspective, a space opens for understanding how not only the status of the artwork has changed, but also the ways in which it is perceived, consumed, and evaluated.

Benjamin points out that at the moment when the art object can be technically reproduced without limitation, the very structure of its existence is transformed: film, photography, and graphic visual practices produce images that no longer depend on a unique original nor on the restricted access that once defined their cultural status. Reproduction introduces a regime in which the work exits the enclosed space of privileged viewing and enters mass circulation; accessibility expands to the point at which the distinction between "those who have access" and "those who do not" is abolished. Yet something remains with the original object that reproduction cannot appropriate: its concrete position in time, the material history of its movement, the traces of the conditions under which it was produced and preserved, and the specific presence that distinguishes it from any copy.

Benjamin links this layer to auraticity, not as a mystified surplus of meaning, but as the result of the fact that the original is bound to a precise spatial and traditional framework, to customs of display, to cultural rituals that determine how it is approached and within what environment it acquires meaning. The artwork is never given neutrally: its perception is shaped by the gallery, the sanctuary, the ceremonial space, familial inheritance, constellations that constitute its unrepeatable scenography. Reproductive technologies dismantle this framework and introduce a different regime of visibility: the image no longer requires a ritual space in order to be seen, sound no longer demands the concert hall, and the work is no longer bound to a specific environment that defines it. Mass distribution shifts the center of gravity from ritual to exhibition, from privileged space to media flow. In such a transformation, the boundaries that once defined the difference between the original act and its multiplied echo disappear, while visual culture enters a state in which presence is no longer a matter of place, but of accessibility and circulation.

It can therefore be argued that the distribution of artistic content, particularly through digital technologies that enable unlimited reproduction and instantaneous availability, does not function merely as a technical channel of transmission, but as a mechanism of ideological interpellation, one that introduces, integrates, and positions the individual within a structure of passive reception and standardized cultural consumption. Reproduction in this context does not signify only the technical multiplication of the original, but also its systemic integration into flows characterized by continuity, rapid turnover, and the functional neutralization of meaning, leading to the perception of the artwork no longer as a singular object of experience, but as a serial content unit embedded within the logic of distribution.

Within such a configuration, the subject no longer approaches art as an event, as a space of active intellectual engagement but as an object of consumption, while the structure of perception is shaped by parameters dictated by availability, portability, and distributional efficiency. The role of viewers is thereby redefined: they become consumers of cultural material that has already been semantically pre-structured, temporally condensed, and aesthetically balanced to produce immediate satisfaction, but not cognitive or affective destabilization. In other words, ideological interpellation in this context does not operate through explicit repression, but through form, through a regime of representation in which artistic content is modified so as to lose what Benjamin designates as auraticity: spatial embeddedness, temporal irrepeatability, and ritual differentiation of access.

Instead of an artistic object that constitutes the subject, we encounter a series of cultural units that shape patterns of consumption, transforming the experience of art from hermeneutic to logistical, from contemplative to automated. In this context, mass distribution functions as an apparatus of cultural rationalization that selectively neutralizes the resistance of the image—its capacity to establish distance, to pose a demand, or to provoke a disturbance in perception—and instead organizes conditions in which viewing unfolds as a process without interruption, without intensity, and without the necessity of cognitive participation.

It should also be emphasized that, while Benjamin recognizes in the de-auratization of the artwork an ambivalent yet potentially emancipatory process, a process through which art is released from ritual enclosure and rendered accessible to collective experience, Adorno (together with Horkheimer) insists that this potential is already neutralized in advance by the logic of capitalist production, that is, integrated into the system of the culture industry, which does not employ reproduction in order to democratize perception, but rather to standardize, homogenize, and depoliticize it. For Adorno, mass reproduction does not dismantle, power hierarchies, but rather reshapes them into a subtler yet more effective form: artistic

contents are serialized, formally differentiated yet structurally identical, thereby producing what he designates as pseudo-individualization: the illusion of choice within a strictly delimited spectrum of the possible. Where Benjamin discerns the possibility that technically reproduced art might become a means of political articulation and collective perception, Adorno identifies a mechanism through which the subject is adjusted to the existing order, one in which the critical potential of art is displaced by its function of entertainment and relief, reproducing social passivity. The difference between these two approaches can therefore be understood as a distinction between dialectical hope and structural pessimism. Benjamin's understanding of technical reproduction remains open to historical contingency, to the possibility that media apparatuses might be deployed against their own internal logic, whereas Adorno proceeds from the assumption that the very form of mass culture is already inseparable from the relations of production that generate it. In this sense, the loss of aura in Benjamin signifies a transformation of the regime of artistic existence, while in Adorno the same process marks the definitive subordination of art to the laws of exchange, whereby the artwork ceases to function as a site of negativity and resistance and becomes a functional element of the cultural economy. This divergence reveals a crucial difference in their respective conceptions of the subject: in Benjamin, the subject still retains the possibility of an active relation to the reproduced image, the possibility of a political rearticulation of perception, whereas in Adorno the subject is already largely shaped by the very mechanisms of reception, formatted through the patterns of industrially produced culture. Mass distribution, accordingly, remains for Benjamin an ambivalent field of struggle, while for Adorno it assumes the character of a closed system in which the emancipatory potential of art is reduced to a minimum.

Within the hypermodern visual regime, this dispute between Benjamin and Adorno ceases to be merely a theoretical "old score" and becomes a description of everyday reality: images are no longer reproduced because they can be, but because they must circulate. Platforms, as infrastructures of visibility, assume the role once occupied by institutions of exhibition, only now the "site" of the image is neither the gallery nor the cinema but the feed, and its duration is no longer determined by the time of reception but by the rhythm of scrolling and micro-decisions of attention. In this sense, Benjamin's de-auratization today acquires an algorithmic version: aura is not lost solely through multiplication, but through the conversion of presence into metrics (reach, retention, engagement), where the "visible" is that which is statistically most likely to hold attention. Adorno's pseudo-individualization, by contrast, becomes almost literal: content personalization produces the illusion of singular choice, while in reality it operates through a standardized repertoire merely repackaged, according to profile, habit, and market-legible emotion.

The relationship between the artwork and technical reproduction thus forms a complex dialectical framework in which elements of transformation, loss, and potential redistribution of meaning appear simultaneously. Benjamin observes that the process of de-auratization does not necessarily lead to a complete impoverishment of aesthetic experience, but rather opens possibilities for its repositioning within the context of mass perception. By contrast, within the critique of the culture industry articulated by Horkheimer and Adorno, the same process is understood as a mechanism of cultural standardization, integrated into the logic of reproducing social domination. In both cases, technical reproduction cannot be treated as a neutral technology of transmission, but must be grasped as a factor that reshapes the ontological status of the artwork, the structure of its reception, and the position of the subject who encounters it. In this sense, contemporary regimes of visibility do not exhaust themselves in the mere availability of images, but generate new forms of relations to art, relations that no longer rest upon ritualized, spatially

defined encounters, but upon conditions of distribution, automation, and perceptual economy. The possibility of aesthetic experience under such conditions remains open, but is no longer guaranteed by form, space, or tradition; it depends instead on the configuration in which the image appears, as well as on the ways in which it is approached, used, interpreted, or ignored.

Theorizing the Rhizomatic Structure of Visual Culture

Precisely because contemporary regimes of visibility operate as networks of distribution, recommendation, and redirection of attention, analytical frameworks grounded in linear causalities and hierarchical "sources" prove insufficient (Deleuze and Guattari, 1987: 3–7). It is no longer a matter of an image "originating somewhere" and then "acting elsewhere," but of meaning being produced in movement through the linking of nodes, the interception of flows, and the overlapping of codes that are not neatly ordered by levels. In other words, if hypermodern visuality constitutes an infrastructure of circulation, then its understanding must likewise be networked. Here the rhizome emerges as an epistemological minimum: not as a metaphor, but as a means of mapping a culture that is no longer vertically organized, but laterally distributed, through flows, connections, and lines of flight.

In the analysis of contemporary visual and media practices, the concept of the rhizome, as articulated by Gilles Deleuze and Félix Guattari, introduces a productive epistemological distinction in relation to traditional, hierarchically structured models of knowledge. Opposed to the model of the "tree of knowledge", which rests upon the assumption of a stable foundation, vertical organization, and a logic of derivation, the rhizome functions as a structuration without center, without primary cause, and without teleological orientation. Within this framework, knowledge is not constructed from a single source toward ever higher branches, but expands horizontally, multidirectionally, and unpredictably, through a multiplicity of connected yet non-substantialized points. In the field of visual culture, rhizomatic logic enables a fundamentally different approach to structures of representation. Rather than proceeding from clear binary oppositions (image/reality, original/copy, author/viewer), the rhizome opens a space for analyzing flows that resist stable coding and cannot be reduced to linear causal patterns. Visual practice, in this context, is not understood as the outcome of a linear production of meaning, but as a domain in which meanings circulate through networks of affective, cultural, and technological relations that are not easily mapped or fixed.

The rhizome is not composed of static elements but of lines, more precisely, of three basic types of connectivity identified by Deleuze and Guattari: rigid lines of segmentation, flexible lines of destabilization, and lines of flight. The first type refers to structures that organize subjectivity and cultural production through stable binary oppositions – male/female, private/public, elite/popular – relations that are naturalized and maintained through the systemic distribution of power. The second type encompasses unstable, fluctuating connections that function as internal disturbances within rigid structures. These are not necessarily revolutionary, but they undermine the stability of identities and open spaces for overlap and ambivalence. The third type, lines of flight, designates flows that fully escape existing structures and open the possibility for the emergence of new forms of subjectivity, meaning, and practice. These are flows that do not seek to transform what exists, but to exceed it.

From a Deleuzo-Guattarian perspective, it may therefore be concluded that the application of rhizomatic analysis within the domain of contemporary visual culture entails abandoning stable categorical

frameworks and shifting the analytical focus toward processes of connection, networking, and displacement. The subject is not positioned as a stable point of perception or meaning, but as a temporary node within a network of affective and symbolic flows. Within this framework, the visual image no longer retains the authority of representation; rather, it functions as a point of passage, displacement, or interruption within a network of meanings that does not strive for closure, but for openness and continuous reorganization (Deleuze and Guattari, 1987: 13–25).

However, it is necessary to note that Manuel DeLanda's reading of the Deleuzian tradition (including the concept of the rhizome) enters a terrain in which philosophical topology is deliberately "lowered" to the level of material and social configurations. In this move, the rhizomatic ceases to function as a stylistic figure and begins to resemble an operational map for describing real assemblages: cities, markets, institutions, digital networks, logistics, technical standards, interfaces, affective regimes, everything that is usually separated into "technology" and "society" is reconceptualized as a composite assemblage in which heterogeneous elements are held together not because they were predesigned within a single overarching idea, but because, in practice, they become linked, stabilized, deteriorate, and are re-linked.

It is precisely here that DeLanda opens a particularly productive perspective on the rhizome: the rhizome is not merely a way in which meaning circulates, but a way in which social reality itself is composed—layer by layer, across thresholds, through changes in density and speed. In this sense, rhizomatic logic does not imply the absence of form; rather, it indicates that form emerges as the result of local connections and temporary stabilizations, rather than as the execution of a centrally designed schema. When translated into the field of visual culture, the image can thus be read as an event that is simultaneously aesthetic and infrastructural: it exists as content, but also as compression, format, distribution protocol, platform optimization, visibility metrics, archiving, and recommendation. These components are not secondary; they constitute the assemblage within which the visual becomes operative at all. DeLanda's style often appears colder, almost engineering-like, but it is precisely this analytical distance that proves useful in demonstrating that the rhizomatic is not merely a metaphor of "networks," but a set of real compositions of power, in which visibility is produced through technical and social parameters, and the subject emerges as a function of entry into an assemblage as a point through which flows pass, and as a point shaped by what the assemblage permits at any given moment (DeLanda, 2006: 4–5).

This rhizomatic sequence must be complemented by Brian Massumi's reflections, in which the rhizome is approached as an affective nerve. Here, philosophical topology is displaced into the register of micro-movements of attention, intensities, and transitions between perception and reaction. One of Massumi's key interventions lies precisely in this shift: the connection is no longer only semantic or informational, but also bodily and affective. Rhizomatic expansion thus does not consist merely in the multiplication of points, but in the multiplication of impulses, "triggers," and state-shifts, allowing the network to be read as a map of intensity variations rather than solely as a map of meanings (Massumi, 2002: 23–45; esp. 27–28, 35). Massumi consistently insists that affect is not the same as emotion, since emotion is already culturally articulated, named, and integrated into narrative form, whereas affect remains pre-narrative—fast, slippery, a transition that occurs before it can be captured in language. In this sense, the rhizome becomes a way of thinking visual culture as a continuous redistribution of intensities across images, sounds, frames, edits, notifications, rhythms of repetition and interruption. In the digital regime, this can be read through what is often trivialized as "scrolling": scrolling is not merely a movement, but a micropolitics of attention, continuous switching, brief suspension, and passage, in which not only content changes but the state of the subject itself. Massumi's contribution to the understanding of the rhizome can

thus be read as an insistence that the network is not a neutral "structure," but operates according to affective logics: it produces moods, shifts thresholds of tolerance, normalizes saturation, disciplines through excess, and guides the subject into a mode of constant "connection" with something that has not yet become thought. When Massumi speaks of mapping, it is not the mapping of stable entities, but the mapping of transitions, stumbles, accelerations, decelerations, jumps in intensity, and even lines of flight that need not be heroic, but may be small and almost imperceptible, yet still powerful enough to redirect attention, desire, and interpretation, without the need to be closed into a single "lesson" (Massumi, 2002: 23–45).

Along this line of inquiry, it is also important to engage the work of Sarah Kember and Joanna Zylinska, who approach media as processes rather than objects, or as a "living" ecology (in the sense of being dynamic and evolutionary). Their framework both extends and structurally consolidates the rhizomatic perspective precisely at the point where a reduction of media to tools or channels is to be avoided. Media become environments, and environments become active participants in the production of meaning. From this perspective, the rhizome can be read as a media ecology in which it is no longer possible to neatly separate "technology" from "culture," "image" from "distribution," or "subject" from infrastructure, since all of these instances emerge together, through mutual feedback loops. Kember and Zylinska insist that what is "new" in new media does not reside solely in devices or platforms, but in the reorganization of relations—in shifts in regimes of mediation, speed, accessibility, and in the transformation of how reality is experienced as being "mediated by default." Here, the rhizomatic acquires a quieter yet persistent dimension: connection is not spectacle, but the everyday infrastructure of life. Visual culture thus becomes the site where this infrastructure appears as habit, automatism, an economy of attention, and as the translation of experience into a format designed for circulation. Their contribution to rhizomatic thinking can be mobilized to show that visual culture does not emerge only within the "sphere of representation," but within media ecologies that operate through routines, availability, continuous readiness for production and sharing, and through the micro-protocols of everyday life (record, post, react, move on). In this sense, rhizomatic multiplication of connections need not be framed as the euphoria of multiplicity, but rather as a condition in which both ethics and aesthetics are displaced, since the question is no longer only what an image "means," but what it does, how it circulates, to whom it belongs, and how it shapes the subject who participates in its circulation (Kember and Zylinska, 2012: 1–6).

Postmodern Hyperreality/Simulacra

For the French theorist Jean Baudrillard, one of the defining features of postmodern society is simulation and hyperreality. More specifically, reality, in Baudrillard's framework, is always already mediated and reproduced, not merely as a technical fact, but as a structural condition of contemporary experience, in which the real does not appear "before" the sign, but is constituted through the regimes of its multiplication and circulation. Accordingly, Baudrillard defines the simulacrum as a copy of a copy, that is, a reproduced form detached from any relation to an original, which "stands on its own" and ultimately assumes the function of the original, replacing it as a reference point. The simulacrum is, therefore, reality without origin, hyperreality that, in Baudrillard's words, "substitutes signs of the real for the real itself," producing a condition in which reality is no longer measured against its source, but according to the operational plausibility and effects of its signs (Baudrillard, 1983: 4).

In this disposition, Baudrillard emphasizes that subjects are usually unaware of the degree to which simulation displaces and reshapes the relationship between the real and the hyperreal: the problem is not simply that "there are too many images," but that the very ontological difference between what is and what is represented gradually dissolves in favor of a regime in which representation ceases to be secondary and becomes primary. Virtual reality (in a broader sense: media- and technology-mediated realities) radically alters our conception of the world precisely because it introduces models of experience in which reality is not merely "followed" but pre-formatted, so that we live in a society where simulation of reality displaces the idea of "pure" reality, not violently, but through habit, availability, speed, and standardized perception.

In this context, the simulacrum becomes "true" not because it corresponds to reality, but because reality increasingly appears only in the form of simulacra: the world is saturated with signs and symbols in which the real is displaced by the hyperreal, and the difference between the actual and the imaginary becomes increasingly difficult to maintain, as both operate within the same semiotic and media regime. The consequence is that human experience increasingly takes the form of the simulation of reality, rather than an immediate relation to reality as such: what is perceived, remembered, and shared is not the event "in itself," but the event in its formatted, coded, and distributively prepared version. Simulation is closely tied to the development of mass culture, because mass culture does not stand "beside" reality as decoration, but produces the prevailing reality through patterns of visibility, recognition narratives, and symbolic schemes that guide attention, affect, and interpretation, so that hyperreality cannot be treated as mere illusion, but as an effective matrix of the contemporary social world (Baudrillard, 1983: 4).

Ergo, from Baudrillard's perspective, modernity no longer possesses the kind of "productive capacity" that once enabled the establishment of stable, teleologically and morally saturated referents in the name of the Enlightenment horizon, progress, humanity, emancipation, as endpoints of meaning that held the semantic order together. On the contrary, precisely when the real ceases to be a self-evident anchor (when one can speak of its disappearance/absence, or at least of its radical erosion), culture is pushed into a double constraint: either into full semantic nostalgia (an attempt to "restore" what has been lost), or into a panicked hypertrophy of the production of the "real", where reality is no longer found, but fabricated, enforced, multiplied, and confirmed through the regime of oppressive simulation of hyperreality, that is, an "inventable" reality that demands to be the only, total, and unquestionable one (Baudrillard, 1983: 9–13).

In this configuration, postmodern culture no longer operates through the classical branching into real and unreal, nor through the distinction between true and false representation, because representation itself disperses within a continuum of the simulacra: not "yes/no," but "more/less" perceptible, more/less convincing, more/less operational simulation freed from the "weight" of the real as an external criterion which floods the entire edifice of representation and turns it into a self-sufficient order of appearances. The image is no longer secondary to reality, nor is the appearance a mere defect of truth, but emerges as the only available "truth" to the extent that, outside the play of signs itself, there is no other external reference point that could guarantee veracity. Precisely because postmodern culture is no longer disciplined/limited/"constrained" by anything that could be registered outside itself, it breaks with representation per se—with the idea that representation must correspond to something external—and becomes unrestrained in constructing an invented universe without an external anchor, where the referent is not lost accidentally but is systematically superfluous: the real is not "mirrored," but substituted, and meaning derives not from origin, but from circulation and self-confirmation of signs.

If one were to position, relative to Baudrillard, an author offering the closest "critical antecedent", not in terms of identical concepts, but in the contextualization of revealing the same operative logic of contemporary/postmodern society, it would certainly be Herbert Marcuse. He analyzes, prior to Baudrillard, how reality is maintained not merely through force or ideology in the classical sense, but through the systemic production of needs, satisfactions, and interpretive frameworks that integrate the subject into the order by offering "freedom" as a format, rather than as rupture. In One-Dimensional Man, Marcuse is concrete: advanced industrial societies (and their later post-industrial forms) produce one-dimensionality as a narrowing of the horizon of thought and experience—society becomes "administered," rationality becomes techno-political, and conflict and negativity are neutralized through integration. This means that mass culture and media do not function as neutral representations of the world, but as mechanisms that standardize expectations and reinforce existing relations by differentiating between the "needs" the system demands from the subject and those that would lead to genuine liberation. Marcuse introduces a key distinction: false needs – those that are induced, that "come from outside" through advertising, consumer lifestyles, the entertainment industry, and social conformity – are not merely an economic category, but a media-affective infrastructure: they organize what we desire, how we desire, and what we consider "normal" pleasure, so that social stability is produced by keeping the subject continuously in a regime of satisfaction that simultaneously liberates and disciplines (Marcuse, 1964).

We consider it necessary, on a theoretically productive level, to add that the repertoire of primordial/archetypal human stories, what in the broadest sense is called myth, has by no means been exhausted in the alleged "rationalization" of the modern age. On the contrary, it continues to reactivate and redistribute itself extremely efficiently through pop-cultural narratives, serving as a kind of narrative reservoir for recognition, identification, and affective world-binding (Barthes, 1972: 109–156). Here, myth should not be understood as a "relic" of the premodern, but as a specific narrative configuration in which divine/heroic/mystical actors, together with their metaphysical plots and worlds, do not stand outside the "real" world as mere phantasmagoria, but share with it the same dynamic plane—so that myth functions as a semantic generator, adding a figurative logic to the real (order of trials, call, transformation, punishment/reward, return), thereby stabilizing social experience in the form of stories that are "understood" before they are rationally analyzed.

It is precisely for this reason that mythic themes, motifs, and components are widely present in media representation, in film, serialized programming, television formats, advertising, and commercial narratives, not as decoration, but as an operative script condensing complex social relations into shortcuts of meaning, transforming cultural values into recognizable figures and collective tensions into dramaturgical schemes. In this sense, myths continuously shape and reshape social life, its rituals, ceremonies, and institutional self-representations, enabling society to "narrate" itself through codes experienced as natural, self-evident, and emotionally compelling (Bart, 2019: 199–217).

In Bart's framework, the visual sign does not reflect natural reality, but encodes it retrospectively imposing cultural semantics, organizing the legibility of the world, and producing "evidence" through connotative regimes experienced as self-evident. However, the moment this Barthesian logic of codification (the image as an apparatus of meaning) moves from the relatively stable regimes of mass media into the extremely fluid architecture of electronic communication and digital networks, the code no longer remains merely a layer of meaning "over" the real, but becomes the operative infrastructure of the text itself: what for Barthes was the naturalization of meaning through myth and connotation is here radicalized as re-textualization—the text no longer exists only in relation to other texts, but is continuously reshaped within

the very process of networked circulation, where the boundaries between reading and writing, reception and production, author and user dissolve within the interface regime, and the text assumes a nomadic, variable form that persists only as a temporary configuration in the perspective of the reader.

However, once one moves from the Bakhtinian (Mikhail Bakhtin) premise that a text "exists" only in dialogical interaction with other texts, within a context where both anterior and posterior planes of understanding are opened, into the extremely fluid, electronically accelerated textuality of digital networks, this conjuncture ceases to be merely relational (co-presence) and becomes transformative. Intertextual contact no longer ends at "touch," but extends into reconfiguration: texts not only coexist within the networked milieu, but are re-textualized, rewritten/reconfigured as variable instances that dissolve across iterations of reading and use. For this reason, Epstein introduces the concept of the textoide as a virtual "nomadic" text – a text without a fixed ontological anchor outside the reader's perspective, in which the reader (under conditions of digital circulation) shifts from the position of interpreter to that of operator/co-author, so that authorship increasingly appears as a function of the interface rather than as a stable intention preceding the text (Bakhtin, 2010: 162; Epstein, 2012: 70–71).

Within such a regime of "text-as-protocol," a technological perspective in media analysis becomes not a supplementary optic but a necessary analytical ground—not because of any naïve celebration of technology, but because specific media (writing, the typewriter, film, television, the computer) are attributed with properties that generate concrete social and cultural consequences, primarily through their modes of operation and mediation, and only secondarily through the "content" that passes through those modes. In this respect, Jonathan Bignell is particularly useful in reminding us that media are not neutral channels, but cultural–technical forms that reorganize perception, rhythm, accessibility, and the boundaries between what is taken as message and what is taken as world. Here, technological agency undermines the distinctions required for critical distancing (self/other, medium/message, reality/representation), narrows the space of classical alienation and differentiation, and introduces a hybrid assemblage in which the human and the machine become increasingly difficult to separate as distinct instances (Bignell, 2000: 193–194). Within the same conceptual block, one can naturally situate the line of thought extending from Marshall McLuhan's formulation of the medium as the message, via Friedrich Kittler (media as the historical a priori of what can be said/seen/recorded), to N. Katherine Hayles (media and computation as frameworks that shape what counts as meaning, embodiment, and cognition) and Lev Manovich (digital textuality as a material–informational assemblage and as an algorithmic regime of selection) , for all of them, using different terminology, advance the same claim: in digital environments, text is no longer a "thing" but an event, and the event is no longer "outside the media" but emerges as a media-formatted reality.

Conclusions

After conducting the theoretical taxonomy, it becomes evident that the object of our inquiry cannot be adequately described either through a linear narrative of "epochal succession" or through the comfortable demarcation between "modern" and "postmodern" cultural forms, because the contemporary visual-media regime behaves as a field in which paradigms are not abolished but displaced—they transversally reconfigure, inscribe themselves into one another, and, crucially, change function. The postmodern no longer appears as a historically "former" configuration, but as an operative code that, in a hypermodern environment, performs an infrastructural role, enabling reality to be articulated as legible, shareable, and affectively convincing. Hence, the key affirmation of this study lies precisely in showing that visual culture

is neither a mere reflection of society nor a neutral channel of meaning transmission, but an apparatus that produces the conditions under which an event is recognized as an event, identity as identity, and the "real" as that which can be thought, experienced, and confirmed, where aesthetic, political, and technological dimensions are not separated but appear as interdependent layers of the same apparatus, in which the subject is not established as a sovereign interpreter but as a variable position within protocols of visibility, attention rhythms, and distribution regimes.

In this apparatus, traditional oppositions (real/unreal, original/copy, true/false, author/reader) are confirmed as not disappearing because they are "theoretically disputed," but because they become practically inoperative: contemporary reality is increasingly measured not against its origin, but against effects—whether something is sufficiently convincing, sufficiently stable in circulation, sufficiently compatible with already-formatted expectations and habits. The "real" is therefore not lost as a referent because it disappears, but because it is substituted by regimes of signs and images that assume its function, transforming reality into a continuum of operative confirmation and repetition. From this follows the study's second confirmation: social stability and the reproduction of order no longer primarily rely on explicit coercion or prohibition, but on the production of compatible needs, desires, and interpretive frameworks, on normalization that occurs through form, through rhythm, through the abundance of availability, continuous stimulation, and the feeling of choice within an already limited spectrum of possibilities. Culture thus functions as a mechanism that simultaneously liberates and disciplines, offering pleasure that alleviates tension while consolidating existing coordinates of experience, so that critical potential is not abolished frontally but amortized through overload, acceleration, and the habit of registering everything while retaining little as cognitive destabilization.

Hence, the final synthesis of the study can be formulated as the affirmation that the hypermodern visual regime does not constitute a "new age" in the sense of a clean break, but a new configuration in which postmodern poetics are refuncionalized as techno-ontological infrastructure: fragmentation, citation, pastiche, spectacularization, networked connectivity, and algorithmic attention management do not appear as aesthetic figures to be observed from a distance, but as operative units of culture that produce reality in its everyday, mass-mediated, shareable form. In this sense, visuality becomes the primary mode of cognitive and affective articulation of reality, not because "the image is more important than the word," but because the very structure of experience is reorganized through protocols of visibility, metrics of presence, and formats that determine what can be perceived, recognized, and used as "real." It is precisely here that the confirmation of our starting point is found: the postmodern has not ended, but has changed its mode of existence. It has ceased to be a historical label and become a functional code in a state of continuous mutation, a code which, in the hypermodern milieu, is not exhausted in "style," but operates as an infrastructure of mediation, as an apparatus that simultaneously organizes meaning, attention, affect, and social recognizability.

Conflict of interests

The authors declare no conflict of interest.

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Ince, E. (2025). Digital Platforms and Freedom of Expression: A Comparative Analysis of Turkey and Global Approaches. *Social informatics journal, Vol. 4, No. 2*, 73-79

UDC: 316.774:004.738.5]:340(560)
https://doi.org/10.58898/sij.v4i2.-73-79

Digital Platforms and Freedom of Expression: A Comparative Analysis of Turkey and Global Approaches

Esra Ince[1*]
[1] Ankara University, esraince@ankara.edu.tr

Abstract: The rise of digital technologies, particularly social media platforms, represents one of the most transformative societal shifts of the 21st century. While these platforms expand access to information and enable active participation in public discourse, they also present complex challenges for freedom of expression. Issues such as misinformation, hate speech, cyberbullying, privacy violations, and illegal content circulation highlight the limitations and responsibilities of digital platforms. This article examines the multidimensional impacts of digital platform regulations on freedom of expression, with a focus on Turkey's legal framework and comparative international approaches. The study explores the evolution of digital legislation in Turkey, including the Internet Law No. 5651, the 2020 Social Media Law, and the 2022 Anti-Disinformation Law. It further analyzes global regulatory models, such as the European Union's Digital Services Act (DSA) and Digital Markets Act (DMA), Germany's NetzDG, and the United States' Section 230. The paper emphasizes the critical role of platforms in shaping public discourse and calls for a nuanced understanding of the balance between state oversight, individual rights, and platform governance.

Keywords: Freedom of speech, digital platforms, social media regulation.

Introduction

The emergence of digital technologies, particularly social media platforms, has become one of the defining social transformations of the 21st century. The communication possibilities offered by the Internet have enabled individuals not only to access information but also to participate as producers and publishers in public debates. This development has led to the emergence of a multi-voiced, network-based public sphere beyond the unidirectional and limited structure of traditional media (Castells, 2009). Social media provides individuals with the opportunity to reach potentially global audiences, representing one of the most visible manifestations of freedom of expression in the digital era (Fuchs, 2014).

However, this new digital public sphere also introduces significant paradoxes. The rapid dissemination of misinformation, hate speech, cyberbullying, privacy violations, and illegal content has highlighted the limitations and responsibilities of digital platforms (Gillespie, 2018).

*Corresponding author: esraince@ankara.edu.tr

In this context, the regulatory efforts of states and international actors intersect directly with the boundaries of freedom of expression. While maintaining public order and national security is emphasized, states are simultaneously responsible for safeguarding fundamental rights and freedoms, creating a delicate balance (Balkin, 2018).

The rise of digital platforms has shifted freedom of expression debates beyond the traditional state-individual dichotomy. Issues such as content moderation, algorithmic biases, and transparency have become central components of the freedom-security balance. As Gillespie (2018) notes, platforms are not merely technical infrastructures but "gatekeepers" shaping societal norms and determining content visibility. This development necessitates a re-evaluation of Habermas's (2006) public sphere concept, and John Stuart Mill's (1859/2011) "harm principle" resurfaces as a framework to discuss what constitutes permissible expression in digital contexts.

In Turkey, legislation such as the Internet Law No. 5651, the 2020 Social Media Law, and the 2022 Anti-Disinformation Law exemplifies the tension between freedom of expression and state control (Akdeniz, 2021; İnceoğlu & Sözeri, 2022). These legal measures raise concerns about censorship and increasing tendencies toward self-censorship among users.

At the international level, the European Union's Digital Services Act (DSA) and Digital Markets Act (DMA), Germany's NetzDG, and the United States' Section 230 illustrate diverse approaches to balancing freedom of expression with digital regulation (Suzor, 2019). These comparative examples are critical for understanding how states manage the increasingly digital public sphere.

This article aims to examine the multidimensional impacts of digital platform regulations on freedom of expression. First, it addresses the historical and theoretical foundations of freedom of expression in the context of digital dynamics. Next, it analyzes the evolution of Turkey's digital legislation, discusses global regulatory approaches comparatively, and evaluates the content management practices of platforms.

Freedom of Expression Debates

Discussions on freedom of expression trace their intellectual roots to John Stuart Mill's seminal work, On Liberty (1859/2011). Mill's "harm principle" limits individuals' right to express themselves freely only when their actions directly harm others, forming the intellectual backbone of liberal democracies' freedom of expression regimes and protecting citizens from excessive state interference (Barendt, 2005). However, the digital age challenges the applicability of this principle. Rapid dissemination of misinformation, hate speech, and systematic cyberbullying on social media can threaten individual security and social cohesion without producing direct physical harm, necessitating a re-evaluation of Mill's classical liberal framework.

Freedom of expression is not only the individual's right to voice opinions but also a mechanism enabling citizens' participation in public discourse. Jürgen Habermas' "public sphere" offers a critical theoretical lens, viewing communicative freedom as an epistemic dimension of democracy (Habermas, 1989). The rise of the Internet and social media has prompted scholars to revisit this theory, recognizing the potential for increased participation and pluralism (Dahlgren, 2005; Habermas, 2006). Yet social media does not guarantee equal participation, with phenomena such as echo chambers and polarization eroding the public sphere's functions (Sunstein, 2017).

The focus of freedom of expression debates has shifted from state–citizen relations to platform–citizen relations. Social media companies now play a central role in defining digital speech. Platforms act

as "gatekeepers," shaping societal norms and content visibility through algorithms and community standards, often without transparency (Gillespie, 2018; Noble, 2018; Suzor, 2019). Consequently, considerations of freedom of expression must include both state regulation and private-sector content policies. Jack Balkin's (2018) "information fiduciaries" framework suggests that platforms should safeguard users' expression and privacy, aligning commercial practices with human rights responsibilities (UN, 2011).

In sum, the theoretical landscape of digital freedom of expression spans classical liberal principles, public sphere theory, platform capitalism, and human rights-based regulatory approaches.

Digital Platform Regulation in Turkey

Turkey's legal framework for Internet regulation began with Law No. 5651 on "Regulation of Publications on the Internet and Combating Crimes Committed Through These Publications" (2007), initially aimed at protecting children and preventing catalogued crimes. Over time, it became the primary legal basis for Internet censorship in Turkey, granting broad powers to the Telecommunications Authority (later BTK) to enforce access-blocking measures (Akdeniz, 2011; Altıparmak & Akdeniz, 2018).

The 2010s saw social media increasingly influence political communication, drawing state attention, especially after events like the Gezi Park protests (2013), the December 17–25 investigation (2013–2014), and the July 15 coup attempt (2016). Temporary restrictions on platforms such as Twitter and YouTube highlighted Turkey's challenges regarding digital freedoms (Yesil, Sözeri, & Khazraee, 2017).

The 2020 Law No. 7253, commonly known as the Social Media Law, amended Law No. 5651 by requiring platforms with over one million daily users to appoint a representative in Turkey, imposing advertising bans and bandwidth reductions on non-compliant platforms. Mechanisms to remove or restrict content for privacy or personal rights protection were strengthened. Although the government justified these regulations as protecting users' rights, academics and civil society viewed them as enhancing state control over platforms and restricting freedom of expression (Akdeniz & Altıparmak, 2020; İnceoğlu & Sözeri, 2022).

The 2022 Anti-Disinformation Law further introduced Article 217/A into the Turkish Penal Code, criminalizing the public dissemination of false information intended to cause public fear, panic, or threaten national security, public order, or health, with imprisonment ranging from one to three years. Critics argue that vague language and potential criminalization of journalistic reporting raise serious freedom of expression concerns, resulting in increased self-censorship (ARTICLE 19, 2022; Human Rights Watch, 2022; İnceoğlu & Sözeri, 2022).

These regulations illustrate the narrowing of the public discourse space in Turkey, shifting from merely protecting citizens from digital harms to actively restricting debate. Scholars argue that Turkey's Internet policies have become increasingly authoritarian, using freedom of expression as a tool of control rather than protection (Yesil, 2016; Akdeniz, 2021). The European Court of Human Rights has condemned certain access-blocking practices as violations of freedom of expression (Ahmet Yıldırım v. Turkey, 2012).

Overall, Turkey's digital platform regulations exemplify the tension between state control and freedom of expression, highlighting critical debates over democratic participation and the governance of digital public spaces.

Global Comparative Perspective

The relationship between digital platforms and freedom of expression can be understood not only within universal norms but also through the comparative analysis of different political systems and cultural contexts. Globally, liberal democracies tend to prioritize the protection of free expression, whereas authoritarian regimes emphasize control, censorship, and surveillance (Freedom House, 2023). This divergence results in the same platforms functioning under entirely different roles and constraints depending on the country.

In the United States, freedom of expression enjoys one of the strongest constitutional protections. The First Amendment significantly limits government interference in speech (Barendt, 2005). Nonetheless, the role of social media companies as private actors in content moderation raises concerns about whether platforms act as "new censors" (Klonick, 2018). For instance, the permanent suspension of Donald Trump's accounts on Twitter and Facebook following the January 6, 2021 Capitol riot demonstrated the influence of private companies on democratic processes and their determinative role over freedom of expression.

In the European Union, freedom of expression is approached with a more balanced perspective, integrating limitations on hate speech and disinformation. The European Court of Human Rights (ECHR) protects expression while legitimizing restrictions on speech that incites discrimination or violence (Mendel, 2012). Recent legislation, such as the Digital Services Act (DSA), aims to enhance platform accountability, transparency, and alignment with public interest principles (Helberger, Pierson, & Poell, 2018). The EU thus exemplifies a framework that safeguards individual rights while promoting public oversight of the digital ecosystem.

In Turkey, debates around freedom of expression on digital platforms are largely shaped by state interventions and regulatory measures. Law No. 5651, the Internet Law, expanded state control over online expression by imposing obligations on social media platforms to remove content and establish local representatives (Yesil, Sözeri, & Khazraee, 2017). Access restrictions and content censorship on platforms like Twitter and YouTube have repeatedly reshaped the digital public sphere in Turkey. Despite these limitations, social media remains a critical tool for expression among opposition groups, activists, and civil society (Topak, 2019).

The Asian context, particularly China and India, provides additional insights. In China, social media platforms are entirely under state control, with services like WeChat and Weibo tightly regulated and censored by government mechanisms (MacKinnon, 2011). This exemplifies how freedom of expression can be severely restricted under the pretext of state security. In India, despite a democratic framework, government pressures on Twitter and WhatsApp indicate a gradual contraction of digital freedoms (Arun, 2019).

A global comparative perspective demonstrates that while digital platforms offer new avenues for freedom of expression, the scope of this freedom is shaped by each country's political regime, legal system, and cultural values. Consequently, the issue of "freedom of expression and digital platforms" is not merely technological; it intersects with political power, economic interests, and societal norms.

Turkey in Comparative Perspective

In Turkey, freedom of expression debates have acquired a new dimension with the rise of digital media and social networks. Longstanding state interventions, censorship, and licensing mechanisms in traditional media have extended into the digital sphere. Despite being one of Europe's leading countries in Internet usage, Turkey occupies a limited position in global freedom of expression rankings.

The 2020 Social Media Law, amending Law No. 5651, increased state oversight of digital platforms. It required social network providers operating in Turkey to maintain a local representative and comply with content removal and data storage obligations (Kurban & Sözeri, 2020). While these measures expanded governmental control over social media companies, international human rights organizations have criticized them as restrictive of freedom of expression (Human Rights Watch, 2020).

Social media platforms in Turkey are frequently restricted under the pretext of "public order" and "national security," contrasting with global examples. Germany's NetzDG law, for instance, mandates the removal of hate speech and illegal content, whereas Turkish regulations are broader and more ambiguous (Yılmaz, 2021). Internet access is also often curtailed during political crises, such as post-2016 coup attempt restrictions and bandwidth throttling during the 2023 elections (Yesil, 2016; Freedom House, 2023). Compared to European Union countries, Turkey's approach is less transparent and offers fewer judicial safeguards.

Another distinctive aspect of Turkey is the high engagement of young people in using social media for news consumption and political participation. According to We Are Social (2023), over 80% of Turkey's Internet users are active social media users. However, Freedom House (2023) categorizes Turkey as "not free" in its Freedom on the Net report, illustrating the tension between the democratic potential of digital media and authoritarian tendencies.

Overall, Turkey's approach to social media regulation is influenced by both global trends and domestic political structures. In this respect, Turkey's digital governance practices resemble more centralized, state-first models like China or Russia rather than rights-based European approaches. This positioning directly impacts Turkey's international image concerning freedom of expression.

Discussion and Conclusion

Digital platforms play a central role in shaping freedom of expression and democratic participation in the 21st century. The Internet and social media have enabled individuals to amplify their voices on a global scale, elevating freedom of expression to a dimension markedly different from previous historical periods. At the same time, these spaces present new challenges, including disinformation, hate speech, cyberbullying, and self-censorship. Global comparisons reveal that the protection or restriction of digital freedoms largely depends on the political and legal frameworks of each country. In the United States, strong constitutional protections and the relative independence of the private sector coexist with the EU's rights-based regulations and transparency mechanisms, while countries such as China and Russia prioritize state control and surveillance. Turkey occupies a unique position within this spectrum, influenced both by Europe's rights-oriented approaches and by authoritarian tendencies that are increasingly reinforced through digital platforms.

In the Turkish context, Law No. 5651, the 2020 Social Media Law, and the 2022 Disinformation Law have become key instruments for enhancing state oversight of the digital public sphere. While these laws have the potential to limit freedom of expression, they are legitimized under the rationale of protecting

user rights. As emphasized in the academic literature and civil society reports (Akdeniz, 2020; İnceoğlu & Sözeri, 2022), the ambiguous wording of the legal framework increases the risk of censorship and self-censorship, constraining democratic participation. Young and active social media users, although capable of exercising freedom of expression, often limit their online behavior due to prevailing legal and political pressures.

In a global comparative perspective, Turkey's approach illustrates the precarious balance between protecting freedoms and expanding state oversight. In European cases such as Germany's NetzDG, regulations are relatively transparent and subject to judicial review, whereas in Turkey, broad and discretionary implementation poses significant risks to democratic standards. In the United States, restrictions on freedom of expression apply only in exceptional circumstances, with platform self-regulation generating a distinct dynamic from state intervention. Turkey's digital governance approach occupies a hybrid position between Europe's rights-based models and the US's market-oriented framework, increasingly trending toward authoritarianism.

At the same time, digital platforms themselves exert a decisive influence over freedom of expression through content moderation and algorithmic governance. Algorithmic biases and opaque moderation processes shape the expression space beyond state interventions, directly affecting democratic participation and pluralism (Gillespie, 2018; Suzor, 2019). This situation raises new debates in light of Mill's classical harm principle and Habermas's public sphere theory: safeguarding freedom of expression is now not only a matter of state regulation but also of the algorithmic and political management by private actors.

From a policy perspective, several strategies can help secure freedom of expression in Turkey's digital sphere. First, legal regulations should be implemented transparently and proportionately to prevent arbitrary access restrictions. Second, platform representation should function not only as a formal obligation but also as an effective mechanism for safeguarding user rights. Third, multi-stakeholder governance models involving civil society and academic actors could establish a more balanced framework between freedom of expression and public order.

In conclusion, freedom of expression in the digital age represents not only the right of individuals to voice their opinions but also an indicator of democratic participation, rule of law, and social equity. The Turkish case provides a striking illustration of both the democratic potential and authoritarian risks of digital platforms. Comparative analysis with global examples demonstrates that strategies for protecting freedom of expression must encompass not only legal regulations but also transparency, algorithmic accountability, and user-centered policies.

Conflict of interests

The authors declare no conflict of interest.

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UDC: 338.46:008

https://doi.org/10.58898/sij.v4i2.80-85

Creative Cities as Initiators of Cultural Transformation from the Aspect of Creative Industries

Nada Torlak[1], Maja Vojinović[2*], Tatjana Davidov[3]

[1] The Faculty of culture and media, Belgrade, Megatrend University, Belgrade

[2] The Faculty of management, Sremski Karlovci, University „Union-Nikola Tesla“, Belgrade, vojinovic@famns.edu.rs

[3] College of Academic Studies Dositej, Belgrade, tatjana.davidov@vsdositej.edu.rs

Abstract: Through the prism of various aspects that shape modern society, creative industries stand out as key factors of economic and cultural transformation. Their vitality is reflected in their ability to push the boundaries of innovation, thus enabling market success and shaping our everyday lives. Creativity is an essential component of market success, because it brings new ideas, opens new horizons and enables competitive advantages. Through the process of creation and innovation, creative industries not only generate wealth, but also influence social change, setting new standards and shaping the cultural landscape. In today's context, innovation and courage are necessary to face global challenges. Creative industries are becoming a center for finding solutions to complex problems and developing creative cities. Their ability to generate original ideas and find new approaches brings hope for a better future.

Keywords: creative cities, culture, creative industries, transformation.

Introduction

Culture plays a key role in the development of industry, which has always been encouraged through civilizations. Today's societies support innovative cultural practices, and cities strive to create spaces for cultural activities.“ In addition to people who are experts in their fields and who have no problem to indulge their creativity in order to give birth to a completely new way to enter the market, communication channels certainly have a special place“ (Vojinović, Jevtović, 2023, p.127). Communication within economization is an essential part of culture.

*Corresponding author: Maja Vojinović, vojinovic@famns.edu.rs

Economization of art changes the functioning of cities, making blocks centers of creativity and more

attractive for social activities, while the concept of the creative city offers new models of urban development, „especially in countries which go through certain sort of transition, towards better social order“ (Donev, Vojinović, 2022, p.274). Globalization brings art from private galleries into public spaces, inevitably commercializing it. Creative people are looking for a rich social life, and support for creative society which is based on Talent, Technology and Tolerance (3T system), (Florida, 2014). The creative city model focuses on the use of space for the affirmation of certain values, whereby the dynamism and adaptability of space is key to the evolution of cultural and social values.

The implementation of strategies for the development of creative industries is often lacking, and young and educated residents leave the cities. Creating an attractive environment that retains talent is key to the development of creative industries. Cities are attractive to the profit-seeking private sector, creating a dilemma between renovating old areas and buildings into new parts of cities or retaining old structures.

European Vs American urbanism

American urbanism often lacks cultural patterns valued in Europe. The mayor of Los Angeles proposes that big corporations fund poor neighborhoods, thus promoting corporate branding and social responsibility.

Creative cities have the economic potential to help less developed areas, as Manchester's transformation into a world music center shows. Also, Novi Sad has become a world music center thanks to the Exit festival. People from all over the world come to the festival and in this way the potential of a creative city is developed. Recognizability of cities through cultural events, festivals and sports competitions becomes crucial, while the diversity of cultural content creates the city's identity.

The European model of urban planning emphasizes the preservation of cultural heritage, requiring a balance between economic and cultural interests. Aligning regulations with the urban context is challenging, and inefficient use of construction land can threaten the city's authenticity and creative atmosphere.“ Sometimes ethical ideas, written and prescribed in normative acts, are inappropriate from the aspect of the possibility of practical implementation, and sometimes the norms from the code are not realized for other reasons“ (Donev, Vojinović, 2022, p.285). Political leaders and experts, along with the active involvement of state institutions, are key to designing the concept of a creative city. Cooperation between the public and private sectors is necessary for successful implementation. The action of public „can be active or passive, proactive or retroactive, deliberate or thoughtless, but always with the goal of causing some reaction“ (Vojinović, 2022, p.33-34). Economization of art and culture changes the way cities function, while creative entrepreneurship increases their attractiveness. Globalization emphasizes the uniqueness and inimitability of space, while in America urbanism differs from the European approach. Creative cities are becoming key centers for artists and cultural activities, providing support and space for their development. Through creative industries, cities have the opportunity to thrive and attract the attention of the global public. They compete more and more for recognition, becoming hosts of various cultural events and institutions

The analysis of creative and cultural industries requires a systematic approach, using consistent methodologies and objective data to understand the value chain, cross-sectoral linkages and the role of public and private actors, taking into account challenges such as the valuation of culture, technological change and competition in distribution.“ The creative industries idea recognizes that issues of economics

(production) and audience (consumers) are important to understanding creativity (content), and that each of these areas plays a causal role in all the others“ (Hartli, 2007, p.56). Public policies play an important role in the development of creative industries, serving as facilitators that provide infrastructure, financing, intellectual property protection and export promotion, while simultaneously establishing creative clusters and developing instruments to measure the contribution of creative industries to economic development. „The audience is represented by a group of people, from broad social masses, who act individually from their own intellectual and cultural aspect“ (Vojinović, 2022, p.33).

In this context, the government should create a favorable environment and infrastructure that will encourage creative capacities, while entrepreneurs promote creative entrepreneurship and establish connections with artists and the creative sector. Thus, civil society has a role in forming strategic alliances and encouraging interaction among all relevant actors. „The creative industry has advanced to the point that everything that is necessary to have, in order to work, is a concept of what one wants to talk about, telephone, internet connection and of course, indispensable creativity“ (Vojinović, Jevtović, 2023, p.126).

The spirit of the creative city

Creative people are key to shaping a rich social life, and the key elements of a creative atmosphere are talent, technology and tolerance (Florida, 2014). The creative city model does not rely only on physical space, but also on the values and identity of the city, and it is important to initiate different models that follow development and improvement, creating attractive and dynamic urban environments. Belgrade is a magnet for all of Serbia. In many cities of Serbia, there is a lack of practical implementation of strategies for the development of creative industries. Most young, educated people without creative opportunities do not want to stay in their cities. The first step towards solving this problem is emphasizing the identity of cities and raising their image.

The connection with the native environment has deep-seated roots in one's emotional and mental being. It is not just a matter of geographic location, but a complex network of emotional connections, memories, experiences and identities. Someone's birthplace is the place where one has formed his first connections with the world, where one has gone through important life events, shaping attitudes, values and identity. Therefore, it is natural that one person strives to remain connected to his native environment, because it represents a part of himself, a part of identity and spiritual heritage. It is like returning to the basic sense of belonging and security that one has had in the youth, even though a lot may have changed.

In this sense, the spirit of a creative city represents a challenge for young talents who, with their originality, paint walls of facades, paint murals and memories of people who once created and worked in that city. Urban units are zones of good taste, in accordance with the trends and challenges of the new age. On the other hand, the rural areas have a certain old structure within, a reflection of times long gone, but equally challenging and enriched with creative energy. Creative energy leads young artists into the spheres of research, search for new solutions, innovations, models, it breaks down barriers and does not recognize limitations. Creative power is spiritual and creates works of inestimable value, it does not belong to the materialistic world, „naked“ matter. It is the essential and valuable force of every cosmopolitan city that nurtures spirituality.

Planning methodology

Cities face the dilemma of whether to reconstruct devastated areas or build completely new parts, which reflects the conflict between the preservation of cultural and historical heritage and the need for economic development. The institutions of the system are striving to preserve the old core, precisely because of cultural and hereditary factors, due to the fact that culture, tradition and heritage present key factors in preserving the national identity of a country. Aligning the interests of different parties is a challenge, especially in terms of adequate land use. It is important to establish an effective planning methodology and control the implementation of plans in order to preserve the concept of a creative city. „If the ideas in the codes are set and formulated so abstractly that they do not inspire and motivate concrete and active action in that area, as well as objective judgment of such action“ (Donev, Vojinović, 2022, p.285), then the lack of diversity in the use of construction land and the lack of authenticity of space require changes in urban practice and legislation to solve problems in this area.

One good example of great creative structure is the airport in the city of Doha, in the state of Qatar. It represents a unique architectural achievement that integrates exterior and interior in an extremely functional and aesthetically appealing way. Its size and functionality create the impression that you are outside, while the interior space offers the comfort and practicality of a modern airport. A huge interior garden with beautiful plants and lighting creates a pleasant atmosphere, while the possibility of sleeping makes the wait for the flight even easier. The train inside the airport enables fast movement through the space, and the big bear is a recognizable point for orientation. All this makes the Doha airport not only functional, but also a pleasant place to spend time, creating an extremely positive experience for passengers. In addition to an impressive indoor garden and practical facilities such as sleeping and smoking rooms, Doha Airport also offers a wide range of restaurants, shops and entertainment facilities to give passengers a complete experience while waiting for their flight. Modern architecture, high level of service and carefully designed details make this airport not only a transit area, but also a destination in itself. Modern architecture, high level of service and carefully designed details make this airport not only a transit area, but also a destination in itself. Architecture represents the fundamental basis of the creative industry, shaping the space and environment that inspires, encourages innovation and enables the development of various artistic and creative fields. It not only provides functionality and aesthetic appeal, but also creates a platform for cultural interaction, social engagement and economic prosperity.

Culture, industry and education

Culture represents a vital element in the progress of any society, stimulated and supported throughout the centuries by different civilizations. In today's world, it is becoming increasingly important that the whole society actively participates in encouraging innovative cultural practices and forming cultural attractions in their cities. Creative cities are becoming centers of art and culture due to globalization and development. Art is moving from galleries to public space, while the commercialization of art inevitably imposes itself. This development attracts visitors and improves the urban environment, highlighting the importance of innovation and openness to change, (Florida, 2014).

Creative industries are a source of artistic reality and value, uniting diverse arts with market appeal, freedom of thought, innovation and ideas. Risk is necessary for success, both economically and culturally, because it challenges us to dig deeper into the information we receive. It takes persistence, intelligence, toughness and curiosity to better understand and embrace new forms of creativity, innovation and ideas,

ensuring that new creations thrive and reach their full potential. In the future, we should be able to set our own working hours, realizing that excess time can be wasted. We should aspire to creative occupations, because we believe that the development of creativity is crucial for every individual. It should be accompanied by support and changes in the educational system that should be transformed into a better, more modern framework, instead of stifling our creativity. It is necessary to modernize the traditional education system in order to preserve and encourage creativity among students. The current educational model often stifles individuality, and instead should strive to create a better, more inclusive environment that encourages teamwork while nurturing authentic identity and critical thinking. This would strengthen the positive aspects of human interactions, preventing the emergence of negative emotions such as anger and hatred towards others, thus preserving the desire to create and encouraging the continuous development of creativity.

Conclusion

Creativity is at the core of human progress and innovation, playing a key role in the development of societies, industries and individuals. It enables the creation of new ideas, solutions and approaches that improve the quality of life and promote economic growth. Throughout history, creativity has been an essential part of art, science, technology and culture, connecting people and ideas in ways that have changed the world.

Creativity also promotes cultural and social development. Culture and the arts enrich our lives, providing us with ways to express, connect and understand different perspectives. Cities that nurture creative industries become vibrant hubs of innovation, attracting talent and „fueling“ economic growth. Through creative projects and events, communities come together, strengthening social cohesion and identity.

One may conclude that the development of creative cities requires the involvement of politics and educated experts as initiators of improvements. The main step is to activate state institutions and adopt a national strategy for the operationalization of goals. This requires community support and detailed regulatory plans to ensure success and progress. Connecting public and private interest is necessary. People need to think about all the possibilities, advantages and changes in the urban space, where the creative industry can be the key to realizing these changes.

Ultimately, cultural transformation is a process of deep and lasting changes in the culture of an organization, community or society. It includes changes in values, beliefs, habits, behaviors and ways in which people cooperate with each other and make decisions. In the social context, it can be the transition of a society from traditional values to more modern ones, changing attitudes towards technology, education, gender roles, etc. Cultural transformation is a way of life.

Conflict of interests

The authors declare no conflict of interest.

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Njegovan Gužvica, M., Šišaković, T. & Bajac, M. (2025). Between Personalization and Surveillance: the Influence of Digital Marketing on Modern Consumers. *Social informatics journal, Vol. 4, No. 2*, 86-97

UDC: 658.8:004.738.5]: 659.113.25

https://doi.org/10.58898/sij.v4i2.-86-97

Between Personalization and Surveillance: the Influence of Digital Marketing on Modern Consumers

Milica Njegovan Gužvica[1], Teodora Šišaković[1] , Momčilo Bajac[1*],

[1] Faculty of Management, University Union Nikola Tesla, Serbia, momcilo.bajac@famns.edu.rs, teodora.sisakovic@gmail.com, milica.njegovan@famns.edu.rs

Abstract: This study examines the impact of digital marketing on consumer behavior and broader social processes, focusing on the role of digital platforms, algorithms, personalization, influencer marketing, and peer recommendations. A quantitative and descriptive approach was employed using an online questionnaire consisting of thirty questions organized into eight thematic sections, distributed in November 2025 to a sample of 130 respondents, primarily younger adults actively using the internet and digital platforms. The results indicate that respondents are aware of personalized advertisements and data collection practices, and those with higher awareness of data processing are more likely to perceive that algorithms influence their purchasing decisions. Peer recommendations, such as reviews and comments, were found to have a stronger influence on purchasing behavior than influencer promotions, highlighting the importance of perceived credibility and authenticity. The study also reveals that personalization and algorithmic content selection shape consumer engagement and trust, raising ethical concerns regarding privacy, surveillance, and the balance of power between platforms and users. These findings suggest that digital marketing is not only a commercial tool but also a social phenomenon that affects decision-making, information interpretation, and social norms. Future research should explore long-term effects of personalized content, cultural and demographic variations, and the impact of regulations and ethical standards on user perception and platform behavior.

Keywords: digital marketing, consumer behavior, personalization, privacy.

Introduction

The development of the internet and digital technologies over the past three decades has brought significant changes in the ways people communicate, access information, and make purchasing decisions. In this context, digital marketing has become a key component of the economic and communication infrastructure of modern society, where algorithms, personalization, and the datafication of human behavior shape decision-making processes.

*Corresponding author: Milica Njegovan Gužvica, milica.njegovan@famns.edu.rs

This paper, combining theoretical and empirical approaches, examines the impact of digital marketing on consumer behavior and broader social processes. It focuses particularly on the role of digital

platforms, algorithms, and targeting models, as well as on how personalization, influencer marketing, and peer recommendations influence purchasing decisions.

To this end, an empirical study was conducted using a survey questionnaire to assess the extent to which respondents notice personalized advertisements, how much they trust them, how they perceive digital recommendations, and to what degree digital marketing affects their consumer habits. The significance of this study lies in providing insight into contemporary behavioral patterns in digital environments and contributing to a better understanding of the relationship between technology, marketing, and society.

Theoretical Background: Digital Society and Surveillance Capitalism

The digital society represents a contemporary stage of social development in which digital technologies, data, and algorithmic systems become key intermediaries in almost every aspect of social life. Its development has been marked by the transformation of the internet from a relatively open, decentralized network based on information exchange into a global, highly commercialized infrastructure dominated by large digital platforms. In this environment, users' digital interactions are increasingly viewed as sources of economic value rather than merely as means of communication or access to information.

Shoshana Zuboff conceptualizes this new socio-economic order as surveillance capitalism, which she defines as "a new economic order that unilaterally claims human experience as free raw material for translation into behavioral data" (Zuboff, 2019). Unlike industrial capitalism, whose primary raw materials were nature and human labor, surveillance capitalism relies on human experience—users' digital activities, emotions, locations, habits, and choices. These data are not used solely to improve services but to build predictive models that anticipate and guide future behavior.

Such a system generates a pronounced asymmetry of knowledge and power: while digital companies possess detailed insights into user behavior, users themselves have limited understanding of how their data are collected, processed, and utilized. Zuboff emphasizes that this structure is "fundamentally anti-democratic", because "they know everything about us, while we know almost nothing about them or what they know" (Zuboff, 2019). Digital platforms, therefore, do not remain neutral intermediaries but act as active agents shaping perceptions, preferences, and behavioral patterns within the digital environment.

Platforms as the Infrastructure of Digital Marketing

Platform companies such as Google, Meta, and Amazon occupy a central position in the contemporary digital ecosystem, managing the technical infrastructure, information flows, and content visibility. These platforms function as "gatekeepers," algorithmically determining which content users see, in what order, and in what context, thereby directly influencing patterns of attention and preference (Asadullah et al., 2018). Thanks to network effects and the accumulation of vast amounts of data, platform companies have become highly indispensable actors within the digital society (Neittaanmäki et al., 2016).

Within this system, digital marketing increasingly relies on automated, predictive, and personalized decision-making mechanisms. As Dwivedi et al. (2021) emphasize, the future of marketing is closely linked to algorithmic targeting, real-time optimization, and the adaptation of user experiences in real time. Platforms thus do not merely mediate between brands and consumers; they actively shape the conditions under which these interactions occur.

The Evolution of Marketing under Surveillance and Datafication

Transformations in marketing have occurred alongside changes in the ways data are generated, processed, and utilized in digital media. The shift from the early internet, characterized by limited interaction, to the Web 2.0 environment of social networks and platform mediation has led to the mass datafication of users' everyday activities. In this context, marketing ceases to be a separate communication tool and becomes part of a broader technological infrastructure that directs and monetizes user attention (Dhir, 2020).

These changes manifest concretely through modern digital advertising mechanisms such as cookies, tracking pixels, and script codes, which allow for detailed analysis of user behavior, including searches, interaction duration, and content viewing history. Linking activities through unified accounts and continuous data from mobile devices enables the creation of coherent user profiles, while advertising is delivered through automated real-time bidding systems. In this way, marketing becomes part of a predictive infrastructure that optimizes content delivery according to the estimated likelihood of desired user responses (Mukhtar et al., 2023).

Legal Considerations in Digital Marketing

The widespread collection and processing of personal data in digital marketing raise significant legal and regulatory concerns. Privacy rights, consent, and data protection are central issues, as users often have limited understanding of how their data are collected, stored, and utilized. In many jurisdictions, legal frameworks such as the General Data Protection Regulation (GDPR) in the European Union establish obligations for transparency, accountability, and user control, requiring companies to inform users about data practices and obtain explicit consent for processing personal information (European Parliament and Council, 2016). These regulations aim to mitigate the power imbalance between digital platforms and individuals, ensuring that personal data are handled ethically and legally.

Beyond privacy, legal considerations also involve issues of consumer protection, algorithmic transparency, and liability. As digital marketing strategies become increasingly automated and predictive, the potential for manipulation or unfair targeting grows, raising questions about the limits of acceptable corporate influence on consumer behavior (Regulation (EU) 2016/679; European Data Protection Board, 2020). Ensuring compliance with legal standards requires not only adherence to existing regulations but also the development of new frameworks that address emerging challenges in algorithmic decision-making, targeted advertising, and cross-border data flows. In this context, law functions as a critical mechanism to safeguard individual rights and maintain trust in the digital ecosystem.

Brand Perception in the Digital Society

In the context of platform-mediated environments, brand perception is shaped through algorithmically controlled visibility and continuous interaction with users. A brand no longer functions as a static symbol but as a dynamic and adaptive system that evolves through personalized communication, data analysis, and learning from user interactions (Pascucci et al., 2023). Digital platforms play a key role in shaping brand identity, as they determine which messages, products, and content even have the opportunity to be seen (Srnicek et al., 2021; Asadullah et al., 2018).

At the same time, reviews, peer recommendations, and user-generated content become important factors in forming brand reputation and influencing purchasing decisions. Digital marketing impacts all stages of the consumer journey, from initial information gathering to post-purchase loyalty, where consumers increasingly act as co-creators of brand identity, while marketing tools function as mechanisms to orchestrate and amplify their voices (Mukhtar et al., 2023; Masfer et al., 2025).

Influencer Marketing as a Specific Form of Digital Influence

Influencer marketing represents a specific form of digital marketing that relies on social media, personal branding, and the dynamics of online communities. Instead of institutional authority, the key factor is the perception of authenticity and closeness that influencers cultivate with their audiences. Their influence is based on parasocial relationships, through which users develop one-sided emotional bonds with digital personalities, while the boundary between private and commercial content increasingly blurs (Nuseir, 2016).

Beyond commercial effects, influencers can play significant positive social roles, such as disseminating information of public interest and fostering a sense of belonging and support, particularly among younger and marginalized groups. However, their influence also carries serious risks, especially in the promotion of risky behaviors, idealized lifestyles, and non-transparent sponsored content. These risks are further amplified within the broader framework of surveillance capitalism, where "behavioral surplus" is used to predict and shape future consumer decisions (Zuboff, 2019). Therefore, understanding the real impact of influencers and personalized digital marketing is only possible through empirical investigation of user perceptions and experiences.

Research Design and Methodology

The study was conducted using a questionnaire consisting of 30 questions divided into eight thematic sections, aligned with the theoretical framework of the paper. The aim was to examine the impact of digital marketing on consumer behavior and purchasing habits, with particular attention to personalized advertisements and peer recommendations.

A total of 130 valid responses were collected through an online questionnaire created using Google Forms during November 2025, employing a random sampling method. The questionnaire was distributed via personal contacts and the Instagram social network, with respondents primarily younger adults who actively use the internet and digital platforms, reflecting the real environment in which digital marketing is most intensively applied.

The research methodology was quantitative and descriptive. The instrument was a standardized questionnaire with closed-ended questions, designed to facilitate completion and enable clear statistical analysis. The questions were organized into eight sections: basic demographic information, purchasing habits, perceptions of personalization and algorithms, digital marketing, influencer marketing, peer recommendations, privacy and surveillance, and expectations regarding future trends.

Data were analyzed both descriptively and statistically: the chi-square test of independence was used to examine relationships between categorical variables, while McNemar's test was applied to compare paired categorical data.

Results

Regarding socio-demographic characteristics, 66.2% of the participants in the study were female, while 33.8% were male. These results are consistent with findings from numerous online surveys, where women tend to participate slightly more frequently in studies related to consumer habits and digital media. In terms of age groups, the largest proportion of respondents belonged to the 25–34 age range (65.4%), followed by 18–24 years (17.7%), 35–44 years (14.6%), and the smallest proportion was in the 45–54 age group (2.3%). Older age groups, 55–64 and 65+, were not represented in the sample. This indicates that the study results primarily reflect the experiences of the working-age generation that grew up with the internet and digital media.

With regard to the frequency of online shopping, the largest percentage of respondents indicated that they shop online rarely (1–2 times per month), accounting for 46.2% of the sample. A slightly smaller proportion reported shopping occasionally (3–4times per month), while 13.9% shop frequently or very frequently online (once a week or more). Only 1.5% of respondents indicated that they never shop online (Figure 1).

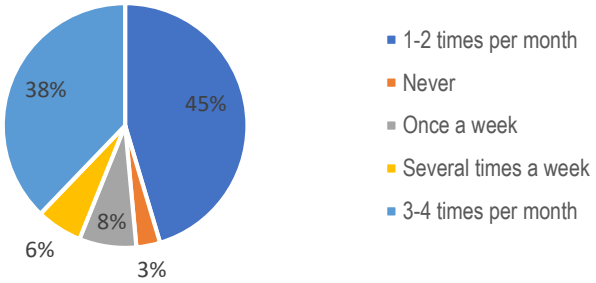

Figure 1: How often do you purchase products or services online?

Online Shopping Habits

The subjective sense of security when shopping online is predominantly positive, with 73.4% of respondents feeling mostly secure, 18.8% feeling very secure, 7% feeling insecure, and only 0.8% feeling very insecure. These results indicate a high degree of normalization of online shopping, where the majority of users feel sufficiently confident to treat the internet as a standard consumption channel rather than an exception.

Regarding the most frequently purchased categories of products and services online, respondents most often cited clothing and footwear (71.1%). To a lesser extent, they reported purchasing food and beverages, household appliances and furniture, electronics, and cosmetics and personal care products. A significant proportion of respondents (50.8%) also purchase other products or services, such as travel, education, subscriptions, and similar items.

The primary motivation for shopping online, according to the respondents, is mostly convenience and time savings (46.1%). Less frequently cited reasons include lower prices (22.7%), a wider selection of products (18%), and better access to product information (10.9%). A smaller number of respondents mentioned specific reasons, such as the product being available exclusively online or the lack of suitable physical stores (2.3%) (Figure 2).

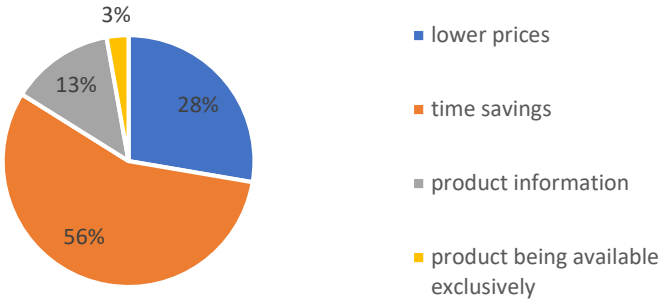

Figure 2: "What is your main reason for shopping online instead of in physical stores?"

Perceived Algorithmic Influence and Personalization

When asked whether they notice that online advertisements are tailored to their interests and activities, 57% of respondents reported noticing this very often, 35.9% sometimes, and only 7% rarely (Figure 3). At the same time, there is a visible level of concern regarding data collection for ad targeting: 43% reported moderate concern, 25% were very concerned, 21.9% slightly concerned, and 10.2% were not concerned at all.

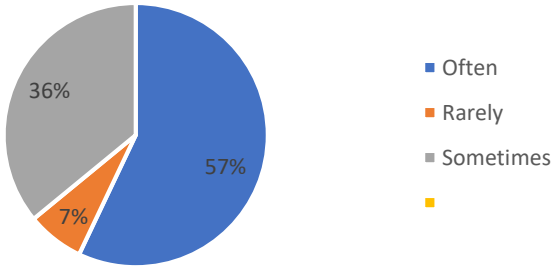

Figure 3: "Do you notice that the ads you see online are tailored to your interests and activities?"

Nearly half of the respondents (43.8%) feel that ads often appear "too precise" or highly relevant, while 49.2% experience this occasionally. Only 5.4% say this happens rarely, and no respondents reported "never." Regarding algorithmic influence on purchasing decisions, 37.5% believe algorithms have a moderate impact, 31.3% perceive little impact, 17.2% think there is no impact, and 14.1% consider the influence significant (Figure 4).

When asked which online marketing channels they notice most, social media was the dominant channel (94.5%), followed by influencer marketing (35.2%) and search engine ads like Google Ads (29.7%), while email marketing was less prominent (14.8%). SMS marketing was not observed at all. Compared to traditional advertising (TV, radio, print), a majority of respondents view digital campaigns as more effective: 70.3% consider online ads much more effective, 20.3% somewhat more effective, 7% see little difference, and only 2.4% believe traditional ads are more effective.

Regarding the influence of online marketing on consumer habits, 45.3% of respondents feel it has a moderate effect, 34.4% a minor effect, 11.7% a significant effect, and 8.6% perceive no impact at all

(Figure 4). Chi-square analysis revealed a statistically significant association between the perceived impact of digital marketing on purchasing habits and the perception that algorithms influence buying decisions (χ^2, $p = 0.00059$). Respondents who acknowledge the effect of digital marketing on their habits are more likely to perceive algorithmic influence, indicating that awareness of personalization affects perceptions of autonomy in shopping.

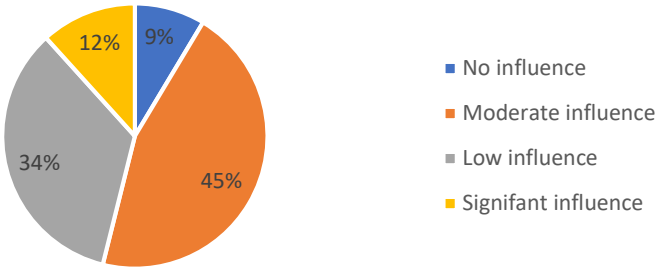

Figure 4: "Does internet marketing influence your consumer habits?"

When it comes to brand perception, 50% of respondents believe online ads sometimes influence their opinions, 28.1% say rarely, 17.2% often, and 4.7% never. Regarding impulsive purchases after seeing online ads, 43.8% report this happens rarely, 29.7% never, 18% occasionally, and 8.6% frequently. McNemar's test revealed a statistically significant difference in paired responses between perceived influence of digital marketing and impulsive buying behavior ($p < 0.001$). This indicates that respondents who perceive marketing influence show a different pattern of impulsive purchasing behavior compared to those who do not.

Influencer Marketing

Influencer marketing represents one of the most visible segments of contemporary digital marketing, particularly on social media platforms. The results indicate a divided attitude among respondents: 41.4% sometimes pay attention to influencer product promotions, 28.1% do so rarely, 18.5% never, 7.7% often, and only 3.8% always pay attention to such content.

When asked whether they had ever purchased a product or service based on an influencer's recommendation, 39.8% answered sometimes, 28.1% never, 25.8% had considered a purchase but did not complete it, and only 6.3% reported doing so often (Figure 5).

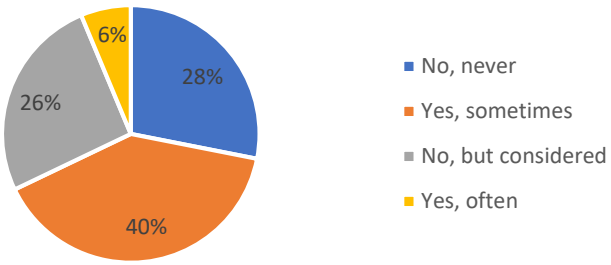

Figure 5: "Have you ever purchased a product or service based on an influencer's recommendation?"

Regarding reactions to influencer recommendations, the most common response was that respondents research the product but do not purchase it (40.0%), while others mostly ignore such content (23.1%) or do not pay attention at all (22.3%). Only 13.1% usually research and then purchase the product.

Levels of trust in influencer recommendations are notably low: 46.1% report low trust, 28.9% no trust at all, 24.1% partial trust, and only 0.8% express complete trust. Cosmetics and personal care products are the most commonly purchased categories based on influencer recommendations (42.2%), followed by clothing and footwear, food and beverages, electronics, travel, education, and subscriptions. Household appliances and furniture are the least influenced category (8.6%).

When asked what matters most in purchase decisions, 51.6% stated that seeing or trying the product in-store is most important, 34.4% indicated that none of the listed factors is decisive, 11.7% considered influencer recommendations and personal experience equally important, and only 2.3% identified influencer recommendations as the primary factor (Figure 6).

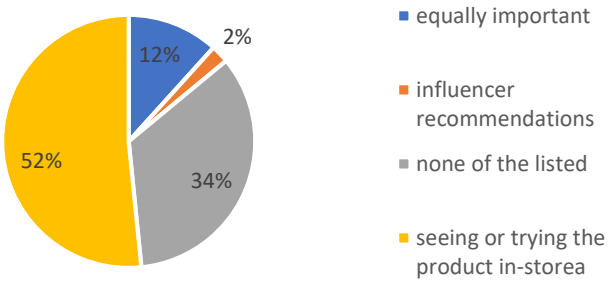

Figure 6: "What is more important to you when making a purchasing decision?"

Recommendations from Other Consumers

In contrast to influencers, recommendations from other consumers—such as reviews, forums, and comments—have a significantly stronger and more stable impact on respondents' behavior. While influencer reviews are often part of promotional collaborations, consumer reviews usually originate from independent users sharing personal experiences through ratings, comments, or forums.

When asked whether they had ever purchased a product based on recommendations from other consumers online, 60.9% answered sometimes, 22.7% often, 10.2% had considered but not purchased, and only 6.3% never (Figure 7). Combined, 83.6% of respondents reported purchasing based on peer recommendations, nearly double the share of those influenced by influencers (46.1%).

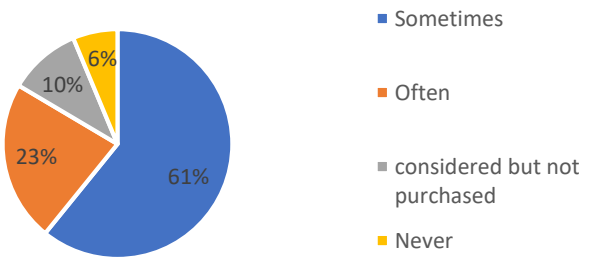

Figure 7: "Have you ever purchased a product based on recommendations from other consumers online?"

Regarding review-reading habits, 46.9% always read reviews before online purchases, 29.7% often, 18% sometimes, while only a small minority rarely (3.9%) or never (1.6%) read reviews. Concerning their last two purchases, 40.6% stated that reviews had a moderate impact, 39.2% a significant impact, 7.7% a small impact, and 11.5% no impact.

Privacy, Data, and the Perception of Surveillance

Perceptions of surveillance and data collection are highly pronounced. A majority of respondents (62.5%) believe that digital platforms excessively track their online activities, while 32.8% feel this is partially excessive. Only a small proportion believe platforms do not track them excessively (3.9%) or are unsure (0.8%) (Figure 8).

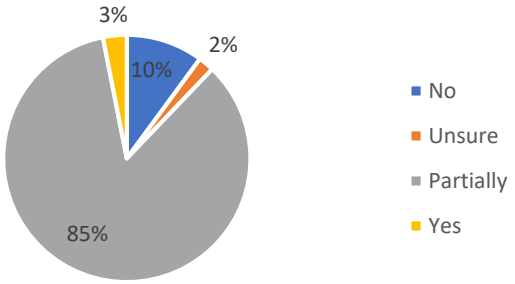

Figure 8: Do you believe that digital platforms track your online activities too much?"

Regarding the amount of data collected, 46.1% report being partially bothered, 40.6% are bothered, 10.8% are not bothered, and 2.3% have no clear opinion. A strong subjective sense of being monitored is also evident: 53.1% feel observed while using the internet, 35.9% sometimes, while only a small share report rarely (7.8%) or never (3.1%) feeling monitored.

When asked whether data collection affects their purchasing decisions, most respondents indicated that it does so sometimes (44.5%) or rarely (31.3%), while fewer reported frequent influence (14.1%) or no influence at all (10.2%) (Figure 9).

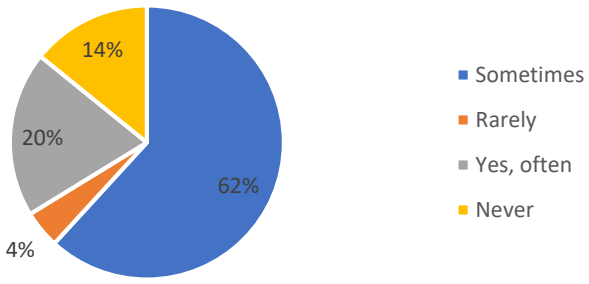

Figure 9: "Do you believe that data collection influences your purchasing decisions?"

Expected Future Developments

Regarding future trends, 40.6% of respondents believe that their shopping habits will likely depend more on online promotions than physical stores, while 30.5% believe this will probably not happen. A further 22.7% are convinced it will certainly happen, and only 6.3% believe it certainly will not.

Similarly, when asked whether algorithms will have an increasing influence on their purchasing decisions in the coming years, most respondents answered affirmatively (yes: 19.5%; probably: 42.2%), while fewer believe this will probably not (29.7%) or not at all (8.6%) be the case (Figure 10).

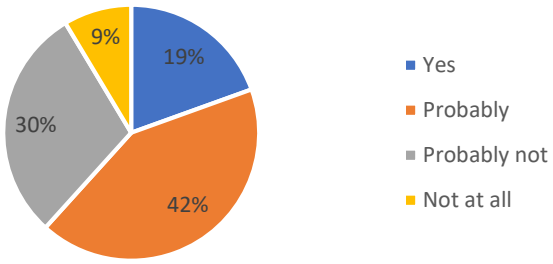

Figure 10: "Do you expect algorithms to have an increasing influence on your purchasing decisions in the coming years?"

Discussion

To gain a broader perspective on the findings, it is useful to identify consistent patterns across the sample. The participants are primarily younger adults (25–34 years) who shop online regularly and report feeling secure in their electronic purchases. The internet is used to purchase a wide range of goods and services, with convenience, time savings, and lower prices being the main motivations. These results confirm that the internet is perceived as a space of practicality, efficiency, and expanded choice, aligning with theoretical descriptions of the "digital consumer" in the contemporary platform economy (Saush et al., 2021).

The findings also indicate that consumer attention is increasingly shifting from traditional media to digital channels, particularly social media and algorithmically personalized content. Most respondents notice personalized advertisements and are aware that digital platforms track their activities, creating a sense of being "watched." Online advertisements are generally perceived as more effective than traditional formats, and digital marketing has a moderate to significant influence on consumer habits and brand perception.

Overall, nearly 80% of respondents reported that peer reviews moderately or significantly influence their purchasing decisions. Consumer reviews, including website ratings and forums, are a major source of social influence in digital marketing. Influencer marketing primarily affects lifestyle-related categories, such as fashion, cosmetics, and travel, but trust in influencers is limited, and purchasing decisions are often based on personal experience or other sources. In contrast, peer recommendations and reviews have a strong and stable impact on consumer behavior. While users express concern about data collection and surveillance, they anticipate that online promotions and algorithmic targeting will have an even greater influence on their future shopping habits.

Conclusions and recommendations

Digital marketing today functions as a core mechanism of the digital society, relying on the collection and processing of user data, content personalization, and algorithmic guidance of attention. As Zuboff's concept of surveillance capitalism explains, platforms such as Google, Meta, and Amazon turn user interactions into commercially valuable data, transforming digital marketing from a simple tool of market communication into a broader process of datafication, behavioral prediction, and monetization.

Empirical findings from Serbia indicate that users recognize personalized advertising and are aware that their data is collected. Those with higher awareness of data collection are more likely to believe that algorithms influence their purchasing decisions, while recommendations from other consumers, such as reviews and comments, are perceived as more credible than those from influencers. This underscores how digital marketing shapes not only consumer choices but also broader patterns of trust and perception.

Despite its benefits, digital marketing also raises social and ethical concerns. Algorithms rarely present neutral information, instead prioritizing content that maximizes engagement or commercial potential, which blurs the line between personalization and manipulation. Continuous monitoring and data processing have become normalized, highlighting the need for more transparent algorithms, stronger ethical standards, and regulatory measures that give users greater control over their personal data. From a legal perspective, the pervasive collection and processing of user data raise important questions about privacy rights, consent, and accountability. Strengthening regulations and ensuring that users have meaningful control over their personal information is essential to balance the power between digital platforms and individuals.

Future research could explore how these dynamics vary across cultural and demographic contexts and examine the long-term effects of personalized content on consumer behavior and social norms. A deeper understanding could also be gained by combining quantitative and qualitative approaches to capture both measurable trends and subjective experiences of surveillance. While this study provides insight into user perceptions in Serbia, its findings are shaped by the local context and the focus on self-reported experiences, suggesting that broader studies are needed to fully understand the global implications of digital marketing.

Conflict of interests

The authors declare no conflict of interest.

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Vojinović, M., & Rabrenović, D. (2025). Journalism in the Transition from the Old to the New Age. *Social informatics journal, Vol. 4, No. 2*, 98-103

UDC: 070:[316.774:004.738.5
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Journalism in the Transition from the Old to the New Age

Maja Vojinović[1*], Dragić Rabrenović[2]

[1] Faculty of Management, Sremski Karlovci, University „Union-Nikola Tesla“, Belgrade, PhD, vojinovic@famns.edu.rs

[2] Simon Fraser University, Vancouver, B.C, Canada, PhD

Abstract: Stories in magazines, articles in newspapers, television news, radio broadcasts, multimedia content, Internet platforms are types of media and therefore is the statement "the media is all around us". Because of this, many people often take media for granted and do not actively think about the information they read, see or hear. Also, there are many prejudices about journalism, journalists and editors, and they are the ones who collect, select, process and shape, and ultimately publish information through the media. This paper will explore the history of journalism, its basic definitions, journalistic codes and genres, as well as its function in contemporary society, with a particular focus on the development of online journalism.

Keywords: history, contemporary, codes, genres, online.

Introduction

The history of journalism as a profession goes back several centuries, and the first real journalists appeared in the 17th century. In that period, newspapers began to become regular publications, and journalists became key figures in a society that was in the process of modernization and democratization. In England, the first newspapers dealt with reporting on social, political and economic topics. With the advent of the press, journalism became a means of disseminating information and opinions, which influenced the formation of public opinion. One of the key moments in the history of journalism is the Enlightenment period in the 18th century, when journalism became a platform for spreading the ideas of freedom, equality and individual rights. “A few years after the abolition of censorship, at the beginning of the 18th century, the press in England experienced a real boom. Various types of papers appear: commercial, liberal, entertainment, political.

A completely new type of newspaper was the Weekly Review, which was started in 1704 by Daniel Defoe, better known today as the writer and author of the novel Robinson Crusoe” (Bjelica, Jevtović, 2006, p.46). Journalism then began to develop in a modern form, with an increasing influence on the shaping of political and social life.

*Corresponding author: Maja Vojinović, vojinovic@famns.edu.rs

Contemporary journalism

In the 19th century, with the advent of technological advances, such as the telegraph and the telephone, journalism became global and comprehensive, enabling faster and more efficient distribution of information. The modern development of journalism, especially after the digital revolution at the end of the 20th and the beginning of the 21st century, has brought drastic changes in the way journalists collect and distribute information. „Speech, letter, image, video, sound, noises and numerous messages overcome the absolute limits of the universe, so that thanks to modern means of information and communication technology, everything is possible for human senses“ (Bjelica, Jevtović, 2006, p.195). Online journalism has become the dominant form of media production. Thus, authors Bjelica and Jevtović conclude that „Internet journalism has become an explosive field in which it is most difficult to reach safe and verified information“, (Bjelica, Jevtović, 2006, p.209).

One of the most important aspects of the digital revolution in the media is the change in the dynamics of access to information. Digital media have provided users with instant access to news via the Internet, mobile applications and social networks. Unlike the press, which transmits information periodically, digital media offers continuous updates of news in real time. This speed of content distribution has set standards that traditional print media can hardly match. Another key factor is economic pressure. As advertisers move to digital platforms, print media is seeing a drastic drop in revenue. Advertising, which has been the main source of press funding for decades, has now been diverted to digital giants like Google and Facebook, whose algorithms enable precise audience targeting. This change in the financial model has forced many print publications to reorient to digital editions, often offering content for free, further collapsing the concept of paid journalism.

Definitions of journalism and its transformation

Journalism can be defined as a profession that deals with collecting, researching, analyzing and reporting on events and issues of public interest. Author of the book „Introduction to media and communications“, Miloš Babić writes that „high interdisciplinary education is important for the performance of journalistic tasks and tasks (whether it is journalism studies, culture studies, or individual disciplines such as sociology, law, economics, or more precisely all those whose mastery enables journalists to deal with certain sectors of the media sphere), (Babić, 2015, p.81). The main role of journalism is to inform the public and help in shaping opinions and behavior and enable citizens to learn about events and issues that affect their daily lives. Digital media is also changing the way audiences participate in consuming and creating news. The emergence of social networks as distribution channels created space for the so-called citizen journalism, where users not only comment and share information, but also create it themselves. This democratization of the media space has led to the growth of disinformation and the so-called fake news, which further complicates the position of traditional journalism, which insists on fact-checking and editorial responsibility. Despite the challenges, print journalism is not dying, it is being transformed. The lead, as a key element of the journalistic text, becomes a strategic key for attracting the audience's attention. It summarizes the essence of the text, sets the context and invites further reading. In the digital age, the lid must be informative and attractive, adapted to fast models of information consumption.

Numerous newsrooms are trying to redefine their role through quality investigative work, in-depth analyzes and exclusive content that cannot be easily found on the Internet. In this sense, the press is

trying to find a new value in a time when information is available to everyone, but its accuracy and credibility are increasingly being questioned.

Digital media have irrevocably changed the landscape of modern journalism. Although print media have lost their primacy as the main source of information, they still play a significant role in preserving professional standards and credible journalism. The future of print lies in the ability to adapt to the digital environment, maintain its unique value and find sustainable business models. Rather than competition, the relationship between print and digital media should be seen as a potential for synergy – where digital media expands reach and print provides quality, context and accountability.

Journalistic codes

Journalistic codes represent a set of ethical principles that regulate the behavior of journalists and journalistic organizations. These codes include guidelines on objectivity, accuracy and accountability to the public. „Journalistic codes represent a set of ethical principles that regulate the behavior of journalists and journalistic organizations. These codes often include guidelines on objectivity, impartiality, accuracy and accountability to the public. In addition, journalists undertake not to spread false information, manipulative narratives, or anything that could harm the integrity of the profession. In many countries, journalistic codes set high standards for journalistic freedom, protection of sources, and avoidance of conflicts of interest. These codes serve as guidelines for journalists to work in accordance with principles that ensure public trust and maintain professionalism“ (Donev, Vojinović, 2022, p. 279). In many countries, journalistic codes set high standards for journalistic freedom, protection of sources, and avoidance of conflicts of interest.

Codes like the BBC's from the 1920s ("No bias and sensationalism") or The New York Times' principles ("Just the facts") became the foundation of professional identity. However, today's challenges, such as misinformation on social media, require rigorous verification.

In terms of genres, the difference between short news, in-depth reports and columns is reflected in the purpose: the news informs, the report humanizes the problem, and the column offers perspective.

Journalism, despite technological changes, deals with three fundamental principles: accuracy, relevance and ethics. Throughout history – from stone tablets to algorithms – journalism has proven to be more than a craft. It is a living dialogue between society and truth. Although the techniques change, the three pillars remain the same: an ethics that imposes limits on sensationalism, a methodology that seeks 5WH even in 280 characters, and a responsibility to those who do not have a voice. As Heinrich Biel said in the 19th century: "Newspapers are a beacon in a sea of ignorance." Today, when the beacon shines through smartphone screens, that goal remains the same: to illuminate the darkness, even as algorithms try to blind us.

Journalism is not a profession that ends with the last sentence - it is a requirement that each sentence be laid as a foundation for the next question.

Journalistic genres and social networks

Journalism is divided into different genres, which are used to report on different types of events and topics. Each genre has its own specific characteristics and requirements in terms of style, tone and structure. Some of the most important journalistic genres include reporting as the most basic genre of

journalism used to convey facts about events without personal commentary or interpretation, then commentary which allows journalists to express their opinions on a certain topic, (Valić Nedeljković, Pralica, 2020). Commentators often provide in-depth analysis and interpretation of events, but must be clearly labeled as such. Moreover, interview is a dialogue between a journalist and a source, where the journalist asks questions in order to obtain information or views on a certain topic and reporting that covers broader social or political contexts and often includes research and field reporting. They have a narrative character and describe events or personalities in detail.

Analysis as a distinct genre, since it provides a deeper understanding of events, using data, statistics and contextualization to provide a clearer picture of complex issues.

Social networks play a key role in spreading information, but also in creating public opinion. Algorithms determine which content the user sees, which can create so-called an "echo chamber" in which already existing opinions are reinforced. Although they allow journalists to communicate directly with the audience, they also require greater responsibility because every published content leaves a digital trail.

The genre spectrum of journalism reflects the complexity of modern information. Traditional genres such as news, reports, interviews and reports have been expanded by digital formats that include multimedia content. Each genre has a specific function - from instant transmission of facts to in-depth analytical interpretations of social phenomena.

The structure of the journalistic text has evolved from the traditional to the inverted pyramid. While the former model implied a gradual disclosure of information, the modern approach places key information at the very beginning of the text. The 5W+H model (who, what, when, where, why and how) remains fundamental to constructing a comprehensive news report.

Digital journalism has brought revolutionary changes in the production and distribution of information. The Internet has transformed the media space - news is no longer geographically limited, the audience becomes an active participant in content production. Online platforms enable the instantaneous flow of information, but at the same time impose challenges such as authentication and combating disinformation.

Online journalism

The development of online media began at the beginning of the 90s, parallel to the development of the Internet. The first online articles were published on the static websites of major newspaper companies, as a supplement to the printed editions. In 1994, 'The Daily Telegraph' became one of the first newspapers with its own website. By the end of the nineties, more and more media moved to the Internet, and the first exclusively online portals appeared, such as 'Salon' and 'Slate'. During the 2000s there was a rapid growth of online media thanks to the wide availability of the Internet, the development of blogs and social networks. Today, online journalism dominates the information space - information is published in real time, with multimedia content, interaction with the audience and the possibility of commenting. Traditional journalism relies on print media, radio and television, where there is a clearly defined editorial process and time gap between the event and its publication. Online journalism allows for immediate news publication, with a greater degree of interaction with the audience and flexibility in format. The difference is also reflected in the dynamics of work - while traditional media are slower and focused on fact-checking, online media often publish information under pressure of speed before final confirmation, which can lead to the spread of misinformation.

Online journalism emerged in response to technological changes and the development of the Internet, which led to new forms of information distribution. Given the speed and availability of information via the Internet, online journalism has become the dominant form of journalism in many countries. „Starting with twitter, Facebook, Instagram, TikTok, news portals, web platforms and other Internet content, almost the entire world population has succumbed to the influence of an unchecked amount of content that creates human consciousness, opinion, reshapes and dictates the actions of human behavior, especially the younger population“ (Vojinović, Davidov, 2022, p.44).

Major advantages of online journalism are speed, multimedia and interactivity.The function of journalism has a key role in modern society. Its functions include informative function, control function, educational function, social function, etc. Digital journalism has brought revolutionary changes in the production and distribution of information. The Internet has transformed the media space - news is no longer geographically limited, the audience becomes an active participant in content production. Online platforms enable the instantaneous flow of information, but at the same time impose challenges such as authentication and combating disinformation.

The functions of journalism are multiple and crucial for the democratic functioning of society. The information function provides access to reliable data. The critical function enables questioning of government decisions. The educational function raises the level of public awareness. The integrative function strengthens the sense of community. The control function acts as a mechanism of public supervision over institutions of power.

Conclusion

Throughout history, journalism has been key to conveying information - starting with ancient systems like the Roman Acta Diurna, where news was carved in stone, to today's instant sharing of articles via social networks. This profession developed as a response to the human need for accurate and fast information, but also as a tool to control the powerful. From the first printed newspapers in the 15th century to the explosion of digital platforms, its role remains clear: the collection, verification and distribution of facts. Journalism is a profession with deep roots in history and an important function in modern society. Through its ability to inform, educate, control government and connect people, journalism plays a key role in maintaining democracy and freedom. Considering the faster development of technology and the emergence of online journalism, this profession continues to develop, facing new challenges and opportunities.

Online journalism is more than just the transmission of information over the Internet – it represents a fundamental change in the way we experience, analyze and share news. It allowed us to get information faster than ever, to participate in discussions ourselves and to be part of the global information flow. However, this freedom also carries responsibility – both for the media and for us as users. At a time when the line between accurate information and manipulation is getting thinner, it is crucial to develop media literacy, critical thinking and journalistic ethics. The future of online journalism will depend on the ability to use technology for the benefit of society, without compromising the truth. Only in this way will journalism remain a pillar of democracy in the digital age. Further technology development is expected – artificial intelligence and automation are already being used to generate short news stories, while virtual reality (VR) and augmented reality (AR) are being explored as new ways of presenting information. Ethical issues, the fight against misinformation and the preservation of professional standards will become even more significant challenges. The question of where journalism begins is becoming increasingly complex.

The once clear boundaries between professional journalists and the public are disappearing. Every smartphone, every social network, is a potential source of information. Professional journalists must now navigate through this complex information environment, preserving the principles of professionalism and ethics. „People must be an active parameter and factor in the creation of information, both through their work and mutual relationships and communication. People who participate must know what is happening now but also predict what will happen in the future“ (Davidov, Vojinović, 2025, p.56).

The future of journalism will not be defined exclusively by technologies, but by values. The ability to find the truth, provide context, and serve the public interest are key imperatives that transcend all technological change. Journalism remains a critical mechanism of a democratic society, a bridge between facts and their meanings.

Conflict of interests

The authors declare no conflict of interest.

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